(NATIONAL TRANSCONTINENTAL INVESTIGATING COMMISSION: EVIDENCE TAKEN IN TRANSCONTINENTAL OFFICES, NOV. 28th, 1912.)

COLLINGWOOD SCHREIBER, sworn:—

By Mr. Gutelius:

Q. You were consulting engineer to the Government in the year 1905?—A. Yes.

Q. Did you make an estimate in 1903?—A. Yes.

Q. For the construction of the line of railway between Winnipeg and Quebec?—A. Yes.

Q. What was the average price per mile that you estimated?—A. Between Quebec and Winnipeg, $28,000 per mile.

Q. Did you make an estimate of the probable cost of the railway between Quebec and Moncton?—A. Yes, $25,000 per mile.

Q. What character of railway did you have in mind in making these estimates?—A. I made an estimate for a line such as is subsidized in Ontario by the Dominion Government, with grades less than those upon the Intercolonial, which I based at one per cent—that is 52.80.

Q. And the sharpest curvature would be ten degrees?—A. No, I think it was six degrees.

Q. You would have used wooden trestles?—A. Yes.

Q. And practised the ordinary economies in such railways, as the Canadian Northern have built?—A. Yes, very much the same. My view with regard to that is this: that where the cost of taking in material for permanent structures, and so forth, is considerable, not to introduce those at the outset, but to wait until the traffic develops, some years afterwards: in the meantime to build comparatively what you might call a temporary road: that is to say, with wooden trestles and wooden culverts.

Q. Do you, in the light of your subsequent knowledge believe that such a railroad as you have described could have been constructed between Winnipeg and Quebec for $28,000 per mile?—A. I am still of that impression.

Q. Are you still of the same impression in connection with the line between Quebec and Moncton?—A. I am.

Q. If the railway as constructed cost more than the figures which you have named, it was because they used lower grades and more permanent structures?—A. It was brought about by introducing steel bridges over the large rivers. I am speaking more of the west than I am of the east.

Q. You are speaking of District F?—A. Yes.

Q. So far as you have examined it?—A. Yes, and I have estimated for 65 pound rails, the same as were on the I.C.R. at that time.

By the Chairman:

Q. By the introduction of steel bridges?—A. By steel bridges and putting in permanent structures and concrete, and also, I may say, by the increased cost of labor, although I think I could build one now for that price.

By Mr. Gutelius

Q. To whom did you give these estimates to which you refer?—A. 12th July, 1903; this is the estimate.

Q. On the 12th July, 1903, you gave this estimate to Mr. Fielding?—A. Yes. Understand, I did not give it in writing to Mr. Fielding. There is a letter from him to Mr. Emmerson subsequently.

Q. From this statement I notice that you advised Mr. Fielding that a railway with maximum grades of one per cent. you could build from Moncton to the south approach of the Quebec Bridge for $25,000 a mile?—A. That is still my impression.

Q. And from Quebec to Winnipeg $28,000?—A. Yes.

Q. Did you advise him in connection with adding 25 per cent. to those figures for reducing these grades to four-tenths?—A. No, I did not.

Q. Did it not strike you that when Mr. Fielding added 25 per cent., and proposed to construct a four-tenths grade, that he was making a very low estimate for this additional facility?—A. Yes.

By the Chairman:

Q. You have been in the Government service of Canada for a great many years?—A. Yes, over forty years.

Q. And you have had a large experience in the construction of railways in this country?—A. I have been connected with the construction of railways since 1852 in Canada.

Q. Had you any experience in the construction of the C.P.R.?—A. Yes, I was chief engineer for the Government during the construction of that.

Q. And had you any experience in connection with the Intercolonial?—A. Yes, I was deputy chief engineer—that is, assistant chief engineer, I suppose you call it now,—during the construction of that road part of the time, and was also Commissioners' agent.

Q. And in connection with your duties as chief engineer for the Government on the C.P.R. construction, did you traverse that country?—A. Yes, I did, very frequently.

Q. So that you had a personal knowledge of the topography—not from going over it on a railway train, but from going over it as an engineer—of the country lying between this and Winnipeg?—A. Between this and Winnipeg, did you say?

Q. Yes?—A. Yes, along the line of the survey.

Q. Now, when the Government proposed to undertake the construction of a Transcontinental railway from Moncton to Winnipeg, did they consult you in the beginning?—A. They consulted me with regard to the cost of the road.

Q. Who consulted you?—A. Mr. Fielding.

Q. Can you recall the interview between you and Mr. Fielding?—A. My impression is that I informed him that there was no difficulty in building such road as I described between Moncton and Quebec at the figure I named; that I was somewhat familiar with that country.

Q. That country was not an unknown land to you?—A. No.

Q. Had you traversed some of the country through which the line was expected to be built?—A. I cannot say that altogether, although I had before me surveys of lines that had been made through there.

Q. Then you had the information which a chief engineer usually has, when advising a builder of a road concerning that country, at all events?—A. Yes, I think so.

Q. You had a general knowledge of it?—A. Yes.

Q. Derived from your own personal experience and from surveys made through that territory?—A. Quite so.

Q. Had you, when giving that advice, information sufficient to your own satisfaction, to advise the Government on it?—A. Yes, I had. I am speaking now between Moncton and Quebec.

Q. I am confining the question to east of the St. Lawrence River?—A. Yes.

Q. Did Mr. Fielding know that you had that information? Did you discuss it with him?—A. I have discussed it with him.

Q. Then Mr. Fielding also consulted you as to the construction of the railway through Northern Quebec and Northern Ontario to Winnipeg?—A. Yes.

Q. That was an unsurveyed country, was it not?—A. Partially so.

Q. Was the Quebec section unsurveyed?—A. Yes, it was unsurveyed.

Q. Perhaps it would be better if you would tell me what portions of that country were surveyed that you know of?—A. Well, the Quebec and Lake St. John road had been surveyed for the portion of it from Quebec. Then there was a portion from the end of their surveys which I was not familiar with, and which I had very little information upon, and I stated to him that if they ran along the summit I thought it could be built for that, and then again about Cochrane, from that neighborhood, I based it upon the information I had from surveys and reports made by Sir Sandford Fleming, then Mr. Fleming. So far as my estimate is concerned, I assume all responsibility.

Q. I want to show from you exactly what information the Government had when it asked those estimates to be made; will you tell me how far the exploration by surveys had been made west of Quebec?—A. I could not tell you off hand.

Q. Can you tell me approximately how far that St. John railroad had been surveyed? Was it as far as La Tuque?—A. Oh, yes, I think so, beyond that; it was not under the name of the Quebec and Lake St. John railway that the surveys were made; it was under some charter that Mr. Scott had for the Transcontinental railway.

Q. Are those surveys in the Government's possession now?—A. Not in the Government's possession; they were in the possession of the local government, I presume.

Q. Were they before you at the time?—A. No, they were not; I had seen them, but they were not before me at the time.

Q. Had you gone over them and examined them?—A. Well, that I would not be positive about; I could not state positively as to that.

Q. Was it not a fact that you just had a general knowledge of what the surveys were?—A. I think so.

Q. There was no survey then, or reconnaissance made of the country from the end of that St. John survey as far as Cochrane, was there?—A. Not to my knowledge.

Q. Then from Cochrane do you say there had been a survey made?—A. Several surveys made in that neighborhood, from that neighborhood to Port Arthur, and through to Winnipeg.

Q. Had you examined those surveys?—A. I had examined the reports frequently.

Q. Are the reports in the possession of the Government?—A. They are in the Department of Railways and Canals.

Q. Whose reports are they?—A. All under Sir Sandford Fleming. I can give you the printed documents, if you want them.

Q. The road which you have explained to us that you expected to be built—did you discuss that with Mr. Fielding?—A. No, I think not.

Q. Do you think he appreciated what sort of road you proposed to build?—A. Oh, he did, undoubtedly, because he states that, and he would not deny that.

MR. GUTELIUS: He states in his letter of May, 1904, to Mr. Emmerson, with reference to this: "These estimates were made for a road of an ordinary character, such as constructed elsewhere," etc.

By the Chairman:

Q. Has this letter ever been published?—A. I could not tell you.

Q. You produce a copy of a letter from Mr. Fielding to Mr. Emmerson, then Minister of Railways and Canals, dated 11th May, 1904, in which Mr. Fielding says that he consulted you, and that your opinion was that a road could be constructed from Quebec to Moncton for $25,000 a mile and from Quebec to Winnipeg for $28,000 a mile. "These estimates were made for a road of an ordinary character, such as is constructed elsewhere. In order to make a sufficiently liberal allowance for a road of better character, I added 25 per cent., making the estimate $31,250 per mile from Quebec to Moncton, and $35,000 per mile from Quebec to Winnipeg. I have not spoken to Mr. Schreiber on the matter of late, but from other experienced railway men I have received assurances that my estimate was a most liberal one and the road could be constructed well within these figures." The account there of the interview with you is correct, is it?—A. Yes.

Q. What sort of a road could Mr. Fielding have expected to build by adding 25 per cent to your estimate in your judgment?—A. Well, that is a little difficult question to answer, what he had in his mind as to what class of road he would build.

Q. What class of road do you think you could build for $31,250 from Quebec to Moncton?—A. I suppose he intended to reduce the grades; no doubt they could have been reduced, but not to the extent which has now been done.

By Mr. Gutelius:

Q. That is, if your estimate would call for one per cent grades, his might be for nine-tenths?—A. Or something of that kind.

By the Chairman:

Q. Would the same apply in building a road to cost $35,000 a mile from Quebec to Winnipeg?—A. Quite so.

Q. Before undertaking to build a great railway such as the Transcontinental between Moncton and Winnipeg, should not the Government have had a proper survey made of it from one end of it to the other?—A. It would have been much more desirable, of course.

Q. Was it not the part of ordinary prudence to have had that done?—A. Yes, I think so, although it is not always done.

Q. But no person, to your knowledge, has ever undertaken to build a railway of this character and completeness before in America, have they, without doing that?—A. No, I think not.

Q. And when people undertake to build a railway, without first providing themselves with full information, they usually do not contemplate spending such great sums of money as was necessary to spend on this road?—A. It all depends upon the standard established.

Q. You take more risks on a cheap standard than on a high standard, would you not?—A. Oh, certainly.

Q. Had the Government, so far as you know, taken any pains or any steps to acquire information as to the character of this country, before it committed itself to the building of this line?—A. So far as I am aware, nothing beyond what I have stated.

Q. Do you know of any other engineer having been consulted by the Government than yourself?—A. Not that I am aware of.

Q. Because Mr. Fielding says in his letter to Mr. Emerson, "I have not spoken to Mr. Schreiber on the matter of late, but from other experienced men I

have received assurances that my estimation—that is, the adding of the 25 per cent to your estimate—was a most liberal one, and the road could probably be constructed well within those figures"?—A. I do not know whom he consulted.

Q. If he had consulted you, you would not have confirmed that estimate, would you?—A. No, I would not.

Q. You were then in Ottawa, and in the Government service?—A. That was my headquarters.

Q. Were the specifications for the construction of this road submitted to you?—A. I think they were.

Q. And by whom were they drawn?—A. Personally, I do not know, excepting from what I have heard; I have heard by Mr. Butler and by Mr. Woods.

Q. Mr. Butler was then Deputy Minister of Railways and Canals?—A. Yes, Chief Engineer of Railways and Canals and Deputy Minister of Railways and Canals.

Q. And Woods was what?—A. He was the Assistant Chief Engineer of the Grand Trunk Pacific Railway Company.

Q. Did you discuss the clauses in the specifications relating to classification with Mr. Butler?—A. No.

Q. Were you asked specially to pass on these clauses at all before they were adopted?—A. My impression is that the specification was put before me to examine and approve or disapprove, but I have no copy in my office, so that I cannot speak of it positively.

Q. You approved of them?—A. I think so.

Q. After these specifications had been adopted, you know there arose some question as to the proper construction?—A. Of the clauses, yes.

Q. Of the clauses relating to classification?—A. Yes.

Q. And you know that the engineers, specially in Quebec, put a construction upon the first clause—that is, clause 34—with which Mr. Lumsden did not agree?—A. Yes.

Q. Do you know that Mr. Lumsden construed that clause 34, which is the one relating to solid rock excavation, so as to exclude from solid rock excavation everything which was not rock?—A. Yes.

Q. Would you agree with that?—A. Everything which was not rock certainly would be excluded.

Q. And afterwards Mr. Lumsden tells us that he was shown the opinions of several eminent counsel, obtained by the contractors, to support their contention respecting the construction of these specifications, and that, as the opinions differed from him, and as the Commissioners differed from him, that he was brought to make a modification of his own views of the specifications; did you know that?—A. I knew that eminent counsel had submitted their views with regard to the specification, but I did not know that he had modified his views.

Q. He tells us that he did, and I think in the Lumsden enquiry he said he did; he is made to modify his views so as to include in the classification material which was not solid rock, when mixed with solid rock; that is, the matrix in which the rock lay?—A. Do you refer to what he calls assembled rock?

Q. I do.—A. Yes, I was aware of that assembled rock, but I did not know he did not agree about it before.

Q. Do you know that he at first contended that even in assembled rock none of the interstitial material should be classified as solid rock?—A. No, I did not understand that. What I understood by his assembled rock, that it was fragments of rock, cemented together in bodies of not less than a cubic yard.

Q. What did you understand him to mean by cemented together? Was it really cemented together by fused material?—A. No, not that exactly; that could not be separated with a pick and bar.

Q. Cemented gravel could not be separated in that way?—A. No, but that is specified under another clause as to what it shall be.

Q. You do not understand, then, that he excluded from solid rock any material which was not rock?—A. In the sense in which I tell you, yes. I made him a sketch of it. I understood it was solid rock when it was fragments of rock cemented together.

Q. If those fragments were separate, they would be loose rock, would they not?—A. Yes.

Q. And if that material was separate, it would be loose rock?—A. Yes.

Q. So that you take two classes of material, each of which is loose rock, and, together, they make solid?—A. It would be the cementing together that would make it solid rock.

Q. You were over the line, were you not?—A. I was a number of times.

Q. Did you ever see anything on the line, any material which would be classified as cemented rock?—A. I think in one or two instances; it may have been only one; I cannot call to mind where it was, but I think there were one or two places.

Q. Real assembled rock would be a very rare bird on this line, would it not?—A. Yes, very indeed.

Q. And what portion of the line did you go over?—A. I went over from Winnipeg the whole way down to about 20 or 30 miles below Quebec.

Q. And you only say in one or two places any material which you would classify under assembled rock?—A. That is my recollection.

Q. Then the assembled rock was not a very serious matter in your view, if the classification was properly applied?—A. No, I think not.

Q. Did you go over the McArthur contract?—A. Yes.

Q. For what purpose?—A. We went over it in connection with the arbitration. I was the third arbitrator, I may say. I went over it first by orders of the Government, to see whether the statements of the engineers were correct that their line between Winnipeg and Graham would be ready for operation before the branch from Graham to Fort William.

Q. And you also went over it as the third arbitrator in an arbitration between the G.T.P. and the Government?—A. I did; I was third arbitrator.

Q. Did you see anything to criticize in the way the work was done?—A. A good deal.

Q. Will you tell us some of it?—A. With regard to classification and overbreak.

Q. What did you object to in the classification?—A. That it was very largely overestimated; the classification was higher that it should have been, very largely.

Q. And the overbreak?—A. As to the overbreak, I was under the same impression, especially in the McArthur contract.

Q. Was there any other matter?—A. There was unnecessary overbreak, I think, in O'Brien and somebody's work.

Q. But you particularly objected to the classification and overbreak on the McArthur contract?—A. Yes.

Q. You thought they were— A. Excessive.

Q. And did you go over the railroad west of the St. Lawrence River?—A. Yes.

Q. Through the Province of Quebec?—A. Yes. Well, I did not go over the whole of it; I went over it from where the work was in operation to Quebec; that is all.

Q. What did you think of the classification between Quebec and La Tuque?—A. Well, it was overclassified there, but not to the same extent, I think, that it was on the McArthur contract.

Q. Was there any overbreak? Did you think the overbreak was excessive?—A. I did in one or two cases particularly.

Q. Were you through New Brunswick with the idea of examining the classification?—A. I was not through the New Brunswick line, as far as I remember.

By Mr. Gutelius:

Q. Did you make a study of the advisability of constructing a new line through New Brunswick paralleling the I.C.R.?—A. No, I never had any discussion with the Ministers about it.

Q. You would not have recommended it, would you?—A. No, I would not.

Q. In the matter of classification, the plough test shown under loose rock was intended to be in your judgment a test of hardness?—A. Undoubtedly so.

Q. Did you have anything to do with the preparation of the book of instructions to engineers on the N. T. R.?—A. No, nothing whatever.

Q. Did Mr. Lumsden make it clear to you, when discussing the assembled rock feature, that there was a controversy between him and the Commissioners on that clause? Did he make you feel that it was a very important matter?—A. Oh, yes, I think he did, but I do not remember any great discussion about it.

Q. You do not recall that he really felt that he was compromising between his judgment and the judgment of other people when he agreed to that?—A. No. Evidently he must have brought the matter up before me, because I made that diagram, which I referred to, so that it is pretty clear, although I do not remember what was said at the time, but it is evident he must have done.

Q. He advises us that this assembled rock feature was really a compromise between contending parties, himself on one side and the contractors and the Commissioners on the other, and that, after they failed to agree, they asked him to go and see you and arrive at some conclusion in which you would concur?—A. I have no doubt that sketch originated from that.

Q. Did you discuss this sketch with anyone other than Mr. Lumsden at that time?—A. I think not.

Q. And if you did discuss it with Mr. Parent, you would have remembered it?—A. Oh, I would have remembered it.

(NATIONAL TRANSCONTINENTAL INVESTIGATING COMMISSION: EVIDENCE TAKEN AT THE TRANSCONTINENTAL OFFICES, OTTAWA, NOV. 27TH, 1912.)

W. F. TYE, sworn—

By Mr. Gutelius:

Q. Will you tell us, in short form, your experience in railway work?—A. I began on railway construction on the Canadian Pacific in 1882, and was employed on the construction of the main line and some of the branches until the main line was completed in, I think, the end of 1885, or early in 1886, I forget which. From there I went to what is now the Great Northern Railway, which was then known as the St. Paul, Minneapolis and Manitoba, and I was employed first on grade reduction out of Minneapolis: afterwards on the location of what is now known as the Montana Central: that is their line from Havard to Bute, Montana. It is a little hard to remember exact dates.

Q. Just give them roughly?—A. I was with the Great Northern for two years. I then went to Mexico and was employed on the Tampico branch of the Mexican Central. I was engineer of track-laying and bridging, and acting road-master of a portion of the road. I left this road after about a year and returned

north, and went to the Great Falls and Canada Railway Company as locating engineer and division engineer on construction. This road ran between Great Falls, Montana, and Lethbridge, Alberta. I had charge of all the location on the American side, and about half of its construction, and was employed about a year on this. I then went back to the Great Northern on the Pacific extension, and located all the road on the west side of the Cascades, including their long tunnel about 2 1-2 miles. On the completion of the location I was employed as division engineer on the construction of the mountain section. I was employed in the neighbourhood of two or three years on this work. I then went to Lethbridge, and was engineer in changing the gauge of the Alberta Railway and Coal Company's road, now a part of the C.P.R. between Dunmore and Lethbridge; afterwards made a location for a projected line between Lethbridge and Macleod. I then went to Kaslo in the interests of the Great Northern, and was for a time Chief Engineer of the Kaslo and Slocan, and afterwards went to Rossland, and was chief engineer of what was first known as the Trail Creek Tramway, and afterwards as the Columbian Western Railway, between Trail and Rossland and Trail and Robson. On the completion of this road I went to the Canadian Pacific. As chief engineer of the Columbian Western I had charge of the surveys between Robson and Penticton, and the construction between Robson and Midway. On the completion of this road I was made chief engineer of construction of the Canadian Pacific, and in 1902 was made assistant chief engineer of the whole system of the Canadian Pacific, and in 1904 I was made chief engineer of the whole system, where I remained till 1906. Since that time I have been engaged in consulting practice.

Q. In the matter of the various problems which this Commission has placed before you, your attention was first called to Instructions to Engineers, a book issued under the authority of the chief engineer, Mr. Lumsden, dated January, 1907?—A. Yes.

Q. Your attention is called to section 29 of these instructions, where it says: "Every effort will be required to secure a level track at stations for 2200 feet each side, particularly at terminal points, water stations, and so forth." Under no circumstances will the water tank be placed in a sag"?—A. Yes.

Q. Are you familiar with this?—A. Yes.

Q. Do you believe that 2,000 feet of level on each side of a station is necessary?—A. At the ordinary stations and water tanks, where freight trains stop but a few minutes, there is no necessity whatever for 4,000 feet of level, and, unless on a maximum grade, no particular change in the grade is required, except that the best available location as to grade should be chosen, provided it is otherwise suitable. On ruling grades every stop should be compensated for. The amount of this compensation depends on a variety of things; the importance of the station, the length of time freight trains will usually stop, the location relative to the maximum grade, whether near its head or at its foot, stops at or near the foot of a ruling grade being the worst, the amount of maximum grade on the section. The compensation is provided not only to take care of the starting resistance, which may at times be greater than the rolling resistance, but also to permit trains to rapidly increase their speed.

Q. What is the rule in regard to compensation for stops on ruling grades?—A. The Canadian Pacific rule regarding compensation for stops on ruling grades is as follows:—

"Train stops on ruling grades should be compensated according to proportion of ruling grade to length of section, varying from zero to 10 feet. If ruling grade one way is 70 per cent, compensate stops at zero."

Q. That is, you will provide no compensation if 70 per cent of an engine section is on a ruling grade?—A. That is right.

Q. Explain the rule?—A. This means that if the engine section should be, say 100 miles in length, and if 70 miles of that is ruling grade: that is, four-

tenths in case of eastbound traffic on the Transcontinental; and the balance less than four-tenths, then the train must be made so light in order to make time over the section that they can easily start such trains on the ruling grade. The rule continues—

"If ruling grade one way is 40 per cent of section, compensate stops at five feet."

This means that in the length of the side track the grade must be made five feet flatter in its whole length than the ruling grade would call for.

"If ruling grade one way is 10 per cent of section compensate stops at 10 feet."

By the Chairman:

Q. The siding in which the train runs must be ten feet flatter?—A. Yes. For instance, we will assume a side track 4,000 feet long: if this were on a straight line and on the ruling grade, the difference in elevation between one end of the side track and the other would be 16 feet. This rule requires this rise to be reduced to six feet.

By Mr. Gutelius:

Q. I understand that the rules which you have given for the Canadian Pacific apply to that portion of the railway which is built with four-tenths grades?—A. Yes.

Q. With reference to the instructions of the National Transcontinental, they do not refer in any way to ruling grades?—A. No.

Q. Then, if these instructions were followed where grades are less than ruling grades, the additional cost for following these instructions would not be justified?—A. No.

By the Chairman:

Q. When you speak of ruling grade, you mean the general grade of the railway?—A. No, you mean that particular grade on the section which limits the haulage capacity of the locomotives.

By Mr. Gutelius:

Q. With reference to section 26 of these instructions, which says:

"The maximum curve on a level shall not exceed six degrees, radius 955 feet. This curve should be used sparingly, and only when the topographical conditions prohibit an easier grade."

Do you believe it a wise policy to adhere strictly to such a rule, or, in exceptional cases, do you believe sharper curvature might be used? You might state fully your views on this subject?—A. I believe that such a general rule is a wise one, but I also believe it should, in exceptional cases, be departed from, where the saving in using an eight, or even a ten degree curve, would be large. The questions to be considered in deciding on the sharpest curve which may be used are: cost of maintenance and operation: effect on speed: effect on haulage capacity of locomotive: limiting effect in the use of certain equipment; greater danger of sharp curvature. The use of sharper curvature does not increase the cost of maintenance or operation: that is, a mile of track made up of 100 degrees (or 1,000 feet) of 10 degree curve, the balance tangent, is no more expensive to operate or maintain than one made up of 100 degrees (or 5,000 feet) or 2 degree curve, the balance tangent. Any difference is probably in favor of the sharper curvature.

Q. What is the effect on speed?—A. The effect on speed, on a long line like the Transcontinental, is of no importance whatever where a few sharp curves only are used. The safe speed on curves, properly equipped with tie plates properly lined, surfaced and gauged, and provided with easement curves, depends on the total allowable elevation of the outer rail. If the maximum be set at six inches, the safe allowable speeds for different curves would be: Three degrees, 60 miles an hour; four degrees, 50 miles an hour; five degrees, 45 miles an hour; six degrees, 40 miles an hour; eight degrees, 35 miles an hour; ten degrees, 30 miles an hour; fifteen degrees, 25 miles an hour. The present Canadian Pacific Imperial Limited makes the run from Montreal to Winnipeg, a distance of 1,421 miles, in practically 48 hours, at an average speed, including stops, of a little less than 30 miles an hour. A speed of 30 miles an hour is quite safe on 10 degrees curves. By quite safe, I mean it is easy riding and no perceptible shocks to the passenger. Therefore, there is no objection, with such trains, to 19 degrees curves on account of speed. The Twentieth Century Limited, between New York and Chicago, makes the run of 980 miles in 20 hours, or at an average speed of 49 miles an hour, including stops. In the present condition of railroading, it would not be safe, and certainly would not be advisable, on such a long run as that between Quebec and Winnipeg to exceed an average speed, including stops, of 40 miles per hour. If we assume an average running speed of 45 miles per hour, exclusive of stops, and a ten degree curve so long that the average speed must be reduced for a mile—and I may say that such a curve would be very exceptional indeed—the loss in time in reducing from 45 miles per hour to 30 miles per hour would be only sixty-seven hundredths of a minute. One hundred such curves would only mean a reduction in the running time between Quebec and Winnipeg of one hour. Such a loss of time on such a long journey has no value whatever.

Q. And if a greater speed were required it could easily be provided for by cutting out a number of country stops, or introducing quicker methods of taking water?—A. Yes.

Q. What is the effect on haulage capacity of locomotives if sharper curvature be used?—A. The standard compensation for curvature on grades on this continent is 0.04 feet per degree for 100 feet. This is the rate as authorized in section 27 of the "General Instructions" issued by the Commissioners of the Transcontinental Railway. It is believed by the great majority of engineers and railroad men that this rate is too high, but at all events, it is high enough. A 10 degree curve on the level has, therefore, the same limiting effect on the haulage capacity of a locomotive as has a 0.4 per cent grade on a tangent. All limiting effects on the haulage capacity of locomotives on 0.4 per cent ruling grades can be eliminated by making the grade on the curve level. 10 degree curves are, therefore, not limiting, as far as haulage capacity of the locomotives are concerned.

Q. Does a 10-degree curve have any limiting effect upon modern rolling stock?—A. All modern locomotives and cars can safely traverse curves as sharp as 14 degrees, without any extra precautions; with guard and hold-up rails they will safely traverse curves as sharp as 22 degrees. 10-degree curves are not, therefore, limiting as far as equipment is concerned.

Q. What would you say as to the relative danger between six-degree and ten-degree curves?—A. The relative danger in the use of curves on a railway is wholly one of speed and the condition of the track; and curves as high as 15 degrees, or even 20 degrees, are quite safe, if in proper alignment and surface, and the speed is reduced to the safe limit.

Q. What would you say, generally, then, in connection with the use of curves sharper than six degrees on the Transcontinental Railway, where a considerable amount of money might have been saved in original construction?—A. Curves as sharp as 10 degrees do not add to the cost of maintenance and operation, and are not more dangerous, at the proper speed, than flatter curves. They are not limiting as to the haulage capacity of locomotives, or to the character of

the equipment. They are not limiting as to the speed of trains of a class equal to the C.P.R. Imperial Limited, and are only limiting as to time when the maximum allowable speed will be used, which certainly will not be for years. The limiting effect at that time will be so small as to have no appreciable effect on the road. On the other hand, as such a curve—unlike a steep grade—is not limiting in its effect, the use of one such curve does not justify the use of another. Their free use would undoubtedly depreciate the character of the road. Each case must be decided solely on its own merits, and only because the use of the sharper curves would result in a large saving.

Q. Then would you have recommended a modification in this original instruction concerning a maximum degree of curvature?—A. The rule is a reasonable one to be included in the General Instructions, but it should have been modified by a circular to the effect that where the use of curves sharper than 6 degrees would result in a large saving, surveys should be made and detail estimates submitted, showing the amount of such saving: no curve sharper than six degrees to be used without the express sanction of the chief engineer in each case.

Q. Would any large saving have been effected had this latitude been given in the construction of this railway?—A. There cannot be any doubt that in rough crooked country this rule, rigidly adhered to, especially in connection with the rule making the minimum length of tangents between the ends of easement curves 300 feet, must have resulted in tremendous expenditures that have absolutely no value whatever.

By the Chairman:

Q. What is a tangent?—A. A straight line.

Q. A straight line lying between the curves?—A. Yes.

Q. And so when one speaks of a tangent on a railway, he means a straight line?—A. Yes.

Q. A circular is 360 degrees?—A. Yes.

Q. And the more degrees there are in that curve, the sharper that curve is?—A. The more degrees there are in 100 feet of that curve, the sharper the curve is; that is, in speaking of a six-degree or eight-degree or ten-degree curve.

Q. When you speak of a six-degree curve, you mean there are six degrees in 100 feet of that curve?—A. Yes.

Q. And when they speak of the number of degrees in a curve, they are speaking of 100 feet of the curve?—A. Not quite. When they speak of the degree of a curve, it means the number of degrees in 100 feet.

By Mr. Gutelius:

Q. The number of degrees of central angle in 100 feet of a curve?—A. Yes.

By the Chairman:

Q. When you speak of a six-degree curve being preferable to a ten-degree curve, you do so because a six-degree curve is flatter than the ten-degree curve, and a ten-degree is sharper than a six?—A. Yes.

By Mr. Gutelius:

Q. Are ten-degree curves used on the main lines of important Canadian railways?—A. Yes.

Q. You have ridden over such curves at rates in excess of those mentioned in your evidence?—A. Yes, frequently.

Q. And did not feel that you were going in the ditch, either?—A. No.

By the Chairman:

Q. Trains often go at a higher speed that laid down in the rule?—A. Yes.

Q. The rule leaves a large margin of safety, does it not?—A. Yes.

By Mr. Gutelius:

Q. Ten miles an hour is considered reasonable excess speed over a track that is elevated for a given speed?—A. Yes.

Q. That is, a curve elevated for 45 miles an hour can be traversed by a train at 55 miles an hour, and, whilst you recognize that you are traversing a curve, it is not dangerous?—A. No.

By the Chairman:

Q. A train may exceed the speed laid down in the rule by ten miles an hour with safety?—A. Yes.

By Mr. Gutelius:

Q. You referred a moment ago to the length of tangent between curves?—A. Yes.

Q. You have handed in a copy of a circular letter, dated Ottawa, June 8th, 1906, signed D. MacPherson, assistant chief engineer?—A. Yes.

Q. You have noted the last clause of the letter which says "In special cases, where it would result in a large saving in cost of construction, tangents may be a minimum length of 300 feet between ends of easements, but this minimum must on no account be reduced". You understand that in the original instructions this length of tangents between curve easements was given as 600 feet, and MacPherson's letter reduces it to 300 feet. Do you believe it is good engineering practice to insist on even a minimum of 300 feet between the ends of easement curves?—A. I do not. On the contrary, I believe it is very bad engineering. Easement curves are used for the purpose of preventing shock to the train, caused by the sudden change in direction in passing from a straight line to a curve, and to permit of the elevation of the outer rail to be gradually increased. Spiral, or easement curves, have an infinite radius at their commencement. The radius is gradually reduced from the point of commencement to the point where the easement curve coincides with the regular circular curve. Or, in other words, the curve starts as a straight line, and is generally sharpened until it reaches the point where it merges with the circular curve, where it is of the same degree. At the same time the elevation of the outer rail is gradually increased, being zero at the point of commencement of the easement curve, and the full amount required where the two curves merge. With good alignment there is no perceptible shock in entering or leaving a curve.

Q. By good alignment, you mean the surface given by the trackmen, and the removal of small kinks, that is in the hands of the trackmen?—A. Yes.

Q. With curves spiralled in this manner, is there any objection to bringing the points of spiral closer together?—A. No. The objection to ordinary reverse curves—that is, curves which, at a point, change from a curve in one direction to a curve in the opposite direction—is that there is double the shock there would be in entering or leaving a simple curve. At the point of the reverse, what was the outer rail of one curve at once becomes the inner rail of the other curve. It is impossible to at once change the elevation of the outer rail from one rail to the other; this must, of course, be done gradually; so that for a certain distance on each curve there is an improper elevation. Taken altogether, the double change in direction, and the lurch in the car changing from an elevation on one side to an elevation on the other, causes a violent shock, even with the most perfect track which it is possible to maintain

Q. This refers to reverse circular curves?—A. Yes, that is curves without any easement curves. On the other hand, where proper easement curves are used, the cars pass gradually and imperceptibly from the curve, and gradually and imperceptibly obtain their upright position, so that by the time the end of the easement curve is reached, the tracks are in a perfect straight line, and are perfectly upright, and therefore in a perfect condition to enter another curve in the reverse

direction, provided this curve in the opposite direction is also approached by means of a similar easement curve. Theoretically, therefore, there is no objection whatever for one curve, provided with a proper easement, to at once change to another similar curve in the opposite direction. Practically, however, even the best track is never in perfect condition, either as to alignment or surface, and it is advisable to allow, say 50 feet of a straight line between easement curves in opposite directions.

Q. This is largely on account of the length of cars?—A. Yes.

Q. The single truck would pass from one easement curve to another without any shock?—A. Yes.

Q. What effect does curve easement have on the speed of trains and the comfort of passengers?—A. With such alignment, there is nothing whatever to prevent passenger trains making a speed of 60 miles an hour without perceptible shock to the passengers.

Q. Around curves of three degrees?—A. Yes. If sharper curves, they must, of course, be reduced in proportion, but as far as the reversing is concerned, there is no perceptible shock. The degree of curve must have its proper speed, as already referred to, in the question of sharper curves.

Q. In other words, if two curves of a given degree of curvature are reversed and spiralled, and their points of spiral were fifty feet apart, they would ride as comfortably, and be as safe as if the tangent between these points of curve were 300 or 600 feet?—A. Yes.

Q. And any greater length than those, which requires large expenditure, would be a useless refinement?—A. Yes.

Q. Would it have any effect on the tonnage that locomotives can haul?—A. It would have no effect whatever on the tonnage. It would not permit them to haul any more tonnage or to make any better time.

Q. So that these tangents might have been reduced on the Transcontinental, without affecting the efficiency of the road, or the comfort of the passengers, or the running time of passenger trains in any particular?—A. Yes.

Q. And any money that might have been saved by reducing these tangents should have been saved if advantage were taken of the points which you have raised? —A. Yes.

Q. What, then, do you say of the rule itself?—A. Such a rule is decidedly expensive on construction in a rough crooked country, such as is much of the country traversed by the Transcontinental. I have been trying mentally to apply it to some of the rough country through which I have located railways, and I confess the thought appalls me. I am certain many *many millions* must have been spent in this way to produce results that are absolutely valueless, or, to speak more correctly, are worse than valueless. The object for which the Transcontinental must have been built was to give a good rapid passenger and freight service between the east and west, and above all to secure the most economical means of moving traffic between the west and east, and vice versa. Or, in other words, to build a road that would permit of freight being handled at the very lowest possible rate. No railway can for a great length of time move traffic at less than cost. The actual cost of handling traffic is the cost of operation, plus the fixed charges. A railway can handle traffic at the least cost when the sum of the operating expenses and the fixed charges is the least sum. Any increase in fixed charges which does not reduce the operating expenses by the same or greater sum is an added burden for the road to carry, and means an added amount to freight rates. This ruling that at least 300 feet must be used between easement curves in opposite directions must add a very large amount to the cost of the road, without in any way reducing the operating expenses, and therefore adds to the cost of handling traffic, and it is in this respect a debasement of the road similar in effect to an increase in the grades.

Q. Can you give us the rules with regard to spiral or easement curves on any other roads with which you have been connected?—A. Yes. The Canadian Pacific Rules regarding spirals or easement curves are as follows:—

"Spirals must be used on all final location. Under ordinary conditions the length in feet of spiral for main lines will be equal to the degree of curve multiplied by 100 feet, the maximum length being 400 feet. On branch lines or rough country, spirals may be shortened, the length being equal to the degree of curve multiplied by 50 feet, the maximum length being 200 feet. The minimum length of tangents on main lines between curves in opposite directions will be at least equal to half the length of the two spirals required for curves, the minimum in any case being 200 feet.

I might put in an explanation there. What is meant is the minimum length of tangents on main lines between simple curves; that is before the easement curve was introduced; so that then you permit of the curves being spiralled, without any tangent between the point of spiral. The rules proceed

"On the same section of line, if sharp curves and short spirals are necessary to avoid heavy construction, do not use this standard over the whole section, but try to improve other portions so that fast speed may be made to compensate for slow speed over first mentioned portion".

Q. From this rule it appears that the Canadian Pacific not only permit their engineers to locate a railway without any tangents between spirals but they also permit of the spiral being shortened, where money can be saved?—A. Yes.

Q. So that that feature, if introduced in the rougher country along the Transcontinental, would doubtless have enabled the engineers to have accomplished even greater savings than if the tangent between points of spiral had been simply reduced to 50 feet?—A. Yes, undoubtedly.

Q. Do you think that the practice of the Canadian Pacific Railway would have been proper for the Transcontinental engineers to have followed?—A. Yes, I undoubtedly think so.

By the Chairman:

Q. There are two kinds of curves; there is the circle curve?—A. Yes.

Q. You have spoken of two kinds of curves; one is the circle curve and the other the spiral or easement curve; is that correct?—A. Yes.

Q. The circle curve is just part of a circle?—A. Yes.

Q. If you continue the curve you will come to the point where you start?—A. Yes.

Q. The spiral or easement curve is such a curve that if you continue it you will never come back to where you started?—A. No.

Q. That is to say, a spiral curve is one in which the curve keeps changing, or may keep changing all the time. It is sharper or flatter as you go along?—A. Yes.

Q. You speak of the practice of the C.P.R. in regard to curves. Is that practice peculiar to the C.P.R.?—A. No.

Q. Or is it the general practice of American roads?—A. Yes the general practice of the best American railways.

Q. Adjusted to fit their particular territory?—A. Yes.

Q. But it is recognized as a standard practice?—A. Yes.

Q. Not one invented by themselves?—A. No.

Q. In a spiral curve the radius changes at every point?—A. Yes.

Q. That is to say, a line drawn from what was the centre when you started the curve to different points in the curve will never be the same?—A. Will never be the same.

Q. To put it in a homely way, if one takes a piece of rope and coils it up on the floor, he will have a spiral curve if he follows the rope round?—A. Yes.

Q. Referring to your statement that a very large amount of money might have been saved by reducing the length of tangents between curves, will you please explain just how that saving could be made?—A. Well, this saving can be made because a line with short tangents between reverse curves is more flexible than one with longer tangents. In many cases it enables the engineer to avoid heavy cuts and deep fills, more especially in crooked country; that is where the contour is very crooked.

Q. In other words, the engineer should be allowed to use his discretion, so that he may adjust the line so as to avoid expensive cuttings and deep fills?—A. Yes.

By Mr. Gutelius:

Q. So that with a larger margin in the matter of the degree of curve, a larger margin in the matter of the length of tangents between curves in the same direction, or curves in opposite directions, the locating engineer would have been able to have laid out a line of railway which would cost very much less, would he not?—A. Yes, very much less.

By the Chairman:

Q. A note to all these rules, saying that these were only for general guidance, and that the engineer was expected to use ordinary discretion, would have avoided the trouble?—A. It would not have required a note. If the engineers were told that they were allowed certain latitude it would have answered.

(Adjourned till 2.30 p.m.)

CORRY BUILDING,

Wednesday afternoon, November 27th, 1912.

Continued examination of Mr. W. F. Tye by the Transcontinental Investigating Commission (Messrs. F. P. Gutelius and George Lynch-Staunton).

Reporter sworn.

CIRCULAR NO. 118.

Mr Gutelius:—With further reference to curvature, Mr. Tye, you have been furnished with a copy of Circular No. 118, dated Ottawa, August 18th, 1908, signed D. MacPherson, Assistant Chief Engineer; what have you to say to the opening sentence which reads as follows:—"It is desirable to have all bridges (especially high trestles) on tangents and level grades, if such locations can be obtained without excessive cost"?

Mr. Tye:—In regard to the desirability of "having all bridges (especially high trestles) on level grades" I believe a sweeping instruction such as this is very apt to lead the engineers in the field astray. There are certainly many cases where it is not advisable to put trestles on level grades even if it could be done without extra cost.

On a long grade, whether ruling, pusher or minor, it would certainly be unadvisable and bad engineering to introduce short stretches of level at every bridge or trestle. This would introduce the very danger the circular tries to avoid in the second sentence, namely, a shock to the trestle caused by break in grade.

There is no apparent reason why a short grade should be broken to introduce a level grade on a trestle; every break in grade is objectionable to some degree and should only be introduced for economic reasons.

There is no reason why trestles or bridges should be treated any different from the ordinary road bed as far as grades and alignment are concerned.

It would certainly be desirable to have the whole road on a tangent and level grade, but this is impossible—any grade or any curve should be introduced solely for economic reasons. A liberal scale of values has been given for curvature, rise and fall, etc., etc. If the introduction of a curve or a grade will save more than the values given, then it should be introduced, otherwise not. If there are special circumstances surrounding any particular place which makes it undesirable why a curve or grade should not be introduced such circumstances should be given due weight. For instance, a trestle on a curve might give unsafe foundations while on a tangent the foundations might be quite good. It would be advisable in this case to take the tangent even if the curve were much cheaper.

A circular which says that bridges or trestles should be on tangents and level grades is wrong; it simply leads the engineers in the field to believe that such conditions must be met and a better line with curves and grades on the trestles might not even be considered.

Mr. Gutelius:—What have you to say to the second sentence—which reads, "It is particularly objectionable to have such structures located on vertical curves, at the intersection of two grades"?

Mr. Tye:—This is objectionable in the same way—it does not put any money value on a vertical curve on a bridge; it simply tells the engineer in the field that such a thing is "particularly objectionable". The circular goes on to say—"Wherever it is impossible to conform with the above-mentioned requirements without greatly increasing the cost, detailed comparative estimates should be submitted showing exactly what it would cost to eliminate the objectionable features". That is, the circular tells the engineer that if he can avoid curves on bridges or grades or on vertical curves at any reasonable cost he must do so; if the cost is unreasonable he must send estimates of the cost of elimination of the so called "objectionable features" and the head office will decide—elsewhere they tell him $50,000 for taking a curve off one end of a high trestle is considered reasonable.

The circular is simply an open invitation to reckless extravagance without one standard to guide the engineer. If there were anywhere in the world a railroad which did not have bridges and trestles on curves or grades or vertical curves, there might be some excuse for such a circular, but I do not believe such a road exists or is ever likely to be built.

Mr. Gutelius:—It would prove then that the basis for this circular is simply sentiments?

Mr. Tye:—Yes.

Mr. Lynch-Staunton:—And that is all?

Mr. Tye:—Yes.

Mr. Lynch-Staunton:—What do you mean by the expression "There is a scale of values for grade and curvature"?

Mr. Tye:—Well, that if they can eliminate any curve they may do so provided it will not cost more than a sum which has been set. The same way with rise and fall.

Mr. Lynch-Staunton:—Then a scale of values means he may make changes provided these changes will not give an increased cost more than a certain stated sum. That is what you mean by the expression?

Mr. Tye:—Yes.

Mr. Lynch-Staunton:—And those amounts are set down for the different changes which may be contemplated?

Mr. Tye:—Yes.

Mr. Gutelius:—And they are based on the volume of traffic so that capital expenditure will have the effect of reducing operating expenses?

Mr. Tye:—Yes.

Mr. Lynch-Staunton:—You have stated Mr. Tye that where a bridge is built on a curve, the foundation may be unstable whereas if it were put on a tangent the foundation might be sound. You mean by that, do you not, that on a curve a foundation will be on one side while on a tangent it would be on another and that the natural side may in the one case be good and in the other bad?

Mr. Tye:—Yes.

Mr. Lynch-Staunton:—So, therefore, insisting on the rule that no bridge should be on a curve they may be deliberately taking a worse foundation?

Mr. Tye:—Yes.

Mr. Lynch-Staunton:—So that they must be governed by the local conditions in deciding whether they shall have a curve or a tangent in any bridge?

Mr. Tye:—Yes.

Mr. Lynch-Staunton:—Now what is a vertical curve?

Mr. Tye:—The grades as drawn on a profile, if produced to an intersection, would come to a sharp, sudden change just as if two straight horizontal lines were produced to an intersection.

Mr. Lynch Staunton:—Starting from a given point and going a thousand feet westerly you are going downward, we will say on a four-tenths grade. Then that four-tenths stops at a thousand feet and suddenly turns the other way up for four-tenths. Now where these two meet is of course the lowest point on the two grades. Now, Mr. Tye, where does the vertical curve come in in that case?

Mr. Tye:—Well at that point there is a sharp angle and you don't want angles because they cause a lurch in the train, and so the grade is put in to take out that angle just the same as a curve is put in, in a vertical curve; just the same as a horizontal would be put in if the lines were horizontal.

Mr. Lynch-Staunton:—So you make a curve on the roadbed so that one of these grades can run gently into the other?

Mr. Tye:—Yes.

Mr. Lynch-Staunton:—That is there are horizontal and vertical curves as we understand the words?

Mr. Tye:—Yes.

CURVES ON TRESTLES.

Mr. Gutelius:—You have just handed a copy of file No. 305 relating to curves, Mr. Tye? Will you state whether in your opinion curves on trestles are unduly objectionable?

Mr. Tye:—Curves on trestles are objectionable in the same way as curves are objectionable on any portion of a railway. The ideal condition is a straight line and a level grade, but unfortunately it is very rarely that such conditions can be realized. The objections to curves are the additional wear on the rails and the additional danger of derailment. The additional wear of the rail on a curve on a trestle is no greater than on any other curve. The additional danger of derailment on a curve on a trestle is usually less than on any other curve.

Mr. Gutelius:—Why do you say it is less?

Mr. Tye:—The track on trestles with proper foundations, properly constructed and kept in proper repair, is almost invariably better than the track on ordinary roadbed. The proper elevation of the outer rail is more easily maintained and therefore the danger of derailment on a curve on a trestle is less than on a curve on ordinary roadbed.

Mr. Gutelius:—Just why is that the case?

Mr. Tye:—Well, the trestle has a solid foundation. It is carried up in solid timber, steel, concrete or piles, or whatever it happens to be, and therefore there is no question as to settlement; whereas an embankment made of earth or rock will always settle. This is more especially true when the road is new. But even in old embankments it does happen, and they are also more subject to washing by rains, storms and so forth and therefore there is more chance of settlement and consequently more danger of derailment.

Mr. Gutelius:—On a curve on an embankment rather than a curve on a trestle or bridge?

Mr. Tye:—Yes.

Mr. Gutelius:—Is there any further reason why a curve on a trestle or bridge is made safer against derailment than on an ordinary embankment.

Mr. Tye:—In case of derailment the chances of a wreck are less on a curve on a trestle than on a curve on the ordinary roadbed because curves on trestles are fitted with safety appliances. Inside guard rails are, or should be, placed on every trestle to prevent a derailed truck from turning at an angle to the track and to safely guide the track across the trestle. A familiar form of this safety appliance is the "Jordan Guard". One or more outside guard stringers are also placed on all trestles to further prevent the derailed trucks from turning at an angle to the track, and to help in safely guiding the truck in a line parallel with the rails. Ties are spaced much more closely on trestles than on ordinary track and are firmly bolted to the stringers, thus preventing all bunching and so preventing the wheels dropping into the spaces made by the bunching of the ties. No such precautions are taken on curves on ordinary track. Hence the danger of a wreck is less where a derailment occurs on a trestle than on ordinary roadbed.

Mr. Gutelius:—Because on an ordinary roadbed provisions in the way of guard rails are not made?

Mr. Tye:—Exactly.

Mr. Gutelius:—Is there anything in the statement that a trestle is a weak spot in a roadbed?

Mr. Tye:—There is none whatever. The added strain can be easily taken care of in the design of the trestle. The only objection to a curve on a trestle over and above a curve on the ordinary roadbed is the possibility of more serious damage should the truck surmount the inside guard rails and the outside guard stringers and the cars plunge over the side of the trestle. Such a wreck would undoubtedly be a bad one, but so would a wreck on a high rock embankment or on a steep rock side hill—it is questionable which would be the worse—and it is absolutely impossible that curves can be avoided in all such places.

Mr. Gutelius:—What would you say about the possibility of building trestles on a tangent?

Mr. Tye:—It is absolutely impossible that all trestles on curves can be avoided. It is axiomatic that in economic railroad location that the curve be placed at the obstacle rather than at either side of it. The very nature of a stream requiring a large trestle is that it lies in a deep valley—or that the general contour of the country is concave at that point. If the country is to be fitted with an economic line under such conditions a curve is required at that point. Many valleys are so wide and deep that it is necessary to run the railway up one side for a certain distance until a practical crossing is found, and follow back on the other side until

the general line of the route is again encountered. This condition naturally requires a curve at the crossing of the valley. The location may be following down a branch of a stream and where this branch meets the main stream a crossing of the main stream may be necessary—under such conditions a curve at the intersection of the streams is almost sure to be a necessity. Dozens of other instances might be cited where curves at streams are necessary, and if in any of them the curve is not placed on the bridge the added expense would be excessive. Such a ruling applied to a long road like the Transcontinental and rigidly carried out would entail an appalling expenditure, and I venture to say there must be many curves on trestles on the Transcontinental. The factors in the problem are these:

The track on trestles is the best on the railway.

Additional safeguards are used on all trestles to prevent derailment, or to guide the derailed trucks over the trestle.

Wrecks on trestles are but little worse than those on high rock banks or steep, rocky side hills.

Q. No attempt is made to avoid curves on high rock banks or on steep, rocky side hills.

Q. It is impossible to avoid all or many curves on trestles.

It, therefore, is a waste of good money to attempt to avoid curves on trestles in isolated cases where the expenditure involved is large.

Mr. Gutelius:—What then is your opinion, Mr. Tye, in connection with the rock embankment at the east end of the Little Salmon River viaduct, where it was decided to construct a rock borrow embankment rather than to extend the trestle at an additional expense of $50,000?

Mr. Tye:—In the case mentioned in file 305, Salmon River viaduct, unless there are some other grave reasons for the change which are not mentioned in the correspondence, the expense involved, $50,000, in extending the trestle was simply so much money thrown away.

Mr. Lynch-Staunton:—In that case there is a curved rock embankment?

Mr. Tye:—Yes.

Mr. Lynch-Staunton:—That was put in to avoid having a curved bridge?

Mr. Tye:—Yes.

Mr. Lynch-Staunton:—Your opinion is that a curved bridge should have been put in?

Mr. Tye:—Yes, if there was a saving of $50,000 by so putting it in.

Mr. Lynch-Staunton:—In a case of a curve on a bridge, the centrifugal force you speak of is only on the side of the trestle?

Mr. Tye:—Yes.

Mr. Lynch-Staunton:—Then would there, or would there not, be a considerable increase in the cost of strengthening that bridge?

Mr. Tye:—No, the cost is not very much greater; it is inconsiderable.

Mr. Lynch-Staunton:—You have explained that in your opinion more things might happen on a curved embankment than on a curved bridge. Now I want to ask you is there any rule laid down for the guidance of the engineers of the Transcontinental which forbids them to make curved embankments?

Mr. Tye:—None whatever.

Mr. Lynch-Staunton:—You do not object to curved embankments any more than you do to curved bridges?

Mr. Tye:—No.

Mr. Lynch-Staunton:—But the engineers of the Transcontinental in allowing curves on embankments and forbidding them on bridges are illogical. That is what your statement is meant to convey?

Mr. Tye:—Yes.

VOLUME OF TRAFFIC.

Mr. Gutelius:—Your attention is directed, Mr. Tye, to blue print No. 59, which is the "Table of values for Equating Distance, Rise and Fall, Curvature and so forth," issued August 30th, 1905, signed by D. MacPherson, assistant chief engineer, and approved by Hugh D. Lumsden, chief engineer. Your special attention is directed to the note on this blue print which reads as follows:—

> "For calculating justifiable expenditure per mile, ten daily trains each way (equal to twenty trains daily) will be assumed between Moncton and Quebec, and between Winnipeg and junction of branch to North Bay. Between other points twelve daily trains will be assumed."

As an engineer, Mr. Tye, who has had to do with the construction of transcontinental railways, do you believe that the assumption of this large number of daily trains is justifiable as a foundation for these values? And you might state to us the date when, from your calculation, this number of trains will actually be run.

Mr. Tye:—In order to economically locate a railway it is essential to have a reasonably good idea as to the probable volume of traffic. There is no way in which this can be ascertained as readily and as correctly as by comparison with an established road through the same country serving the same traffic. Lying parallel to the route of the National Transcontinental is the Canadian Pacific Railway, built under very similar conditions and serving the same country and the same traffic. The amount and growth of traffic on that road furnishes the best possible guide to the probable future traffic on the National Transcontinental Railway.

1—CANADIAN PACIFIC RAILWAY COMPANY—TRAFFIC FOR YEARS ENDING JULY 30th.

YEAR.	Barrels Flour	Bushels Grain	Live Stock Head	Feet Lumber	Cords Firewood	Tons M'f'd Articles	Tons all Other Articles
1898	2,911,072	37,756,201	663,773	831,895,383	185,208	1,319,827	994,813
1899	3,292,450	37,443,084	715,018	840,145,338	203,336	1,529,044	1,119,087
1900	4,005,226	42,763,253	810,559	957,702,349	202,461	1,795,663	1,461,144
1901	3,735,873	32,927,468	945,386	899,214,646	204,818	1,954,386	2,206,970
1902	4,921,993	52,719,706	963,742	1,033,569,377	204,963	2,268,234	2,571,136
1903	5,110,757	63,822,710	1,103,686	1,190,378,217	268,401	2,665,262	2,942,736
1904	5,270,432	52,990,151	1,314,814	1,267,804,321	270,803	3,119,659	3,620,515
1905	5,010,868	59,739,180	1,360,560	1,435,758,930	261,794	3,250,067	3,894,259
1906	5,994,535	82,196,648	1,428,320	1,804,648,962	264,456	3,818,625	4,098,819
1907	6,256,702	93,207,009	1,537,467	1,989,444,728	274,629	4,285,854	4,794,295
1908	5,843,988	88,345,234	1,349,771	1,764,445,459	249,605	3,981,888	5,102,116
1909	6,683,354	97,236,150	1,371,873	1,726,944,584	249,628	4,425,241	5,916,248
1910	7,489,812	112,795,345	1,381,183	2,292,821,963	280,878	5,468,548	7,567,052
1911	8,469,744	111,169,982	1,567,665	2,441,097,107	398,345	5,759,344	8,971,037

CANADIAN NORTHERN RAILWAY COMPANY.

YEAR	100 lb. Sack Flour	Bushels Grain	Heads Live Stock	Feet Logs and Lumber	Cords Firewood	Tons Fish	Cars Immigrants Effects	Cars Building Material	Tons Miscellaneous
1903	332,096	12,367,110	23,775	85,551,000	111,748				
1904	282,214	9,992,195	25,188	117,517,000	171,714				
1905	414,824	9,681,829	20,299	141,614,000	176,365	5,770	1,558	5,968	459,972
1906	483,819	16,192,502	41,588	171,636,000	175,675	3,175	2,614	8,955	559,022
1907	844,500	19,853,142	32,960	189,455,000	109,685	3,402	4,647	9,046	628,521
1908	925,798	22,456,041	44,639	206,698,000	197,633	4,435	3,383	9,432	1,133,508
1909	1,380,207	27,113,077	91,546	247,452,000	177,231	4,547	3,129	9,547	1,073,872
1910	1,789,768	37,355,010	123,635	294,647,000	189,535	282,718	5,068	21,758	889,783
1911	2,215,094	40,249,939	137,295	324,221,000	210,625	370,161	5,644	36,328	1,170,964

WINNIPEG TO LAKE SUPERIOR.

Mr. Tye:—Taking first the section between Winnipeg and Lake Superior, the annual reports of the Canadian Pacific give the total amount of the different commodities handled by that road. This is given for the whole road and not for divisions or districts. Its grain traffic, however, practically all originates in the West, and is practically all hauled from Winnipeg to Fort William; so that the amount of grain handled between Winnipeg and Fort William is a good index of the amount of traffic on that division; grain and flour probably make up half of the eastbound business between Winnipeg and the Lakes. Flour is simply manufactured grain, and all flour handled is made from Western grain so that a statement showing average growth of the amount of grain handled in the past should give a good index as to the probable growth of traffic in the future.

This statement, marked (1) taken from the annual reports, shows the different commodities handled by the Canadian Pacific for each year ending June 30th, from 1898 to 1911; and by the Canadian Northern for the years ending June 30th from 1903 to 1911.

This diagram, marked (2) shows graphically the amount of grain handled each year by the Canadian Pacific and their mileage west of Fort William. This chart shows wide fluctuations from year to year, but notwithstanding this, from 1900 to 1911 the average increase is fairly uniform, being at the rate of about eight million bushels per annum. The Canadian Northern increase from 1904 to 1911 is at the average rate of five million bushels per annum.

In 1905 the Canadian Pacific freight traffic averaged for the whole year about seven trains each way per day for the full 365 days in the year. On the same basis, the C.P.R. traffic would have been at the rate of ten trains per day in 1909. In 1905 the Canadian Pacific began active preparations for the construction of a second track.

Grain in the West is practically all grown between Winnipeg on the east and Calgary and Edmonton on the west. It is a fair assumption to say that the grain handled by the Grand Trunk Pacific and the National Transcontinental should be in the same proportion to the C.P.R. as is the mileage in the grain growing district of the one road to the other. It may be that at the present time the Grand Trunk Pacific does not haul in the same proportion to its mileage as does the Canadian Pacific, because the Canadian Pacific is more firmly established in the country; but it is a safe assumption to say that when the Grand Trunk has its connections with eastern lines which are at least as extensive as are those of the Canadian Pacific—that the whole traffic will be in proportion to its grain haul, and its grain haul will be in proportion to the mileage which it has in the west as compared with the Canadian Pacific.

If, therefore, we assume that the Grand Trunk grain haul and its traffic is proportionate to its mileage between Winnipeg and Edmonton, as compared with the mileage of the C.P.R. between Winnipeg and Calgary, the results may not be correct at the present time, but will be reasonably so in the future when the Grand Trunk has its lines connected. In 1911 the C.P.R. total mileage from Winnipeg to Calgary, including branches, amounted to 5,308 miles; and the Grand Trunk Pacific between Winnipeg and Edmonton, including branch lines, to 1,185 miles. The C.P.R. handled on the basis of their average haul, 116,000,000 bushels. This would make the haul of the National Transcontinental 26,000,000 bushels. If, therefore, the average grain haul of the Grand Trunk Pacific be taken as 26,000,000 bushels for the year ending June 30, 1911, and its rate of increase be assumed to be the same as the Canadian Pacific, the National Transcontinental traffic between

Winnipeg and Lake Superior would, as shown on the attached diagram, in 1917 amount to seven trains per day each way, of the same weight as those handled by the Canadian Pacific in 1905, and to ten such trains each way a day in 1921.

In 1905 the Canadian Pacific had not completed its grade reductions and therefore could not haul as large loads as can the National Transcontinental. Its grades, however, had been partially reduced and its trains were of a fair size. It is quite safe to assume that ten locomotives on the National Transcontinental will haul as much as could eleven locomotives on the Canadian Pacific on its 1905 basis. The National Transcontinental on the basis already assumed would have a traffic of eleven C.P.R. trains each way per day in 1922. Or in other words by the year 1922 the National Transcontinental between Winnipeg and Fort William will have a traffic equal to ten of its own trains each way per day. As the actual construction of the National Transcontinental was begun in 1905, in seventeen years from its date of commencement it will have reached the standard which has been set between Winnipeg and Fort William in these instructions. This seems to me to be a reasonable basis to work on.

LAKE SUPERIOR TO COCHRANE.

Mr. Gutelius:—What do you say, Mr. Tye, about using the same basis for these calculations on the line between Lake Superior Junction and Cochrane?

Mr. Tye:—It is considerably more difficult to decide on what the traffic between Lake Superior Junction and Cochrane will be. The cheapest and easiest way to handle traffic between the east and the west is via the Lakes. It has been proven that during the period of navigation the traffic will go by this route in preference to all-rail, and therefore during this period the traffic on the National Transcontinental will be very light. It is impossible to handle all the grain during the short period between the close of the harvest and the close of navigation, and during the winter much grain must undoubtedly go via the all-rail route.

Again comparing with the Canadian Pacific: that company started to double track its line between Winnipeg and Fort William in 1905. It is now in 1912 commencing to double track between Fort William and Sudbury, or, in other words, if it started its second track when its requirements were the same as they were between Winnipeg and Fort William the number of trains east of Fort William should now be equivalent to the number of trains between Fort William and Winnipeg in 1905; or the traffic requirements west of Fort William are seven years in advance of those east of Fort William. If the railway east of Fort William were of the same high grade as that west of Fort William, or as that constructed by the National Transcontinental, then it would be a safe assumption to say that the National Transcontinental would have seven trains each way per day in 1924, or seven years after it would have that number west of Lake Superior. The roads, however, are not in any respects of equivalent grades. The Canadian Pacific has, west of Fort William a railroad equally as good as that constructed by the National Transcontinental. East of Fort William, however, the road is not so efficient. West of Fort William it has 0.4 per cent grades. East of Fort William and between that point and Sudbury the ruling grades are at least 1 per cent. The haulage capacity of one locomotive west of Fort William on the C.P.R., or on any portion of the Transcontinental is equivalent to the haulage capacity of two similar locomotives east of Fort William on the C.P.R. The rate of growth on the C.P.R. east of the Lakes has been less than one-half as rapid as west of the lakes. Assuming this rate for the Transcontinental, the number of trains which could be handled by its locomotives on the class of road which has been built, would amount to six each way per day in 1935, or thirty years after the commencement of construction.

Mr. Gutelius:—Does the twenty trains per day assumption used in these instructions for construction values, not seem to be unnecessarily high?

Mr. Tye:—Yes, very high.

Mr. Gutelius:—What do you consider would have been a fair assumption of standard for them to use for this portion of the line in making their original calculations?

Mr. Tye:—Six trains per day each way in 1935 would be a high standard to set.

Mr. Gutelius:—So that you would consider it fair and proper to use an average of five trains each way per day, would you not?

Mr. Tye:—Yes.

COCHRANE TO QUEBEC.

Mr. Gutelius:—What would you say, Mr. Tye, about the traffic between Cochrane and Quebec and the number of trains which they should have assumed in making their calculations for that portion?

Mr. Tye:—The difference in traffic east of the Junction to Ontario and west of that point will be the difference between traffic furnished by the eastern portion of the province of Quebec and that furnished by the country between Montreal and Windsor; this difference will undoubtedly amount to one or two trains each way a day, which will reduce the traffic on the eastern end of the Transcontinental to, at the outside, an average of two and a half trains each way per day in 1924. As any grain handled by railway east of the Lakes after the close of navigation must be hauled over this portion of the road, it would hardly be advisable to construct it of a lower standard than other portions of the road.

The amount of traffic, however, will for many years be very light, and every effort should have been made east of Lake Superior Junction, and especially east of Cochrane to keep down the first cost of construction while building a road which could be improved as the traffic justified.

Mr. Gutelius:—What items under the calculations which you have suggested, assuming five trains per day, would have been affected in cheapening the cost of construction and still maintaining the efficiency of the road in the matter of train haul?

Mr. Tye:—The use of momentum grades, wooden trestles instead of high embankments, sharper curves, short tangents, and other expedients to keep down the first cost of construction were surely justified here if on any road. Such expedients do not decrease the haulage capacity of locomotives, do not increase the running time of trains, and only slightly increase the cost of maintenance; but do materially decrease the fixed charges by decreasing the cost of construction, and do permit of an improvement in standard, when required, without extra cost.

If a tonnage of six trains per day each way will not be attained for about twenty years after the commencement of construction between Lake Superior Junction and Cochrane; and about thirty years, east of Cochrane, interest charges on expenditures, which might have been deferred, will have grown enormously. At 4 per cent compound interest one dollar in twenty years amounts to $2.19 and in thirty years to $3.24. The total cost of expenditures which might be deferred would—if made when required—be not more than from one-third to one-half of what they will be with the methods adopted.

CHANGE IN GRADES OR ALIGNMENT.

Mr. Gutelius:—Referring again to Section 85 of the "Revised General Instructions to Engineers" which reads as follows:

> "Resident Engineers will not be allowed to make changes in grades or alignment but will promptly call their division engineer's attention to any possible change they consider beneficial."

Do you believe these instructions are such as should be issued to construction engineers?

Mr. Tye:—I do not believe these instructions are proper, or at least in proper form.

Mr. Gutelius:—What is your idea of such instructions?

Mr. Tye:—I believe that all engineers should be ordered and encouraged to make changes in alignment and grades where such will decrease the cost without lowering the standard, or raise the standard without increasing the cost. All changes made by them should, of course, be approved before they become effective. For various reasons it is not possible for the locating engineer to get the details of the location exactly right. The location may be an admirable one in a general way and the details approximately correct but the locating party does not have the time to make the exact cross-sections necessary to accurately ascertain the quantities in the cuts and fills. Hence the profile may look excellent but the quantities in the cuttings may not balance the quantities in the fills. If not, and it be possible to make them so, the most economical location has not been attained.

Mr. Gutelius:—Did you ever know of a residency on which the final location made by the construction engineers did not improve the line or reduce the cost?

Mr. Tye:—The construction engineer, once the right of way has been cleared, has every opportunity of ascertaining the quantity and should shift the line one way or the other so that where possible the excavation will just make the embankments. In heavy work, especially on side hill, it is often possible by changing the line a few feet only to save very large sums. When the work is opened up, cuttings which were supposed to be rock may turn out to be earth or vice versa, making a very great alteration in the quantities and necessitating a change of line in order that there may be neither waste nor borrow. The resident engineers should be ordered and encouraged to make such changes at once. As soon as a portion of the line is cleared and cross-sectioned, they should ascertain if the excavations balance the embankments; if not, and it is possible to do so, they should at once so change the line that they will. They should be vigilant in this respect until the work is actually completed. As the work proceeds, unforeseen conditions arise which make slight changes of line advisable, and the location should not be considered final and definite until the track is actually laid.

Mr. Gutelius:—Is the location on the part of the construction engineers not a fruitful source of economy in railway construction?

Mr. Tye:—There is no possible way in which an engineer can save as much money. I have frequently seen resident engineers in this way, by reducing the quantities of grading, do as much work in a day as the contractors could do in a month, and of course the cost to the railway company would be a mere fraction of a cent per cubic yard. Every engineer on the work, be he in high position, or in low, should thus be encouraged to watch for opportunities of changing the line so as to reduce the cost without lowering the standard. Fixed charges are only second in importance to operating expenses, and a change which decreases the fixed charges without increasing operating expenses is only second in importance to an improvement in the standard of construction which does not increase the cost.

Mr. Gutelius:—How would you have made these instructions read?

Mr. Tye:—The instructions should therefore have read that resident engineers should be vigilant and watchful for changes in alignment or grades that would reduce the cost without decreasing the standard of construction, or of improving the alignment or grades without increasing the cost. Such changes should, however, be approved by the divisional or district engineer before becoming effective.

Mr. Gutelius:—What saving in cost do you think could have been effected if the construction engineers had been allowed as you suggest to modify the line and grade, in the rough country traversed by this railway.

Mr. Tye:—Five, ten and fifteen per cent, depending on the character of the country.

MOMENTUM GRADES.

Mr. Gutelius:—You are familiar, Mr. Tye, with momentum grades and their use on railways of this character? Will you describe what a momentum grade is?

Mr. Tye:—Momentum grades are grades where the use of the momentum stored in the moving train is utilized to assist the locomotive. The term is usually applied to grades steeper than the ordinary maximum grade up which the locomotive could not otherwise haul a train loaded for the ordinary maximum grade. This is illustrated by the effect produced in taking "a run at the hills".

Mr. Gutelius:—Is the momentum stored in the moving train utilized on many roads?

Mr. Tye:—Yes, on practically all roads. There is no doubt in actual practice on every road in the continent that the momentum stored in the train is used to overcome grades, and that the use of such momentum is made to increase the actual amount hauled by the locomotives. The operating official if he can increase his train haul by taking "a run at the hills" will do so, and not be governed by the lines drawn on the construction engineer's profile. A very convincing instance of this was to be found on the Canadian Pacific between Winnipeg and Dexter, a point about fifty miles west of Fort William. This portion of the road was built by the Canadian Government, the location was made under the direction of Sir Sandford Fleming, the then chief engineer, and was without doubt the finest and best piece of work on the whole C.P.R. system. The country from Dexter to Winnipeg is undulating and not more difficult to secure a low grade against westbound traffic than against eastbound. Owing to the expected heavy grain traffic it was decided to use 0.5 per cent grades against eastbound traffic and 1 per cent grades westbound. The grades were not compensated for curvature. The result was long dragging 0.5 per cent grades against eastbound and comparatively short, steep 1 per cent grades against westbound traffic. The operating officials, after the road had been opened some years and after much experience and many tests with dynamometer cars, found that the haulage capacities of their locomotives eastbound and westbound were practically equal, being exactly the same on two of the sections, and only one car greater eastbound than westbound on the third section. This was caused by the fact that against westbound traffic the grades were long and not compensated for curvature; against westbound traffic they were short and could be and were operated by taking a "run at the hills". Notwithstanding the fact that the profiles showed grades of 0.5 per cent against eastbound and 1 per cent against westbound traffic the actual or de facto grades were demonstrated in practice to be equivalent to about 0.75 per cent each way. I am sure that at this time none of the operating officials of the Canadian Pacific had ever even considered the theory of momentum grades, but they got these results in actual practice and by hard experience. If momentum will be used by the operating

officials in any event (and it is undoubtedly used on practically every road in the continent), it seems silly not to apply the theory in a scientific manner on construction and take advantage of the undoubtedly large saving in construction expenses.

Mr. Gutelius:—Will the saving be large?

Mr. Tye:—The saving on a long road such as the Transcontinental will be enormous. The motion of a train represents stored energy derived from the engine or from gravitation. This stored energy or momentum represents power just as much as the energy derived from the consumption of coal in the locomotive represents power, and it is just as unreasonable not to utilize one as the other, provided that the utilization of such momentum does not entail any corresponding drawback. For example:—A train loaded for a 0.4 per cent and travelling at the rate of 30 miles per hour has enough of this stored energy or momentum, together with the power derived from the locomotive, to surmount a 1 per cent grade 3,300 feet long before its speed is reduced to 10 miles per hour. If, therefore, the conditions are such that it can be relied on that all trains can always have a speed of 30 miles per hour at the foot of such a grade, it is safe to use a grade of 1 per cent for 3,300 feet instead of the 0.4 per cent grade, the result being that at the top of this grade the speed will not be reduced below 10 miles per hour. The grade from that point on must, however, not exceed 0.4 per cent. A 1 per cent grade for 3,300 feet surmounts an elevation of 33 feet while an 0.4 per cent grade surmounts only 13 feet. If, therefore, the foot of the momentum grade is in a sag the height of the fill may be reduced 20 feet, or if the top of the grade is in a cutting the cutting may be reduced 20 feet. This is the theoretical result. In practice a factor of safety should be introduced. A lesser speed should be assumed, and the full length of the momentum grade not used; or say instead of using a 1 per cent grade 3,300 feet long, 2,500 feet only should be used, the actual saving as above being the reduction of the fill or cutting 15 feet in height. Such grades must be used with caution, and it must be definitely decided that there will be no cause to limit the speeds—no train stops, dangerous crossings, or limited curvature must be allowed within the limit of the velocity operations.

Mr. Gutelius:—These conditions, Mr. Tye, refer only to fully loaded trains?

Mr. Tye:—Yes.

Mr. Gutelius:—What precautions are necessary in connection with the location of momentum grades on a railway of this kind?

Mr. Tye:—In constructing a new line like the Transcontinental it is very necessary to ascertain in advance that no side tracks will be required for any reason within the momentum limits. Of course, it is not always possible to do this, and it is almost certain that within the course of years some of these momentum grades will have to be eliminated, because of the necessity of introducing new side tracks, or stations which interfere with their successful working. Even where this occurs the results are good, because it postpones the expenditure of a certain amount of money until actually required. As before stated, the cost of train filling can be very much more cheaply done when the road is in operation than during construction. The conditions might be such as to necessitate rock being used for filling on construction, while earth could be used after the road was in operation. Interest charges at 4 per cent add 48 per cent to the cost in ten years and 80 per cent in fifteen years.

Mr. Gutelius:—Would there be any considerable saving in cost by constructing the road with momentum grades and at the same time maintaining its efficiency?

Mr. Tye:—Taking everything into consideration, the saving in construction on such a road as the Transcontinental would undoubtedly amount to millions of dollars without in the least degrading the high character of the road.

Mr. Gutelius:—Would the use of momentum grades be a degradation of the high standard set by the Commissioners?

Mr. Tye:—The use of momentum grades would not in any way degrade the standard of the road. They would not reduce the haulage capacity of the locomotives by one ounce, would not increase the running time of passenger or freight trains by one minute, and would not increase the operating expenses by one dollar—on the contrary, they would, by decreasing the cost of construction, reduce the fixed charges and so improve the commercial effectiveness of the road.

If the result to be arrived at by the construction of the Transcontinental was to provide a means of handling traffic between the East and West, and vice versa, at lowest cost, the use of momentum grades would certainly be a means to this end, and so would be an improvement in the standard of efficiency of the road. They would certainly reduce the total cost of handling and so tend to permit of lower freight rates.

Mr. Lynch-Staunton:—Will you describe in simple language a momentum grade?

Mr. Tye:—A train running down a grade or on a level acquires a certain momentum—just for instance as a ball rolling down a slope would acquire a certain momentum. This momentum will carry the train up another grade just as the ball would roll up another slope, and the use of this momentum, together with the power of the locomotive, will carry the train up a steeper grade than the train could surmount without the use of this stored momentum.

Mr. Gutelius:—The steeper grade which is used in place of the ordinary ruling grade is called a momentum grade because the train surmounts it by the use of the stored energy plus the power of the locomotive?

Mr. Tye:—Yes.

Mr. Lynch-Staunton:—A momentum grade is the track made a little steeper in localities where we can depend upon the stored energy in the train to carry it over this steeper grade?

Mr. Tye:—Yes.

HELPER ENGINE GRADES.

Mr. Gutelius:—In your experience, Mr. Tye, of railway construction and grade revision on existing railways, you have doubtless found it necessary to provide helper engine grades or pusher grades. Please describe an engine helper grade.

Mr. Tye:—A helper engine grade or, as it is usually termed, a "pusher grade," is one so steep that the use of a helper engine is required to assist the ordinary road locomotive in surmounting it.

Mr. Gutelius:—Is it advisable that grades of this character be used occasionally on first-class railways?

Mr. Tye:—Such grades should undoubtedly be used under certain conditions. These conditions are where the cost of the ordinary ruling grade for a single engine would be so excessive as to be prohibitive, or where the elevation to be overcome is so great that the ordinary ruling grade would require an excessive amount of distance to overcome the elevation.

Mr. Gutelius:—What are the limits of an economical pusher grade?

Mr. Tye:—The rate of the pusher grade should be such as to most economically fit the country, but should not exceed the rate on which two road locomotives could haul the same train which one locomotive could handle on the ordinary ruling grade.

Mr. Gutelius:—In the matter of pusher grades on the Transcontinental, where the ruling grades eastbound are four-tenths and the ruling grades westbound are six-tenths, what rate of grade is proper for pusher grades, assuming that the pusher engines are of the same capacity as the road engines?

Mr. Tye:—Taking into consideration the fact that at times it will be necessary to haul empties eastbound and at times westbound, for 0.4 per cent ruling grades the equivalent pusher grade is 1 per cent, and for 0.6 per cent ruling grades the equivalent pusher grade is 1.34 per cent.

Mr. Gutelius:—If it should require a considerable excessive cost, would it be advisable to use flatter grades than those which you have given us?

Mr. Tye:—There is no advantage to be gained whatever in taking flatter grades than these, unless of course the conditions of the country show that a lesser grade would be as cheap to build. The lightest locomotive which it is likely would ever be used as a pusher is the ordinary road locomotive, that is the pusher will be at least as powerful as the road engine. This is a very safe assumption to make, as the pusher engine is always fresh, has a full head of steam, and having a short distance only to go need not have its full head of steam at the head of the pusher grade; whereas, the road locomotive must have its full head of steam in order to continue with the train. If a different class of locomotive were used for a pusher it would in every case be a heavier locomotive, designed for great tractive power at low speeds. This adds to the factor of safety in assuming these grades.

Mr. Gutelius:—Under ordinary circumstances, could any advantage be gained in handling passenger traffic by assuming flatter pusher grades than you have just given us?

Mr. Tye:—No advantage whatever would be gained, because an ordinarily heavy passenger engine can take up either of these grades a train of 14 cars such as is ordinarily used in Transcontinental passenger traffic. A 14-car train is certainly as long as it is advisable to handle in a single unit, and this it is shown can be hauled on a 1.34 per cent grade by an ordinary heavy passenger engine. It would, therefore, be inadvisable and unprofitable to spend additional money to flatten these pusher grades for any advantage which might be gained from passenger traffic.

TRACK LAYING CONTRACT.

Mr. Gutelius:—On the National Transcontinental Railway each chief contractor was required to do the work of track laying and ballasting on his section. There were twenty-one chief contractors. Do you believe this was good policy, if not how should the work have been done?

Mr. Tye:—I do not believe the policy outlined in your question is at all good.

Track laying, ballasting and train filling requires a very extensive and expensive outfit: locomotives, flat cars, ballast cars, boarding cars, track laying machine, and equipment for track laying and ballasting must be supplied. All of this equipment is very expensive.

Track laying, ballasting, heavy train filling and work of similar character is usually done by the railway companies themselves, or by contractors with the railway company's equipment. Therefore when the twenty-one chief contractors after purchasing this equipment have completed their contract they will find but little work for such equipment, and there will be but little opportunity for them to sell at a reasonable price. Each one will thus find himself burdened with an expensive equipment which cannot be sold to advantage, and for which there is little work to be had. Each contractor knew this before he tendered, so each one had to make his prices high enough to cover the loss he would suffer on this equipment and therefore the Commission have practically paid for the depreciation of twenty-one equipments.

The proper policy would have been to have let each chief contractor do the grading, trestles, culverts, etc., only; and to have let the track laying, ballasting and train filling separately. At the most it would have required for track laying,

ballasting, and train filling one contractor east from Winnipeg, one west from Cochrane, one east from Cochrane, one east from Quebec, and one west from Quebec, or five in all, the Commission would thus have had at the most to pay the depreciation on five outfits instead of twenty-one.

WATER SUPPLY.

Mr. Gutelius:—In the matter of water supply, Mr. Tye, we find that the Transcontinental Railway engineers erected water tanks at divisional points having a capacity of 75,000 gallons and a height of 70 feet—the object being to afford fire protection. What do you say as to the value of 70 feet head for fire protection at a divisional point?

Mr. Tye:—The theoretical pressure due to 70 feet head is 30.32 pounds per square inch. This is reduced by the friction in the pipes, bends, etc., depending upon the conditions. The effective pressure at the foot of the tank would not exceed about 28 pounds per square inch.

A fire pump costing a few hundred dollars will give much greater pressure and therefore be much more efficient in case of fire.

The cost of operation of a fire pump placed in the machine shops and connected with the water system of the yard is in case of fire practically nothing.

With high tanks there is therefore loss in efficiency and a loss in construction of the difference between the cost of the high tanks, and an ordinary tank and a fire pump. This difference would depend upon local conditions but would probably average $2,000.

Mr. Gutelius:—So that $2,000 would have been saved at each of these divisional points had they used ordinary tanks with fire pumps. What do you say now as to the efficiency of this fire service with the 70-foot tanks, generally speaking?

Mr. Tye:—There is a grave question whether these high tanks would furnish efficient fire protection. It is impossible to say without knowing the local conditions such as topography of the ground, the relative heights of buildings and tank; the length and diameter of pipes in the water system; number of hydrants; length of hose required to reach from hydrants to buildings, etc. With an effective pressure of only 28 pounds per square inch at the foot of the tower, the fire service under the best of conditions could not be good.

Mr. Gutelius:—What is considered a reasonably good fire protection pressure in cities and towns?

Mr. Tye:—From 80 to 100 pounds.

Mr. Gutelius:—So that 28 pounds would probably only give you about one-fourth as good a fire hose stream as you would get in an ordinary town service?

Mr. Tye:—Not more than that.

WOODEN TRESTLES.

Q. On the National Transcontinental permanent wooden trestles were not used. Do you know whether permanent wooden trestles have been used on other railroads of like character on the original construction?—A. I believe on every other railroad on this continent wooden trestles have been used to reduce the cost of construction.

Q. Can wooden trestles be made amply strong to carry modern locomotives and cars?—A. Wooden trestles can and are being built to carry the heaviest class of modern locomotives and cars.

Q. Are wooden trestles subject to any disabilities that make them unfit for use on a first class railway?—A. The two objections to wooden trestles for use on any railway are that they are more subject to decay than steel or concrete trestles or bridges, and they are more subject to destruction by fire.

In regard to the first, this is simply an economic question. The cost and repair can be closely estimated, and if the first cost of the trestle together with the cost of repairs and the cost of permanent roadway put in when the wooden structure is no longer fit for use, is not materially less than the erection of permanent construction or an embankment, in the first instance, it should not be used.

If the site of the trestle is properly cleared of all brush, stumps, weeds, chips, etc., and the trestle properly protected by the best system of water supply available, the danger from fire is more apparent than real. There are many, many miles of wooden trestles on this continent. Nearly every road, except the older roads with heavy traffic through old settled districts have them, and yet delays from burnt trestles are not frequent.

Q. Is there any greater danger from washouts where wooden trestles are used than where permanent construction is put in at once?—A. The danger from washouts is still more remote. There is in this respect a distinct and decided advantage in the use of wooden trestles on the original construction. In a new country like that traversed by the Transcontinental there is a dearth of information as to the rainfall, flow of water in streams, etc., and it is impossible to know the correct size for permanent structures. Unless unduly large openings are left there is grave danger of making some of the permanent waterways too small. This is especially true in heavy embankments where the use of wooden trestles would be of the most advantage. A washout in such a place is vastly more expensive and causes as much delay as would a fire in a wooden trestle. Before the wooden trestles decay, and must be replaced, there is ample time to gather information regarding the flow of streams, etc., and thus properly designing the size of the permanent structures. The danger from washouts is thus less where wooden structures are used on the first construction than where permanent ones are at once put in.

Q. Does the use of wooden trestles in the first construction materially reduce the final cost, that is, the cost when the structures have been made permanent?—A. The use of wooden structures on construction, more especially large fills where the cuttings are insufficient to make the embankments and earth or common excavation borrow is scarce, undoubtedly reduces the final cost. There are several things which make this so. It must be remembered, in order to make such an embankment during construction, a trestle is necessary. Such a trestle must be made strong enough to carry a train, so that a great part of the timber and the cost of a permanent trestle must be provided in any event.

There are not many contractors who have the necessary equipment to handle a large amount of train hauled material; moreover, this is a class of work which the large railways usually do themselves, so that after the National Transcontinental is completed the contractors are not likely to have very much use for such equipment, this means they must pay for such equipment out of the profits on the Transcontinental, or, in other words, their prices must of necessity be much larger than the cost to a railroad company.

The life of a wooden trestle is not less than ten years.

With interest at 4 per cent, $1.00 in ten years amounts to $1.48.

I understand the average price paid for rock on the Transcontinental was about $1.75 plus over-haul, or say an average of $1.80, and train hauled filling 55 cents plus over-haul or say 65 cents.

There is no doubt that train fill can be made by a railway company at 25 cents per cubic yard. Thus, if by the use of a trestle the making of a large embankment, which would otherwise of necessity be made with rock, can be postponed, the relative cost per cubic yard would at the end of ten years be:—

Original construction, cost per cubic yard	$1.80
Plus interest at 4 per cent for ten years, $1.80 x .48	.864
Total cost per cubic yard	$2.664
Train hauled material put in by railway company at end of ten years, cost per cubic yard	.25
	2.414

or a saving of $2,414 (or 9 times the final cost) per cubic yard in favor of deferring the expenditure, out of which would have to come the cost of the trestle, its repairs and interest on its cost.

If the embankment could be made by train hauled material the relative cost would be:

Original construction, cost per yard	.65
Interest for ten years at 4 per cent=48 per cent	.31
Total cost at end of ten years	.96
Train hauled material put in by railway company at end of 10 years per cubic yard	.25
	.71

or a saving of $2.414 (or 9 times the final cost) per cubic yard in favor of deferring the expenditure. Out of which would come the cost, repairs, and interest on cost of the wooden trestles.

Railway companies have found that it is a source of great economy to construct large embankments in this manner, and I am sure no long railroad has ever before been built on this continent without the liberal use of wooden trestles. I understand the Grand Trunk Pacific on its line from Lake Superior Junction to Fort William has so used wooden trestles. This branch is a part of the main line from Winnipeg to Lake Superior over which the bulk of the grain will be hauled and is, therefore, just as important as any part of the whole road from Moncton to Prince Rupert.

It is a mistaken idea of the value and use of a railway to hold that such use of wooden trestles is a degradation of the standard of the road. Any increase in the fixed charges which does not reduce operating expenses by a like amount is a degradation of the road, just as much as would be a change in the line which increased operating expenses without decreasing fixed charges. The whole aim of the Transcontinental Commission seems to have been to build the best possible road regardless of cost. Their idea evidently being that the most effective road which could be built was the one where operating expenses were the least. Whereas, in reality, the most effective road which could be built was the one where the operating expenses plus the fixed charges was the least. Fixed charges must be paid just the same as operating expenses—an extra dollar paid in fixed charges has just the same effect in holding up freight rates as an extra dollar in operating expenses.

The use of wooden trestles in the first construction undoubtedly decreases the cost without in any way decreasing the operating expenses, and therefore decreases the total cost of handling traffic and so aids in reducing freight rates.

This surely is an improvement in the effective standard of the road.

Q. The engineers of the Transcontinental advance as a reason for not using wooden trestles the fact that the prices submitted for timber were abnormally high, that they could only take the bids as submitted, and could not have them reduced. Do you believe this is a valid reason, and that where some of the prices in the lowest

tender were abnormal that such prices could not be changed?—A. It certainly would not be a valid reason where the railway is in private hands. If an unbalanced bid were included in an otherwise lowest tender by a railway company, the contractor so tendering would be asked to revise his bid in this respect before the contract was awarded him. It certainly would not be good business on the part of the commissioners to reject a tender on account of such abnormal prices. It certainly would not be good business for them to adopt an uneconomical method of doing the work because a few of the prices were abnormally high. The only good business method is to require the contractor to reduce the abnormal prices. Of course, a contractor should not be asked to change any of his prices unless he were the lowest tenderer so that no injustice would be done to any other tenderer by such change of prices.

(N.T.R. INVESTIGATING COMMISSION; EVIDENCE TAKEN AT OTTAWA, SEPTEMBER 24th, 1912, IN THE OFFICES OF THE COMMISSION.)

CHARLES N. MONSARRAT, sworn:

By Mr. Gutelius:

Q. You were engineer of bridges for the C.P.R. between what years?—A. First of January, 1903, to 1st May, 1911.

Q. And prior to that time you were engaged in bridge engineering work on the C.P.R. for about how many years, roughly?—A. Oh, about seven or eight years, and before that structural draughtsman.

Q. And you are now chairman and chief engineer of the Quebec Bridge Commission?—A. Yes.

Q. So that, during the past fifteen years, you have had to do with all kinds of bridge work on railways, including culverts, trestles, steel bridges, arches, etc?—A. Yes.

Q. Will you refer to article 153 in the N.T.R. Specifications, which reads: "Piling will be paid for under the headings of 'piles delivered' and 'pile driving'; piles delivered will include piling furnished by the contractor at the bridge site, as ordered by the engineer, and will be paid for by the lineal foot, but any lengths in excess of those ordered by the engineer will not be paid for. 'Pile driving' will be paid for at the specified rate per net lineal foot in the finished structure, and will include all work of any kind in connection therewith, but will not include the material in the piles themselves." What do you understand by that?—A. I would understand, under the heading of 'piles delivered' that the contractor would be paid for the lineal feet of piles delivered on the ground that were actually ordered by the engineer.

Q. Whether they were used in the work or not?—A. Yes.

Q. What do you understand by the term 'pile driving'?—A. I would understand by "pile driving" that the contractor would be paid for the net lineal feet of pile that would be driven and left in the work below the point at which he was ordered to cut off the top of the pile.

Q. So that all piling left in the work would be paid for as piling delivered, plus the price of pile driving per net lineal foot?—A. Yes.

Q. The portion of the piles cut off and wasted, then, would only be paid for at the price of piling delivered?—A. Yes.

Q. I have before me the sheet moneying out the tenders for District F, duly certified by the proper officers. (Tender Number 2 exhibited to the witness.) This tender shows piling delivered twenty cents per lineal foot and piling driven at 35 cents per lineal foot. Tender Number 4 shows piling delivered 25 cents per lineal foot, and piling driven (driving only) fifteen cents per lineal foot. By reference to the original tender, now shown you, sent in by the contractor, which you will note is initialled by the contractor, the Chairman and members of the Commission, you will see that opposite the tender for piling driven fifteen cents per lineal foot is written "driving only"?—A. Yes.

Q. Now, in the moneying out of these items, you will note that in tender number 2 the quantity of piling is carried through at 20 cents?—A. Yes.

Q. Also that piling driven at 35 cents is moneyed out at 35 cents?—A. Yes.

Q. In tender number 4 the same quantities are moneyed out at 25 and 15 cents respectively?—A. Yes.

Q. Which shows a difference, roughly, between the total cost of piling delivered and piling driven, on the two tenders of over $37,000?—A. Yes.

Q. Do you notice anything peculiar in connection with the tenders on these items, and the manner in which they are moneyed out?—A. Yes. It would appear to me from an inspection of the figures that the contractor who submitted tender number 2 intended his price of 35 cents per lineal foot to cover the piles both delivered and driven.

Q. That being the case, to make a fair comparison of the tenders, what would you have done, had the consideration of the tenders come before you?—A. I would have assumed that the tenderer in tender number 2 intended to furnish and drive the piles for 35 cents, and that the tenderer in tender number 4 intended to furnish and drive the piles for 40 cents.

Q. What difference do you find between the tenders from your method of computation?—A. I think that tender number 2 is $12,943 less than number 4, as regards the item of piling driven.

Q. By reference to the specification, you will note, on page 24, that prices are asked for ten different classes of concrete?—A. Yes.

Q. Item 58, concrete facing mixture, one of cement to two of sand. As a practical engineer, would you use such a facing mixture as suggested?—A. No.

Q. Why?—A. I think that you would get sufficiently good results from using a mixture of concrete, composed of one part of cement, three parts of sand, and five of broken stone, which is cheaper and makes a better job. The rich facing of one of cement and two of sand is very apt to crack.

Q. Does this diagram, clause 63, now shown to you make any difference in your evidence?—A. No, it does not make any difference. I would not use it.

Q. In the matter of prices for concrete, is one of cement, three of sand and five of broken stone more expensive than one of cement, three of sand, and six of broken stone?—A. Yes.

Q. In contract 18, what is the price given for one of cement, three of sand and five of broken stone?—A. $13.00.

Q. What is the price for one of cement, three of sand and six of broken stone?—A. $15.00.

Q. The leaner mixture is shown at the higher price?—A. Yes.

Q. If a tender of this character came before you for consideration, what action, if any, would you take, before recommending that the contract be closed?—A. I would call in the contractor, and ask him to look over his figures, and see if

he had not made a mistake in his prices for the various mixtures, as it would strike me that there must be some mistake in his putting in a figure $2.00 a yard higher for the leaner mixture.

Q. Then you would have questioned all of the contracts where the higher price was named for the leaner mixture?—A. Yes.

Q. By reference to the statement, this would have required you to question the following contracts: 18, 19, 20, 20a and 21?—A. Yes.

Q. Would it be fair for this Commission to assume that had this question been raised that the contractors would have reduced the excessive prices for the leaner mixture to the same price as the richer one?—A. Yes, I am of opinion that it would.

Q. You note from the statement that on contract 19 a price of $17 per cubic yard has been paid for 5,305 cubic yards of concrete in the construction of the engine house at Graham. When you are advised that at the time of this tender the railway had been constructed to the site of this engine house, what is your opinion of $17 per cubic yard for such concrete in position which you will note is one of cement, three of sand and six and a half of broken stone?—A. I think it is excessively high.

Q. At Graham, with the road then constructed to the site, that concrete in position should have cost how much?—A. I should consider that $12 a yard would be an ample price.

By the Chairman:

Q. What do you think of paying $20 a cubic yard for concrete in buildings, the ingredients of which concrete were one of cement, four of sand and eight of broken stone?—A. I think it is an excessively high price.

By Mr. Gutelius:

Q. You never heard of any such figures before in your life?—A. No, not for that class of work.

Q. Where would an engineer be justified in using a mixture of concrete composed of one of cement, two of sand, and four of broken stone?—A. I would consider he would be justified in using that mixture in copings, concrete deposited under water, some special arch rings, bridge seats, and in connection with reinforced concrete work.

Q. Would you have used this mixture in pedestals for steel trestles, where they were not in contact with running water?—A. No.

Q. Why?—A. I would consider concrete composed of one of cement, three of sand and five of broken stone, would be a thoroughly good material to use in such places.

Q. So that it would be fair for this Commission to assume that any one-two-four mixture used in mass concrete was extravagant?—A. Yes, I would say so in large work, where you use large masses.

Q. And by large masses you mean what?—A. Concrete walls thicker than four feet.

Q. What mixture did you use for arch rings on the C.P.R., where the arch rings were not reinforced?—A. One part of cement, three parts of sand and five parts broken stone or gravel.

Q. If the arch rings on the N.T.R. were designed for the same unit of loading as you used on the C.P.R., would not this richer mixture at extra cost be extravagant?—A. Generally, I would say yes. There might be some cases where you have an extremely large arch—I have in mind an arch at Estevan where I used it. There might be cases where you would be justified in using one of cement, two of sand and four of broken stone.

Q. But in the circular arches?—A. Generally in circular arches I would consider one of cement, three of sand, and five of broken stone, would be good for the arch ring.

Adjourned.

(NATIONAL TRANSCONTINENTAL INVESTIGATING COMMISSION: EVIDENCE TAKEN AT OTTAWA, JANUARY 9th, 1915, IN THE N.T.R. OFFICES.)

WILLARD KITCHEN, sworn:

By the Chairman:

Q. You had a contract on the N.T.R. to build 31.7 miles, being mileage 163.80 to mileage 195.58, west of Moncton?—A. I think that is right.

Q. And your work commenced just west of Plaster Rock?—A. Yes.

Q. And ended about Grand Falls?—A. Yes.

Q. The chief engineer estimated the cost of the grading of this mileage to be $2,232,891; do you think it came within that? Do you think the work was done within that estimate?—A. No, I do not think it was. We have not got our final estimates, but I do not think it was done inside of that.

Q. Your estimates to the 31st December are $3,023,784.84. Is the Little Salmon River Viaduct, in Victoria County, on your contract?—A. Yes.

Q. Who did the cement work in connection with that?—A. It was sublet to Messrs. Powers and Brewer.

Q. Do you remember the prices they got for that work?—A. No, I do not remember.

Q. You had a copy of the specification?—A. Yes.

Q. The cement used in these pedestals is described in the specification as body concrete for piers, is it not? That is massed concrete, is it not?—A. Yes.

Q. I want to draw your attention to the fact of how it is described here. It says in the specification, 64, "The concrete will consist (that is for piers) of one part Portland cement, three parts sand, six parts broken stone, or screened gravel; the same shall vary in size, the largest piece shall pass through two and a half inch rim, and the smaller may be the size of a Lima bean. In piers exposed to the action of running ice or logs, the cut waters, or up-stream corners must, if considered necessary, and ordered in writing by the engineer, be faced with first-class stone masonry, up to high-water mark, which actual masonry shall be paid for at the schedule rate for first-class masonry". That specification of 1-3-6 you knew was ordered for those piers at the Little Salmon River Viaduct, did you not?—A. When you say I know it was ordered, what do you mean by that?

Q. That it was ordered by the specification?—A. I know the specification provides for certain mixtures.

Q. You knew it provided for that; you had a copy of it?—A. If I had a copy of it all right.

Q. You knew that fact, did you not?—A. If the specification states it.

Q. If it is so provided in the specification, you were aware of it?—A. Yes.

Q. You were also aware, were you not, that under your contract, in order to vary from this specification, you should have an order to so vary from the engineer in writing; is that not correct?—A. From the engineer?

Q. Yes?—A. Yes.

Q. Now, in the Little Salmon River Viaduct, I am informed that the massed concrete, or the pedestals, was of a different mixture than that prescribed in the specification I have read to you; is that correct?—A. I understand that we have a mixture of 1-2-4.

Q. 1-3-6 under your contract was to be paid for at what price?—A. I do not remember.

Q. At $10.50 per cubic yard?—A. That is 1-3-6.

Q. 1-2-4 was to be $15 per cubic yard?—A. Yes.

Q. That means $4.50 per cubic yard difference in the price?—A. Yes.

Q. So that it cost the Commission to put in 1-2-4 $4.50 per cubic yard more than if the mixture provided in the specification had been used; is that correct?—A. Well, yes, I presume it is so, but I understand any of these mixtures might be used in the bridge work.

Q. The consequence of your using that more expensive mixture was that the concrete in that particular work cost between seven and eight thousand dollars more to the Commission; do you agree with that?—A. It cost more putting in 1-2-4 than the other.

Q. What justification was there for that?—A. The work, as I already stated, was sublet.

Q. To Powers and Brewer?—A. Yes. Of my own personal knowledge I did not know there was any change being made until the work was well under way, and then I understood that the 1-2-4 mixture was being used, as it was considered a very important structure; they did not want to take any chance of anything occurring, and wanted to make it stronger.

Q. You understood this from whom?—A. I do not know. I cannot name any person who explained it to me; it was generally understood on the work.

Q. You had not any instructions yourself from anybody to make the change?—A. No.

Q. You do not recollect having heard from any engineer why the change was being made?—A. No, nothing official, only just the rumor.

Q. You say your understanding was that the change was made because of this being an important structure, and they did not want to take any chances?—A. Yes.

Q. What sort of a river was this over?—A. It was a very small river, but very big gulch.

Q. It was not exposed to attacks from ice or water to any extent?—A. I should say not.

Q. It was simply a big bridge crossing a large valley?—A. Yes.

Q. Where there were no serious dangers to be apprehended from ice or water; is that not right?—A. Yes.

Q. You are an old contractor of many years' standing, are you not?—A. Yes, I have been contracting for some time.

Q. Could you justify that change yourself?—A. Well, I am not prepared to say whether it was justified or not.

Q. I want you to show how it could be justified?—A. Well, as a contractor, I always do as I am told by the engineers, and I do not question what they do.

Q. You are like the old soldier in the Bible, I say "Do this" and it is done?—A. I always find it is better to do that.

Q. You have a mind of your own, and experience of your own, upon which you can sometimes draw. It is not a question of obeying somebody or other. I ask you to draw on that and tell me whether there is any justification in your mind for making the change in that mixture. You would do it, if you were told to do it, but is there any justification for it?—A. I do not know, really, where the change was made, whether in the tops of the abutments, or in the pedestals, or in the shaft.

Q. It is in the shaft?—A. I prefer, as a contractor, not to give my opinion as against the engineers.

Q. You would have to go against the engineers, if you gave it at all?—A. No, I would feel like taking every precaution that the structure would be all right.

Q. If you were building it, and had to pay for it yourself, would you have used that mixture?—A. Well, if I had had a responsible engineer in charge—

Q. I am not asking that; if you were building that work, and had to pay for it yourself, would you have changed that mixture?—A. I would have made the pedestals larger if I had been building it myself.

Q. I am not asking that; we are relying on the expert for that part; I want a contractor's opinion as to the mixture?—A. I do not think, Mr. Chairman, you ought to insist on my answering that question.

Q. That it might embarrass you to answer it?—A. I do not know that it would, but I think it might place me in a false position.

Q. I infer that you would not have done so, and so conclude, unless you say to the contrary?—(No answer.)

By Mr. Gutelius:

Q. Are you familiar with the gravel and stone supplies in that vicinity?—A. Well, somewhat.

Q. Was there good sand and gravel available within reasonable wagon haul?—A. Since you have brought that to my mind, I might say that I did understand that the sand and gravel was not of the very best quality.

Q. Do you remember of their going elsewhere for sand and gravel ultimately?—A. Yes. They went to MacAdam to get sand for some structures.

Q. Do you know whether the real object of enriching this mixture was not to enable your sub-contractors to use local gravel and sand?—A. No, I do not know that of my own personal knowledge, I know they washed the sand and gravel and did the best they could to make it possible to use it.

Q. And finally gave it up?—A. I understand they used that sand.

Q. You thought they brought it from MacAdam pit?—A. For some other structures; I do not know whether they used any in that.

By the Chairman:

Q. You saw the sand and gravel there?—A. Yes.

Q. Would you swear that that was not good sand and gravel that was there?—A. I thought it was all right myself.

By Mr. Gutelius:

Q. The local stuff was all right after it was washed?—A. Yes, that is my judgment.

By the Chairman:

Q. And it would make a proper and good mixture?—A. I felt so.

Q. You have no reason to advance in your experience and knowledge why that should have been so enriched, excepting the one given, to make a sure thing of an important structure?—A. To take no chances on an important structure.

Q. But you cannot tell me what those chances were that you were paying the money against?—A. The structure was very high, and there was very great weight—the highest on the whole work; everybody was anxious there should be no chances taken with it.

Q. You cannot tell me what your subs were paid for that?—A. No, I cannot.

Q. Did you do any other cement work—concrete work?—A. Oh, yes, a lot of it.

Q. Did you change the mixture in any other places?—A. I could not tell you.

Q. You do not recall?—A. No.

Q. I want to ask you about the classification. Did you do your own grading?—A. No, sir.

Q. Did you do any of the work yourselves on this contract?—A. The ballasting and train haul.

Q. You sublet the rest of the work?—A. Yes; we might do some cutting.

Q. What did you sublet your solid rock at?—A. $1.25.

Q. And loose rock?—A. I think it was 30 cents; I think we had 35 cents for it ourselves.

Q. And your common?—A. 20 cents, I believe, and we got 24 cents for it. We had $1.49 for the solid.

Q. The train haul and ballasting you did yourselves?—A. Yes.

Q. Did you do the tracklaying?—A. Yes.

Q. Did you sublet that?—A. No.

Q. You did that yourselves?—A. Yes.

Q. Tracks and ties?—A. Yes.

Q. On our investigation, we find that you have 115,601 yards of solid rock under the heading "assembled rock" for which you were allowed $1.49 per cubic yard, amounting in all to $172,245.49, and we consider that you should not have been allowed this assembled rock as solid rock, but that it should have gone into the loose rock; and we consider that if we were classifying it in giving you your final certificate, and had been supervising this work at the beginning, you would not get that money. I should like you to tell me why you think you ought to get it?—A. Well, because I have every reason to believe it was in the work and was returned by the engineers to the sub-contractors and paid for by me.

Q. Before you go on, I am not disputing that it was in the work, but I am saying that assembled rock is not classifiable under solid rock, because it is made up of stones which are not a yard, and of other material, and there is no justification under this specification to classify stones which are not a yard as solid rock, and there is no justification of any kind to classify any material, except the stones, as solid rock; that is the reason. We say this has been hoisted out of its class. Now, assuming that it was there, as you say, why should you be paid for it?—A. Well, I presume the specification provides for it, if it is there.

Q. Did you expect to be paid under this specification solid rock price for anything that was not rock?—A. I thought the engineers had certain—

Q. Did you think you were, under this specification, to get solid rock prices for anything that was not solid rock?—A. I understand the specification provides that solid rock could be paid for that is not really ledge rock.

Q. Where do you understand that from? The specification says "Solid rock excavation will include all rock found in ledges or masses of more than one cubic yard, which, in the judgment of the engineer, may best be removed by blasting." That is all you are entitled to under that? You are not entitled to any interstitial materials?—A. I am not familiar enough with the specification to say just off hand.

Q. You do not undertake to construe the specifications?—A. No, I never could.

Q. But I ask you to say, where do you find any ground for claiming solid rock excavation for anything which is not rock?—A. Well, when the engineers go on the work and classify the work, I expect to get what they classify.

Q. Did the engineers go on this work and classify it?—A. They went on the work, and I presume they classified it.

Q. Whom did you have on the work as resident engineers? What sort of men did you have there?—A. You mean their qualifications?

Q. Were these resident engineers all experienced men?—A. No, none of them were of very long experience.

Q. Had they any experience?—A. I do not know, I am sure.

Q. Did you know of any of them who were, before being resident engineers, men of any experience?—A. I did not. I knew of some of them being on the work, but I did not know how much experience they had.

Q. Were they not, as a matter of fact, inexperienced youths?—A. I would not like to say they were, because some of them were fairly good men.

Q. Were they usually inexperienced youths?—A. They were young men, and some of them I would consider had not had very much experience.

Q. They did the classifying?—A. I understand that they did it, with the consent of the district engineer and his assistants.

Q. When you got your classification of this assembled rock, giving you material as solid rock which was not solid rock, you knew it was not right?—A. No, I did not.

Q. Why did you not? You ought to?—A. I did not think I got any more than we should have got.

Q. They gave you 115,000 yards of assembled rock. Now, assembled rock is made up of rock and clay and other stiff material. You knew you were not entitled to get solid rock for clay, did you not?—A. Well, where there is stone mixed in with it, we were entitled to that classification.

Q. As loose rock?—A. Well, it was solid rock where they gave it.

Q. You never expected to be paid for any kind of clay as solid rock?—A. Any kind of clay?

Q. Yes?—A. Well, where the specification did not provide for it, of course we would not expect it.

Q. The specification does not provide for it as solid rock excavation anywhere that you know of?—A. I do not just quite understand.

Q. You have a mass of stones, and they are lying in together and there are spaces, voids, between them; those voids are filled up with clay?—A. Or cemented gravel.

Q. Yes, and that holds them all together, and there is as much cemented gravel as there are stones; so, therefore, in 100 yards you would have fifty yards of cemented gravel and fifty yards of stone, and where is the justification for giving you anything above loose rock for that cemented gravel?—A. Well, the engineers, I presume, in charge of the work realized that the specification provided for it, and they therefore gave it.

Q. You mean the engineers gave it to you, and you do not contest the engineers; you take what they give you?—A. I am obliged to.

Q. Do you always do that?—A. Always have to.

Q. Do you say, so far as you are concerned, that you do not know anything about the specification in that regard?—A. I do not know anything about the specification at all. There is no use in me talking about the specification. Everybody interprets it their own way; never saw two men who would interpret it the same way.

Q. You do not know anything about it?—A. No.

Q. Just took what they gave you?—A. Yes.

By Mr. Gutelius:

Q. You did that because, as a contractor, you have been in the habit of receiving certain figures for solid rock, loose rock and common excavation, and you thought you would get the same treatment under this specification as you were in the habit of getting on previous work; is that right?—A. I did not expect any other treatment than the specification provided for.

Q. Did you not expect this specification would be interpreted about the same as the other specifications under which you had worked, and where you had agreed to do the work for about the same figures?—A. Yes.

By the Chairman:

Q. You told me a lot of other things I cannot get you to tell me now?—A. I just did not know the time to bring them in.

Q. We say you should not get this money. Assuming the specifications would be considered against you, is there any other reason why you should get it? —A. Well, the principal reasons, and the reasons that I count it as being a most fair thing, are that the work was all sublet; we paid the sub-contractors upon the estimates as returned; there was some difference about classifications, but there was a committee appointed, of Mr. Boullion for the Grand Trunk Pacific, and Mr. Balkam for the Commissioners; they went down and went over the work with me and other engineers; the district engineer was there at the same time, and we adjusted all the differences, and I accepted, and when I got to Grand Falls that night I saw Mr. Boullion, and asked him if I would be safe in paying my sub-contractors, if he intended making any changes in the work, and he said with two exceptions: one was a cut, and another was a little piece of borrow on Johnson's work: "With those two exceptions, you would be quite safe in paying your sub-contractors in full, as far as I am concerned". I then called up Balkam, acting for the Commission, and told him what was said, and he replied, "If Mr. Boullion is satisfied, I am; it is my classification, I stand for it. I make no change". After that took place I paid some of my sub-contractors in full and others nearly up to the limit; and, following that, the Government Board of Arbitrators came down and went over the work.

Q. Who were they?—A. Mr. Schreiber, Gordon Grant and Mr. Kelliher. They went out over the work, and looked into some of the cuttings, and heard what I had to say about it, and went away, as I understood it, feeling there was nothing further could be done, that everything had been settled.

Q. And did you ever hear complaints from this Board of Arbitrators that you have spoken of as to the classification of your work?—A. No.

Q. And is this Commission's criticism of it the first you have heard of? —A. That is your Commission here?

Q. Yes?—A. Yes. I never knew there was any question about the classification before your dispute.

By Mr. Gutelius:

Q. Did you build that dump at the east end of the big viaduct over the Little Salmon River?—A. That is, going towards Grand Falls, yes.

Q. What did you get for that?—A. $1.49 solid rock, regular schedule prices.

Q. Was there any special contract for that big rock dump, where you had to borrow the rock?—A. Yes, we had a special price for rock borrow.

Q. What was that?—A. I just cannot call to mind.

Q. It was $1.10¼?—A. Yes; I do not think any material from the east end of that work was used there; some used on the west.

Q. Was not this dump 100 feet high of borrowed rock?—A. I do not know the height of it.

Q. About 100 feet?—A. I should think it was.

Q. Did you ever in your experience know of borrowed rock to make a dump 100 feet high at the end of a bridge before?—A. No, not in my experience.

Q. As a contractor, would you not have expected that that bridge would be extended round there, to where the ordinary dump from the cutting beyond ended? —A. I thought it was cheaper to build the dump, perhaps, than put the bridge round there. I never questioned anybody about it.

Q. That would have been a reason, if they built a rock dump of that kind, because it would be cheaper, would it not?—A. It would be my reason for doing it, if I did it. There was not any other material available there, except that, at the time.

Q. Do you know how much you paid Powers and Brewer on that 1-2-4 concrete?—A. I do not remember; I am not sure of it.

Q. Do you know what percentage of the amount due them under the estimates has been paid, how much money is still due Powers and Brewer on that viaduct masonry?—A. I do not know.

Q. Any considerable amount?—A. I could not tell you on that viaduct. They had the contract for all of the concrete on our section, and there is some money retained, but I just do not know what amount.

Q. Could not give me any idea of it?—A. I should say about $10,000; I do not know definitely, but I think about that.

Q. Is there any other evidence or information which you would like to lay before the Commission, which we have not asked you for?—A. Not that I can think of now, other than, of course, there are some extras that have not been taken up yet, some extra accounts that I thought could not be taken up until we got our final estimate and I saw what was returned. They are not very numerous.

Q. But nothing that would interest us as an investigating board that you want to tell us?—A. No.

By the Chairman:

Q. Your contract began at a railway and ended at a railway, did it not?—A. Practically.

Q. So that you had good facilities for bringing in your material?—A. Yes, we had good facilities; we had to haul it 89 miles.

Q. But you had good facilities at both ends of the thirty miles?—A. Yes.

Q. And you had good roads along which to haul your material?—A. Yes.

WILLARD KITCHEN,
Contractor.

Grand Falls, N.B., Jan. 30th, 1913.

The Transcontinental Ry. Investigating Commission,
Ottawa, Ont.

Dear Sirs,—

In reply to yours of the 16th inst., enclosing copy of evidence given by me before your Commission, and in which you gave me permission to amend my evidence or give further information, I wish to say that our contract had been completed over one year and I had not been looking over specification or correspondence, and as I had no idea when going into your office that I was expected to give evidence, it appeared that I did not know very much about the work.

I wish to assure you that it is my wish to give you any and all information that I have. In answer to your question as to what justification was there for using 1-2-4? I reply that of "my own personal knowledge I did not know that there was any change being made until the work was well under way." I wish to add to that statement. As soon as convenient after my return to Grand Falls I

began looking over letters and other office information and have found the following bearing on this matter, which had entirely left my mind; on October 30th, 1908, a letter from District Engineer C. O. Foss, as follows:—

"Re material for concrete at Little River and other viaducts east of "that; I have had samples of the local sand sent to Ottawa for analysis and "tests, and the reports in every case utterly condemn this sand and forbid "its use in the important work of building pedestals for these heavy via- "ducts. Some provision will have to be made by which suitable sand can "be procured at whatever cost it may be. I exceedingly regret that the "local sand proves so unfit, but neither engineers or contractors can afford "to take chances in construction of such important structures by using any "material about the value of which there is the slightest question. Some "arrangement will have to be made before this work can be continued. I "have so instructed the division engineer, Mr. Balloch.

Yours very truly,

"Signed, C. O. FOSS, *District Engineer.*"

On November 5th, 1908, I replied to Mr. Foss as follows:—

"We have your 21 D., dated the 30th ultimo, re concrete material for "Little River and other viaducts East of that. This certainly is a very "serious matter for us and we trust that you will be able to arrange it for "us in some way so that the work can be continued, and would respect- "fully request that you allow us to use the material and make the mixture "a little stronger, say 1-2-4. We believe this has been done in other cases. "Will try and get down to see you as soon as possible as we certainly must "have this matter straightened out to your satisfaction."

On the 4th November, 1908, a letter from Messrs. Powers & Brewer as follows:—

"We are advised by the division engineer that all of the sand which "we planned on using in the concrete work at Salmon River, Graham and "Caton Brook, has been condemned as unfit for the work and it has been "suggested that we bring in sand from Magaguadavic. We are bringing "in this sand at great expense to use at Little River, but in the case of the "other work the cost of this sand would be more than doubled owing to "the long haul. At the time we contracted with you for this work, Mr. "Mitchell, in company with Mr. Balkam and Mr. Balloch, and in the pre- "sence of yourself and the writer, examined the sand at Salmon River and "Little Salmon River and pronounced it O.K., and it was mainly owing "to this sand being accepted that we entered into contract for the work. "We have had a hard season and have spared no expense to get all the "culverts finished so as not to delay the grading in anticipation of better "work on the viaducts next season. We have asked to be allowed to use "this gravel in a 1-2-4 mixture and were told that we might do so, but we "would only be paid for a 1-3-5 mixture as the price for the 1-2-4 mixture "was too high. This we consider unjust for other contractors are putting "in a 1-2-4 mixture and are being paid at their 1-2-4 prices for it. If "some satisfactory arrangement cannot be made, we would like to cancel "our contract with you."

I went to Ottawa early in December, 1908, and took this matter up with the Chief Engineer Lumsden, and he promised to send Mr. Gordon Grant to make a

report to him direct, am not positive but think Mr. Uniacke was present at this time. Mr. Grant came down early in January, 1909, went over the work with Assistant Engineer Balkam, Mr. Powers of Powers & Brewer, and the writer.

As I am not personally familiar with the estimates, I am advised by our bookkeeper that at this time returns were being made under item 59, 1-2-4, and in April, 1910, change was made to item 59A, 1-2-4 in mass, and noted on blue prints "as per circular No. 116 A" and has been continued in the estimates until December, 1912, when it was transferred to item 62, 1-3-5, arch culverts.

It now appears that we took it for granted that the Department had approved of the 1-2-4 mix, as they were returning it in the estimates and paying us monthly, and we were returning same to our subcontractors.

And in that part of my evidence where you press to know if I had been paying for the work myself, if I would have used 1-2-4 at the increased cost, and I asked you not to press for a reply as it might place me in a false position, I wish if possible to make this a little clearer. I am not an experienced concrete man, and while I have contracted for considerable in my time I have always endeavored to get good concrete men to do the work, I do not consider my judgment on a question of this kind much, if any good. And am now of the opinion that if I had done the work at my own expense and if my engineers or concrete inspector had advised me that the 1-2-4 mix was necessary, I would have undoubtedly permitted it to be used, the additional expense of a few thousand dollars would not have influenced me to take any chance on structures such as we had here, therefore I do not think it fair to me to give a pronounced opinion that might conflict with experts.

In the evidence given re classification, I wish to add that Inspecting Engineer Macfarlane and the present chief engineer, while assistant to Mr. Lumsden or inspecting engineer, each made trips over our work as I understood it, for the purpose of looking into the classification, and while we have never seen their report, we believe that they sustained the classification that was being given by the engineers in charge of the work, as no material changes were made until the last summer, about two years after this portion of our work had been completed. We understand that you then sent engineers over the work, and notwithstanding that they knew really nothing personally about the work during actual construction, they do not hesitate to reclassify the work over the heads of such men as your present chief engineer, Inspecting Engineer Macfarlane, District Engineer Foss, Assistant District Engineer Balkam, and the other engineers on the work, as well as Inspecting Engineer Bouillon for the G.T.P., all of whom saw the work in actual construction and all, with the exception of Mr. Grant and Mr. Macfarlane, saw it many times, and continually during construction.

As we understand it now, our final estimates are returned and a very considerable change has been made in the classification, and we trust that you will readily see the unfairness of said changes and issue an order to have our final estimates returned as formerly.

I wish again to thank you for giving me this opportunity of amending my evidence.

Yours very truly,

WILLARD KITCHEN CO., LTD.

Per WILLARD KITCHEN.

(NATIONAL TRANSCONTINENTAL RAILWAY ENQUIRY COMMISSION
OTTAWA, JANUARY 17th, 1913.)

Present: G. LYNCH-STAUNTON, K.C., *Chairman;* F. P. GUTELIUS, C.E.

E. F. FAUQUIER, sworn:

By Mr. Staunton:

Q. You are a member of the firm of Fauquier Brothers?—A. Yes.
Q. You are the senior partner, are you?—A. We are equal partners.
Q. Your firm have two contracts on the Transcontinental Railway?—A. Yes.
Q. Your first contract was No. 15?—A. Yes.
Q. And commencing at Cochrane it ran for how many miles west of Cochrane?—A. Practically one hundred miles.
Q. It was through a clay country, was it not?—A. Nearly altogether, yes.
Q. Do you know how many tenders there were put in for that work?—A. I think there were only two.
Q. Your tender and the Grand Trunk Pacific?—A. Yes.
Q. Your prices on that work were $1.85 solid rock; loose rock, 70 cents; common excavation, 40 cents; concrete 1 x 3 x 5, $15.00; concrete 1 x 3 x 5 in arch culverts, $16.00; concrete 1 x 3 x 6 in arch culverts, $15.50; is that correct?—A. I would have to refer to the contract.
Q. Look at the contract and see if it is correct?—A. It is.
Q. You sublet all that work, did you not?—A. Do you refer to the masonry work?
Q. The excavation and concrete work?—A. Some of that work we did ourselves.
Q. But the excavation and concrete work, grading, except the train filling, I understood you sublet?—A. Oh no, some we did.
Q. Did you sublet the solid rock?—A. That would be a hard question to answer. We did some ourselves, you understand.
Q. Do you remember the price you sublet the solid rock at?—A. You have copies, I think, of all my sub-contracts.
Q. I find in the sub-contracts that you sublet solid rock at $1.57, loose rock 52 cents, common excavation 31 cents, concrete 1 x 3 x 5 $11.00, concrete 1 x 3 x 5 in arch culverts, $11.50, concrete 1 x 3 x 6 in arch culverts, $11.25, is that right?—A. I cannot say without referring to the contracts, you have copies of our subletting prices.
Q. These figures are taken from your contract?—A. Probably they are, but I would like to verify them; the copies you have will themselves prove it.
Q. Can you verify this—the solid rock returns up to the present at 25,363 cubic yards?—A. I understand it is about 35,000 yards.
Q. And the loose rock is 1,253,395 cubic yards?—A. I cannot answer that, I would have to verify.
Q. Is that about right?—A. I cannot really say, I do not know.
Q. And the common excavation, 1,262,204 cubic yards, can you say as to whether that is approximately right?—A. I believe the two are very close to one another in regard to classification, but as to what quantities I do not know.
Q. That is what I want to know; it appears from your returns that there is about one per cent solid rock, forty-nine per cent of loose rock, and fifty per cent of common excavation on your contract?—A. This is what has been returned by the engineers so far, of course we have not been paid for it yet.

Q. But these are the returns?—A. I understand it is about that.

Q. Now Mr. Fauquier, we have had this work examined by engineers and tests made on this contract, and our engineers think that twenty per cent for loose rock is a liberal classification on this contract, what do you think of that?—A. I should think your engineers are entirely wrong. In fact, the test that beautiful engineer you had up there made cost him about $1.10 a yard, we followed him close.

Q. Tell me all you know about it?—A. I do not know anything about his tests, except in that way.

Q. I want this to go down in evidence, I want you to tell me?—A. My brother has it in the office.

Q. I am only taking your evidence now and not your brother's, and I am taking your sworn statement and I want you to tell me what reason you have for saying that the engineer who examined this work, and reports, if he does report so, that twenty per cent of loose rock would be a generous classification on your work; what reason have you for reflecting on him?—A. Well, if you want me to state my views in regard to the matter, I should say that your engineer must have found, and would find it, and any engineer would find it impossible to classify that work after it was so long completed; he went into that work no doubt with what he considered—

Q. Speak of what you know, Mr. Fauquier, and do not tell anything you are in doubt about?—A. Well, I do not know.

Q. You do not know what he did?—A. Yes, I do. I know that his first test was on a cut that when we took it out it was covered with moss, it was like a swamp. The place was so bad we had to remove our camps. A big fire came over that cut and burned all the moss off the top of the cut, and there being a perfect swamp it was impossible to get there. The drainage of this 16-foot cut all through the dried up material on each side and made beautiful arable ground, and that is where he made his test. But that was not a bit the same as when the ground was taken out.

Q. So that the ground when dried became beautiful arable ground?—A. Yes, good farming land.

Q. It was clay, was it?—A. On the surface.

Q. He ploughed that ground to a depth of five feet? Was it beautiful arable ground to that depth?—A. I do not know, I did not see it.

Q. You profess to know what the ground was?—A. I do on the surface.

Q. What do you know about the cut?—A. The cut was very hard, that same cut, and just where he ploughed, Mr. Lumsden and one of the engineers, now dead, were up there on a trip—

Q. Were you with them?—A. Yes, and they were looking at the material and I said that is pretty tough, and Lumsden said he didn't think it was so very tough, and I asked someone to get an axe and I bet Mr. Reid he could not put an axe through it and he couldn't. It was hard elastic sort of gumbo.

Q. How were they taking that out then?—A. Steam shovels.

Q. Do you mean to tell me that a man could not put an axe into what you could take out with a steam shovel?—A. Oh yes, they could.

Q. Do not exaggerate your statements; you said you took a piece of it up and you bet him a quarter he could not put an axe into it and he could not do it?—A. Well, of course you could get an axe into it but he could not chop it through.

Q. Your statement was that he could not put an axe into it; do you tell me he could not do so?—A. Certainly you could put an axe into it.

Q. And where you were taking that out with a steam shovel?—A. Yes.

Q. It was, at that time, you say, a swamp?—A. My evidence is that it was covered with moss which held the water like a sponge and made it swampy and thoroughly wet.

Q. And Mr. Lumsden saw that condition?—A. Oh, yes.

Q. Mr. Goodwin, the engineer we sent up there tells me he ploughed that land to a depth of five feet without any trouble, with one pair of horses, do you doubt that?—A. I have not got anything to say about it. I do not know what he did. I say that at the time we took it out it would have been utterly impossible.

Q. By reason of what, the wet condition of the ground?—A. Yes, and the material.

Q. He made an examination in other parts of that place with the same results, did he not?—A I do not know anything about any other.

Q. Are you familiar generally with the country up there?—A. Yes, in a crude way.

Q. There is no difference generally speaking in the material throughout that clay belt there?—A. Oh yes, there is.

Q. Will you tell me what difference there is between the line immediately east of and the line immediately west of Cochrane?—A. There is more muskeg I think east than there is west.

Q. There is a great quantity of muskeg in your contract, is there not?—A. No, there is not. There is a great quantity of surface muskeg that has no depth.

Q. What I mean is; this forty-nine per cent of common excavation is mostly muskeg in your contract, is it not?—A. I should not think so. The muskeg was not very deep and then we got into white clay, and in some places the white clay was filled with small stones underneath the muskeg.

Q. You say that the character of the country is not very much the same on all these contracts immediately east and west of Cochrane?—A. No, I should not think it was. All districts vary, even in our own contract they vary.

Q. Oh, yes, I know they do vary, but the main characteristics of the country are the same; it is really a clay country, nearly all through there, is it not?—A. I understand, I do not know whether I am correct or not and I have no reason to say so, but I understand that east of us they have a great depth of muskeg and more quantity of muskeg in that way.

Q. Excepting, perhaps, as to the relative depth of muskeg, the country is about the same, is it not?—A. It is practically a clay belt mixed up with muskeg, if that is what you mean; that is about as far as I can describe it.

Q. That is what I mean. Did you acquire any gravel pits or borrow pits personally along this road?—A. My brother acquired some which we used.

Q. Why did your brother acquire borrow pits there?—A. We had to get them to do our work.

Q. Why had you to get them?—A. Because the engineers of the commission did not.

Q. Did the engineers ask you to get them?—A. No, we asked them to get them.

Q. You asked them to get borrow pits for you?—A. Yes.

Q. Whom did you ask?—A. I do not know, I would have to look it up and see what correspondence we had. I cannot say as to that now, it would be in the head office.

Q. It is all in correspondence, is it?—A. I do not know.

Q. So far as you know, it is?—A. I should judge there would be some correspondence about it, but I do not know.

Q. At all events the commission did not ask you to get any borrow pits?—A. No.

Q. Then your position is that you requested the commission to furnish you with borrow pits, is that right?—A. Yes.

Q. And that the commission neglected to do so?—A. Yes.

Q. You did not head them off and get these borrow pits before you got your contracts?—A. No.

Q. You did not head them off and get these borrow pits before they had a chance to get them?—A. They never had a man up there to discover these pits.

Q. You did not take time by the forelock and get in there first?—A. No, sir, we had a man up there busy all the time scouring that country looking for pits.

Q. Did you just do what the other contractors did, look for the borrow pits?—A. We are not supposed to.

Q. I know you are not and I am wondering at your generosity?—A. It was forced on us.

Q. Did not you do just what the other contractors did?—A. I do not know what they did.

Q. When did you begin work on that first contract of yours?—A. Well, it was practically somewhere about the fall, about September or October, September I should judge, 1908. I do not know exactly. The contract was signed some time in 1908.

Q. But by June, 1909, you had not done very much work?—A. Oh, yes.

Q. Had you worked through the winter?—A. Oh, yes, we worked all winter. In June, 1909, we were laying tracks and ballasting.

Q. You commenced in the autumn of 1908 and you had done a substantial quantity of work by 1909?—A. Yes, we worked all through the winter. We were instructed to by the engineer; we worked through frost and all.

Q. You say that you only got out these patents and leases for the borrow pits because the Commission did not furnish you with them?—A. Yes.

Q. How much money did you spend on that work?—A. That is a matter that is not going into evidence.

Q. It is a matter you are going to tell us, Mr. Fauquier?—A. All right, I shall not just now without consulting my solicitor.

Q. You had better consult him, because you have to tell me?—A. I do not feel that I should.

Q. Then we will have to adjourn until you make up your mind and we might do it as well now as any other time?—A. All right.

Q. We will adjourn until you make up your mind, because we want that evidence?—A. I know what you want it for; I suppose there is some catch about the investigation.

Q. There is no catch about it but we are going to have this evidence?—A. Well, I do not know anything about it myself.

Mr. Gutelius:—Then I think it would be better for you to say that you do not know?—A. I do not know, but if I did know I would not tell it.

By Mr. Staunton:

Q. Then, if you are going to put it in that way, you had better find out if you do not know?—A. The man handling this matter for me is Mr. Nesbitt and I suppose you do not object to my having a few days to consult with him. I do not want to give any information that might be brought up against me afterwards if we had a controversy about that.

Q. I want the information, and that is what we are here for?—A. Then I would like to have it adjourned.

Q. It is adjourned if you so desire?—A. I do not desire it, except to say that I don't answer, I do not know.

Q. Then you had better make up your mind whether you will answer or not?—A. I say I do not know.

Q. It is your business as a witness to furnish yourself with the information, we want you to furnish yourself with that information?—A. Very well.

Q. On the understanding that we will adjourn the enquiry for that purpose, I will go on with something further . . . . you have made a claim or you intend to make a claim against the Commission for gravel taken from these pits, have you not?—A. I suppose so. I have got to get paid for it in some way. We have either got to make a settlement with the Commission or charge so much a yard.

Q. But you made no bargain with the Commission?—A. No.

Q. Wait a moment; you made no bargain with the Commission to pay you for this material?—A. Not that I know of.

Q. You got a patent from the Ontario Government for several parcels of land for which you paid $1.00 per acre, is not that correct?—A. I do not know. I am conscientious when I tell you that I know nothing about it.

Q. You only paid the ordinary Government fee?—A. Of course, our expenses were heavy.

Q. I mean, outside of that?—A. I do not know, I cannot say.

Q. Who does know?—A. You can find out of course; my brother would know, he has the record of it.

Q. There is no use my asking you unless you are prepared to give the facts about this transaction and can say what negotiations or what communications there were with the Commission respecting borrow pits; are you familiar with the facts?—A. No, I am not.

Q. Well, we will ask your brother about that?—A. I know this far, that we had made an application in what form, whether verbal or written, I cannot remember now.

Q. Your brother is the one who can give the information?—A. I do not know whether he can give any more on that point than I can.

Q. Can your brother give information about the licenses and patents you obtained from the Ontario Government?—A. No doubt he could, he would know more about it than I do. I do not know the cost or anything else.

Q. You do not know whether or not there was any understanding with the Commission about paying you for it?—A. Paying by the yard?

Q. Yes, or in any other way?—A. No, that was only very lately put before them. They asked us to put in our bill for ballast pits and we put that in at so much a yard. We sent it in to Mr. Balkam.

Q. You had another contract, No. 18, had you not?—A. Yes.

Q. From about nineteen and a half miles west of the crossing of the Mud River, easterly seventy-five miles, is that right?—A. That is about right, I do not know exactly.

Q. There were seventy-five miles in District E?—A. Yes.

Q. Do you know that if the engineers had not made an absurd mistake, as to the quantity of moss in that country, that your tender would not have been the lowest?—A. I have been told so.

Q. Moss is easily removed?—A. Yes.

Q. Yet the engineers estimated that there were 655,000 cubic yards of moss in there, was there any such quantity?—A. I do not know that we were allowed anything for moss.

Q. You were allowed 13,000 yards?—A. Yes.

Q. And that was about all the moss that was on the right of way?—A. I think so.

Q. Your price on that contract was 12 cents for moss; do you remember that?—A. I think it was about 12 cents. On looking at the tender, I find it was 12 cents.

Q. And Chambers tendered at 35 cents for moss?—A. Yes, it was an absurd price. Chambers told me he tendered at somewhere about that, and that is all I know about it.

Q. Your tender was $1.80 for solid rock there?—A. Yes

Q. And for loose rock, 60 cents?—A. Yes.

Q. And for common excavation, 38 cents?—A. Yes.

Q. And Chambers tendered for $1.75 solid rock, 65 cents for loose rock, and 31 cents for common excavation?—A. I do not know as to that.

Q. And if it had not been for the moss, he would have got the contract?—A. Possibly.

By Mr. Gutelius:

Q. Had you any knowledge or do you know whether your brother had any knowledge that there was any such large amount of moss being estimated upon?—A. I think I had, but I cannot tell you how I gathered it, or how I knew.

Q. Do you mean it is impossible for you to tell us?—A. It is impossible for me to trace back how I got it. I got it from some of the junior engineers. I was enquiring about the whole contract and one thing and another, and I got the information.

Q. I want you to make your position as clear as you can?—A. I had the advantage of that knowledge; I do not mind acknowledging it; I do not want to husband it up in any way.

Q. And the fact that you tendered 12 cents on moss——A. I would have tendered that anyway.

Q. At all events, it gave you the contract?—A. Yes, but I should have tendered about twelve cents on moss, whether I knew it or not. You know yourself that it is easy to remove moss.

Q. But you did have knowledge that there was going to be a large amount of moss figured on that contract and you rather expected it?—A. Yes.

Q. And you knew when your bid was going in that your moss bid was going to get you the contract?—A. I expected it would be very favorable.

Q. Was much of the clay which was classified as 50 per cent loose rock excavated by steam shovels on this contract No. 15?—A. The proportion was very small, I should judge.

Q. About what yardage was the steam shovel capable of handling in an ordinary ten hour shift?—A. I have forgotten; it is one of those automatic sixteen ton or twenty ton.

Q. What would be a fair day's work average in that material?—A. I cannot tell you exactly. I should think that in good material it should handle 250 yards.

Q. You in your final estimate have received something like 6,000 to 8,000 yards of solid rock which was classified because of its being small stones closely assembled, what is called "assembled rock" in the estimates?—A. Do you mean in our work?

Q. In your work?—A. I do not know; I do not know how they classified it. I was never with them when they classified. I thought it was all solid rock we were allowed for, but you say there is a certain amount of assembled rock.

Q. Do you think, as a contractor, that any material composed of stones less than a cubic yard, and sand and clay mixed in with it, should be called solid rock under that specification?—A. If it is cemented, I should think it would be hardpan, but if it were frozen I should say it was solid.

Q. You would only make solid out of it if it was frozen?—A. If it is cemented it would be blasted continually and it is the same thing.

Q. If the cemented material did not have any stones in it, and you shot it, what would you call it?—A. There are a good many different kinds of cemented material, do you mean cemented sand?

Q. Cemented sand and clay if it did not have any stones in it, what would you call it?—A. That would be open to quite a lot of argument because you can get it cemented when it is very easily handled.

Q. Did you ever get solid rock for this stuff they call assembled rock on any other contract you were ever on?—A. I do not think so.

Q. This is a new proposition?—A. Yes; my specifications in the other contracts were for solid rocks or boulders measuring over a cubic yard.

Q. When you made your tender did you expect that solid rock was going to be the same solid rock that you as an engineer and contractor had been handling in previous contracts?—A. No, because I read the specification and the other specifications run differently.

Q. That is argument, but it is facts we want. Did not you expect when you made your tender on these specifications to receive the same treatment in the matter of interpretation from the engineers that you had been in the habit of receiving on other contracts?—A. No, I could not have done so because the specifications were different and worded differently. The specifications of the different materials were different.

Q. Did you put in a lower price for rock, than you would have put in on that account, did you reduce your rock price?—A. No, I got every cent I could possibly venture to ask without competition knocking me out.

Q. Then the interpretation which you contend for did not influence you in making your bid?—A. No, in the first place, on the contract you are referring to now, I never expected any very large quantity of rock. Of course, the estimates of the rock on that line were something like 250,000 yards or over.

Q. How did you know there was an estimate of that kind?—A. I got a copy of the estimate after I got the work. They gave me estimated quantities. I think I got them from Mr. Lumsden. Certainly, I got them from one of the engineers; anyway, I wanted to see what the total would be.

Q. What was your reason for asking Mr. Wallace Nesbitt for an opinion on this clause of the contract?—A. On account of the frozen material.

Q. Did you lay Mr. Nesbitt's opinion before the Commission or the engineers?—A. I showed it to our particular commissioner; our particular commissioner was Mr. Reid. I showed it to him and Mr. McIsaac and Mr. Lumsden, I think. I showed them the written opinion. In the same way, I had one from Shepley, Chrysler, and Arnoldi.

Q. You laid all these opinions before the Commissioners or the engineers?—A. Yes.

By Mr. Staunton:

Q. Why did you go to all the expense and trouble of getting so many opinions on this?—A. We intended to fight it out, and I have not abandoned the idea yet.

Q. Then the Commission was disputing your right?—A. The right to frozen material. In the first place, the Commission or the engineers on the line allowed it in Mr. Lumsden's reign, and then later Mr. Lumsden cut it more than in half, anyway he cut it down to $85,000. During the dispute I got these opinions in order to try the influence of laying first-class legal opinions before them to influence them to reinstate that, and they did not do it.

Q. Did they take all the frozen material from you?—A. Yes, I understand so.

Q. They did not allow you anything for frozen material?—A. I understand not.

Q. And you got these opinions to fortify your case before the Commission?—A. Yes.

Q. Did you get any opinions on any other matters excepting the frozen materials?—A. I cannot tell you offhand, I do not remember now. Of course, when they entered into the classification of frozen material, they entered into the whole classification of these three items: solid rock, loose rock, and common excavation.

By Mr. Gutelius:

Q. Referring again to that moss contract, was it generally understood between the contractors and the Commission that the estimate on which they would money-out the tenders was private information of the Commission?—A. It was not given to us for the purpose of tendering and so forth; we were not allowed to see that.

Q. So that if anyone had been given that it might have influenced their bid?—A. Certainly it would, very materially.

Q. In other words, you would be very glad to have had that private information?—A. I think anyone would. You are enough of an engineer to know that yourself.

By Mr. Staunton:

Q. It would be quite improper to give it to one person and not to another?—A. Certainly.

By Mr. Gutelius:

Q. You happened to secure this information because you were chasing up and down the line and heard in a general way what the boys were doing, that is right, is it?—A. Yes.

Q. Is there anything that has occurred to you that you would like to tell this Commission?—A. Excepting that I might tell you about that letter. There is a letter in existence which in my estimation would make my estimate final as I have paid the subcontractors on the classification as made, on the estimates which were marked "final" by the district engineers or division engineers, I am not sure which. The letter to which I refer and which caused the issue of these final certificates was one written by Mr. Grant in the spring of 1911 to Mr. Molesworth at North Bay, instructing him to issue these certificates as there would be no revision of classification on that work. The letter is every bit as strong as that. On the strength of that letter, I paid my subcontractors on these estimates.

By Mr. Staunton:

Q. Your firm is the firm of "Fauquier Brothers"; you and your brother constitute the firm?—A. It is not called Fauquier Brothers, it is E. F. & G. E. Fauquier.

Q. Was anyone else ever in partnership with you?—A. Do you mean at previous dates?

Q. Yes?—A. On work we did in 1884 there was Mr. Denwoody.

Q. Have you ever had any person else interested with you in a monetary way in the contracts on this Transcontinental Railway?—A. No.

Q. No person else?—A. No.

Q. No person had any direct or indirect interest in your contract?—A. Not the slightest.

Q. Did the profits go to you and your brother?—A. Equally.

Q. And to nobody else?—A. No, if we ever get them.

The Witness:—I would suggest in reference to the question as to the borrow pits that you should ask my brother without recalling me on that question, as I have no personal knowledge of it.

Mr. Staunton:—Yes, we will agree to that, but tell your brother to come prepared to give us the information.

The witness was not further examined.

Ottawa, January 22nd, 1913.

E. F. & G. E. FAUQUIER

Statement of Expenditure re Locating Ballast Pits.

Pit No. 1—	Mile 104	$ 500.00
Pit No. 2—	Mile 112	200.00
Pit No. 3—	Mile 160	515.00
Pit No. 4—	Mile 160	1,015.00
Pit No. 5 & 6—	Mile 160	1,123.75
Pit No. 7—	Mile 184	2,714.40
Travelling expenses, etc., G. E. Fauquier		2,000.00
		$8,068.15

(NATIONAL TRANSCONTINENTAL RAILWAY ENQUIRY COMMISSION. OTTAWA, JANUARY 31st, 1913.)

Present: G. LYNCH-STAUNTON, K.C., *Chairman*; F. P. GUTELIUS, C.E.

REID MCMANUS, sworn:

Examined by Mr. Gutelius:

Q. You had a contract for about eight miles of the construction of the National Transcontinental Railway between mileages 52 and 58 west of Moncton? —A. Yes.

Q. Who constitutes your firm?—A. It is two brothers of mine, Edward E. McManus, and John W. McManus.

Q. And no one else is interested?—A. I have another brother, he is partly interested, but he is studying for the Church, and he has not been interested in our workings.

Q. The peculiar features of the portion of the railway which you constructed seem to be a cutting from mile 50 to mile 52, which cutting is nearly two miles long; you are familiar with the ground there?—A. Yes.

Q. Did that long cut strike you as being a peculiar bit of location?—A. No. I never looked at it from that point of view; you are speaking to me now as from the engineering point of view.

Q. No, as a contractor, from your commonsense knowledge of railway location, did you figure that it was necessary to undertake a cut two miles long at that part?—A. Can I explain that?

Q. Yes, take your time and explain it?—A. I never gave it any consideration when we tendered on the work, and it was a year or so before we started to operate on that cut. We commenced at the small operations, I do not think we touched it at all the first year we were working. I never gave that question any consideration.

Q. Did you ever before take out a cut two miles in length?—A. No.

Q. So that it was very unusual..... did you utilize all that material for fills or was much of it wasted?—A. It was practically all used.

Q. What was the greatest haul that you gave any of that material?—A.

You can see by the profile. There is a small fill before you go into the cut and a part of the cut was borrowed and brought to contract No. 1. The balance was hauled to Chipman to make that fill across the bridge.

Q. So that the material which was taken across the bridge at Chipman was hauled how many miles?—A. About four and a half miles, I should think.

Q. What did you receive for hauling this material that long distance?—A. I got train haul price, as over-haul for that portion of the cut, as far as I know.

Q. What was your train haul price?—A. Thirty-eight cents.

Q. And what was your price for common excavation?—A. Twenty-one cents.

Q. And what was your price for loose rock?—A. Fifty cents.

Q. And your price for solid rock?—A. $1.50.

Q. So that the material in the big fill at Chipman would cost for earth fifty-nine cents and for loose rock eighty-eight cents?—A. The first part of the fill put in was put in from the west side from the borrow pit there about mile 59; we borrowed off the Toronto Construction Company's work about 40,000 yards.

Q. What I am referring to is the cost to the Commission of that portion of this big fill at Chipman which was hauled from the two mile cut at Mile 51; whatever you hauled down there would cost what?—A. The excavation price plus the thirty-eight cents.

Q. Which is common excavation, fifty-nine cents; loose rock, eighty-eight cents; solid rock, $1.88?—A. Yes.

Q. What proportion roughly was hauled down there from the big cut?—A. I think there was about 150,000 yards and perhaps more, I cannot say exactly as I do not remember.

Q. Anyhow you think there were over 100,000 yards?—A. Yes, over 100,000 yards.

Q. Did you grade the Y at Chipman?—A. Yes.

Q. Where did the material for that come from?—A. Some of it was borrowed right in the Y and some of it came from the first cut out from Chipman.

Q. But no considerable quantity of this Y grading came from the big cut?—A. No, the Y was practically completed before we opened that cut at all.

Q. In looking over the Y at Chipman I was surprised to find that you made such a long Y, do you know any reason why they should not make a Y there with an ordinary 10-degree curve?—A. I never gave that any consideration.

Q. The Y now is of such curvature that you could run it at thirty miles an hour without any trouble?—A. Yes, one leg is nearly straight.

Q. And the other is ordinary curvature that is used on main line track on many railways?—A. On many railways, yes.

Q. How did they happen to let an eight-mile contract when the other contracts were all for greater mileage?—A. Only from what I heard that they let fifty miles, and when they came to sign the contract. . . .I understood though, when the contract was asked for, that the work was to extend to Chipman, and then when the notice said only fifty miles they ended their contract there which was six miles out of Chipman.

Q. So that it was a remnant that was not covered by the larger contracts?—A. I understood that the Grand Trunk Pacific or the contractors who had the contract for the fifty miles, asked the Commission that they take eight miles more, expecting they would get it, and give them access to the works from each end.

Q. But for some reason or other they stopped back at the fifty miles?—A. Yes.

Q. And that left this eight mile piece?—A. Yes.

Q. Did you have much trouble in getting this contract?—A. They asked for tenders.

Q. Did you have any trouble about it?—A. We tendered and found we were the lowest. Then some of them discouraged us, they thought we were too low and then Corbett & Floesch offered to buy us out.

Q. But you concluded to do the work yourselves?—A. Yes.

Q. I see that the original estimate amounted to $289,000, what did your last estimate show?—A. $587,000.

Q. Do you know Mr. McManus, why there was such a great difference between the original estimate and the final estimate? Do you know where that difference occurred?—A. I do not know, I did not see any first estimate, but I understand that the engineers did not estimate any rock in that eight miles, that is my understanding of it.

Q. You have no idea of the quantities the engineers figured in their original estimates?—A. No.

Q. Is there any other reason why the contract should have practically doubled the estimate?—A. I do not know unless it was mainly due to classification.

Q. And by that you mean that there was more rock discovered when the cuts were opened than they expected?—A. Yes.

Q. How did the final classification compare with what you expected for your different prices, did you get all the loose rock that was coming to you?—A. I do not think we got all the solid rock that was coming to us. Some of that which we called solid rock they gave as loose rock, but I think our classification was a very fair one. We were continually fighting for more classification and as we had differences with our engineer from the start we thought we were not getting sufficient.

Q. Is not that always the case on contract work with the contractors?—A. I do not know as to that.

Q. The contractors are always trying to get the best classification they possibly can?—A. Yes, that is natural.

Q. That is considered good business for a contractor?—A. Yes.

Q. But there is not anything that stands out particularly in your mind as to which you got higher classification than you thought was coming to you?—A. No.

Q. You said a moment ago that you should have received more solid rock, what do you mean by that?—A. There was one cut in this work that the ledge overlaying what they called loose rock, ordinary material; the ledge was over the top of the cut, they called it indurated clay and gave us loose rock or hardpan. We claimed that as the rock formation was on the top, we should have rock to the bottom of the cut.

Q. Regardless of what material was underneath?—A. The rock was there first.

Q. But you didn't fight that very hard?—A. I tried to get it.

Q. I can understand, but you did not have a great deal of heart to try to make solid rock out of indurated clay?—A. It was kind of marl or fireclay. We had to blast it to take it out, but the moment you laid it in the air, it slackened like lime.

Q. Then, they did not make any mistake in classifying it as loose rock, that was low enough?—A. Oh, yes, it was low enough.

By Mr. Staunton:

Q. You have a claim, Mr. McManus, for overhaul on ballast?—A. Yes.

Q. What grounds do you base that claim on?—A. According to our contract as I understand it, the Commission furnished us with ballast pits on the work. There were no ballast pits within reasonable distance from our eight miles, and so we hauled ballast from the North River pit, and I had a verbal understanding with Mr. Foss, the district engineer, that he was going to pay us one cent a yard overhaul beyond the five miles.

Q. The same as is done in overhaul for borrows?—A. Train haul overhaul yes.

Q. The clause in the contract is 228 of the specifications, and it reads:—

"228. The land for ballast pits and approaches thereto will be furnished by the commissioners and approved by the engineer. In selecting land for this purpose, a preference will always be given to those points where the best material can be procured within a reasonable distance as determined by the engineer. During the working of any pit, should the material be found unfit for ballasting, the engineer shall compel the contractor to close such pits and open others. The cost of clearing land for ballast pits outside the right-of-way and grading and laying the main branch track to pits (but not sidings in same), shall be paid for according to the general schedule of prices."

Now, clause 225 reads:—

"225. Ballasting will include the loading, hauling, unloading, alongside of track, and transportation of all material hauled by train for the purpose of ballasting the track, said material to be duly accepted as ballast by the engineer. Ballast shall consist of broken stone, gravel, or coarse sand, approved by the engineer."

The item in the Schedule is No 75:—

"75. Ballasting—no overhaul allowed."

Now, those are the only clauses that I find in the contract referring to the subject, and I would like you to explain to me, if you can, how you came to infer that the Commission was bound to supply you with a ballast pit on the ground?—A. It says: "Where the best material can be procured within a reasonable distance as determined by the engineer."

Q. It says "Preference will always be given to these points where the best material can be procured within a reasonable distance as determined by the engineer." Certainly, the preference would be given if there are any such, but where there are no points where you can get ballast within a reasonable distance, you must still get ballast, must you not?—A. Well, I did not talk to Mr. Grant very much about it. I understood that he and Mr. Foss had a discussion about that, and I understood that we were entitled to a certain overhaul for ballast as it was costing us as much or more than we were getting for the delivery on the ground.

Q. As a fact you say there was no ballast along your contract?—A. There was no ballast along our contract.

Q. And you had perforce to bring that ballast to your contract how many miles?—A. Forty-five miles before we entered on our contract.

Q. Forty-five miles to the commencement of your contract?—A. Yes.

Q. So that some of it would be hauled over fifty miles?—A. Yes fifty-three miles, the average was about forty-nine miles.

Q. Do you know what that ballast cost you?—A. I cannot tell you.

Q. Did you never make a calculation?—A. I was figuring it as we went from day to day, you have the force accounts, and I think it is all there.

Q. But it cost you more than forty cents?—A. More than forty cents. You see we hauled it in the fall of the year and we could not leave the trains loaded over night. We hauled the most of it in November and December and we were afraid it would freeze on the trains if we left it over night.

By Mr. Gutelius:

Q. How many yards did you haul for the eight miles?—A. I think about 30,000 yards.

By Mr. Staunton:

Q. Have you any written promise from the engineer?—A. No, it was put in one estimate or two estimates. We got it one month in the estimate, that was the December or January estimate, and then in the spring of that year it was taken away from us again; it was cut out altogether.

Q. How much money do you think you will lose by it if you are not allowed?—A. I think the estimate is $6,800 for overhaul.

Q. It means $7,000 to you?—A. Yes, but that was only on part of it; we were allowed $7,000 on the overhaul for one month.

Q. Did you draw any surfacing from there?—A. I do not know, I do not think so.

Q. There is a clause here which allows you for surfacing:—

> "224. Surfacing 'B' will include the cost of all train hauled material under the track, surfacing, lining and all other work incident to the preparation of the track for running work trains where surfacing is done with train hauled material other than ballast. The surfacing must be kept up with the track laying as far as possible. All new tracks must be brought to surface and tamped up before it is run over. Rails that are damaged by reason of neglect on the part of the contractor will be replaced at his expense".

A. The contract we were working on we surfaced with sand from Chipman.

Q. You have a small allowance made to you for what was called "assembled rock", 600 yards on the eight miles, do you know what assembled rock is; did you get an allowance on indurated material, clay and small stones put in as solid rock?—A. I do not know. In certain of the cuts this sandstone would throw out as boulders but it was in flakes and it would show out on the side of the cut as rock.

Q. Show out on the estimates as rock?—A. No, we made a claim for that but I do not know how much we got.

Q. Have you not heard of this discussion about assembled rock?—A. Is that in reference to that blue print of Mr. Lumsden's?

Q. Yes?—A. Yes, I heard of that.

Q. Did not that assembled rock go down to your line at all, did it appear on your contract, to your knowledge?—A. Not that I remember.

Q. Did you, or did you not, try to get from the engineers small stones and cemented material in combination passed as solid rock?—A. No.

Q. Then if you are given stone smaller than a yard and cemented material as solid rock, it was not through any effort of your own that that was called solid rock?—A. The only claim I made was for what we usually call boulder measurement, that would show up in the cut as ledge.

Q. It is sandstone?—A. Yes.

Q. Why did you try to get that in as boulders?—A. It would show up in the face of your cut perhaps four or five feet wide and a few feet high, and go along five or six feet and disappear altogether. There would be nothing to show after the work is finished that there had been any rock there at all.

By Mr. Gutelius:

Q. These were all pieces of rock larger than a yard that you claimed boulder measurement for?—A. Yes.

Q. And if the pieces were smaller than a yard you knew they were loose rock?—A. We made a claim for it.

By Mr. Staunton:

Q. You made a claim for big or small?—A. No, not for small.

Q. That country down there has no hard boulders in the work; what you see all through the place was little junks of hard sand?—A. No, it was sandstone.

Q. Well, of sandstone through the sand?—A. No, it was in hard material, hard clay material.

Q. But you got allowed as solid rock those pieces of sandstone that were less than a cubic yard?—A. I do not know.

Q. Were they not generally less that a cubic yard, you got 610 yards of assembled rock and 94,000 yards of solid rock—in that solid rock how much of this sandstone was there?—A. It was practically all sandstone formation there.

Q. I do not remember seeing any stone there that was not sandstone; was it not all fragmentary sandstone?—A. It was ledge.

Q. It was not ledge as spread out beyond your contract?—A. Do you mean beyond the sides of the cut?

Q. Yes?—A. Oh yes, it was ledge.

Q. Where did you get the small fragments?—A. There are certain of the cuts there that were clay and through these cuts you would find that sandstone.

Q. Did that wandering sandstone amount to much?—A. Apparently, it was over 600 yards; there was quite a bit of it.

Q. There was not quite a bit of it that was over a yard?—A. It laid along in trenches, I can show it to you on the work a good deal easier than I can explain it to you.

Q. The point I am asking you is, was it in large or small pieces?—A. It was not in large pieces but I think there were pieces as large as this desk, over a yard.

Q. You say most of it was over a yard?—A. I cannot say that.

Q. Were the pieces of fragmentary sandstone small pieces, generally, or were they large pieces over a yard generally?—A. I cannot answer that, I do not know.

Q. From what you saw, what do you think?—A. I think we are entitled to all we made claim for.

Q. That is not the way I am asking you, were you entitled to all you were allowed?—A. I do not know.

Q. You may not have claimed it, they may have put it in under a misapprehension or under a misconstruction of the specifications; and Brer Rabbit he say nothing; may not that have been the result?—A. I do not know.

By Mr. Gutelius:

Q. You did not get all you claimed?—A. We did not get all our claims.

By Mr. Staunton:

Q. Of the sandstone?—A. Of the ledge as boulders.

Q. Did you ever get a copy of the opinion of the Minister of Justice on your claim for overhaul of ballast?—A. I don't remember that we did.

Q. Were you informed that he had given an opinion stating that you were not entitled to it?—A. Yes, I think that is the reason we did not get it.

Q. Had you any understanding, verbal or otherwise, with the engineer before you hauled this material, that you would be paid for overhaul?—A. Yes, we had.

Q. What was that understanding and with whom was it?—A. Before I hired the outfit, that is the engines and cars to haul this ballast, I had a talk with Mr. Foss and I asked him if he was to pay for overhaul on the work, and he said: Why certainly, the same as train haul, as I understood it, and as he awarded it to us on the first estimate.

Q. You were paid, you told Mr. Gutelius, for train haul in certain cases . . . . . the common excavation price plus the train haul material price, were you not?—A. Yes, as the train hauled material price was considered as overhaul.

Q. Now when you take out common excavation, your labor in connection with it is to remove it from its place on your carts and then dump it either on the way or as waste?—A. Put it in the dumps or waste, yes.

Q. Now in train hauled material, your contract is to remove that from its place, put it on the train, and haul it and deposit it along the way?—A. To make up fills, yes.

Q. Your price for train-hauled filling is 38 cents. Now, if it became necessary to use trained-hauled material, you would have to go to the ground, dig it up, put it on the train and haul it five miles for 38 cents and there deposit it on the road, is not that right?—A. Yes.

Q. Now why should you be paid the two prices?—A. You see the fill was across the river over at Chipman. To make up that fill they would have to go on to the west side as the borrow and the material we had to borrow was a hard kind of material. It would cost them more money than to pay us the overhaul price plus excavation price from the cut.

Q. But the point I make, Mr. McManus, is this: it makes no difference where you get the train-hauled material, whether it comes out of the line itself or out of the ballast pit, your labor and expense are the same, that is, if the borrow pit is as close as the place where you take it out of the line cut?—A. Yes.

Q. As a fact you contracted with the Commission for 38 cents, plus mileage for material carried by train and deposited on the line, did you not?—A. Yes.

Q. And you contracted with the Commission for material which is known as common excavation moved on the line for 500 feet at 21 cents?—A. Yes.

Q. Now, if you had not train-hauled that common excavation, you would have had to move it for 21 cents?—A. I would have to move it from this cut in the spoil pit and then I was entitled to a cent a yard for every one hundred feet beyond the 500 feet haul.

Q. Let us study that out. . . . you have, we will say, 1,000 yards of common excavation that you have no use for and that you propose to move into the spoil bank and that spoil bank is within 500 feet of the place where you were taking it out of the line cutting. Now then, the engineer comes along and says: Mr. McManus, instead of depositing that in the spoil bank, carry it down the line on the train forty-six miles and deposit it on the line. You carry it down the line. The only extra cost you are put to is for hauling it by train that extra distance, is that right?—A. Yes.

Q. Then they give you 38 cents for material, hauling that on the train five miles, because all the other expense you were put to anyway, is common excavation?—A. Yes.

Q. Now, what justification is there to give you 38 cents for hauling it that distance?—A. I do not know. From the understanding of my contract I could pull it out on to the spoil bank and they could borrow to make a fill on the other side.

Q. But they could come to you and say: Mr. McManus, we want you to take that out as train haul, we won't allow you to spoil that?—A. Then I guess they would have to pay me extra as train-hauled fill.

Q. They would pay you just on the train-hauled fill alone. The material removed by you is called common excavation when it is taken out and moved along within the 500 feet and deposited on the track or put in the spoil bank. The material is called train-hauled when it is put on the train and moved by the train. That is the only distinction between the two?—A. No, as I understand your contention there would be no classification in any cut, you would not be able to make any classification of loose rock or solid rock in a cutting?

Q. No, I say that any material that is carried by train is train-hauled and should come under that heading, but why you should drag in the other heading and put them both together, I cannot understand. You see the train-hauled filling, as interpreted by me, in this specification is for any extra filling to bring your cuts up to grade. You get a price for the train-hauled filling, but your line cuts have got to be excavated any way as classified. Therefore, if they make you haul line cuts anywhere, they are supposed to pay you one cent a yard for every 100 feet over 500 feet. When they make your haul five miles from the line cut they said the overhaul clause would not cover it and they made the other arrangement.

Let me read this, clause 224 X reads:—

"224 X. Where there is not sufficient material suitable for making embankments by men and teams within reasonable haul, of which the engineer shall be judge, and it becomes necessary to make use of the track laid at the expense of the commissioners to haul material for such purpose by train either for the widening of embankments to their full width or raising them to their full height, or for the purpose of filling temporary trestles the contractor will have the use of the commissioners' rails, fastenings and necessary switches for such purpose, it being understood that the track-laying will only be paid for once by the commissioners, and that any damage to rails, fastenings, or switches while in such service shall be paid for by such contractor to the commissioners, or the commissioners may deduct it from the monthly or final estimate due, or to become due to the contractor. The price given in the schedule for such train-hauled filling shall include the cost of all temporary trestles which the contractor may require, which he shall erect according to his own plans and at his own cost and risk, and all tools, plant, material and labor necessary for the loading, hauling, putting in place and trimming, as directed by the engineer. The limit to which the contractor will be called upon to haul such train-hauled filling at the price stated in this schedule will be five (5) miles; beyond such distance a price of one cent (.01) per yard per mile will be paid him, the measurement of such haul being made to the nearest mile, one-half mile or over counting as a full mile. Measurements of all train-hauled filling will be allowed on train-hauled filling from borrow pits."

Now, that applies, without any exception, to all material which you put on the train and haul, does it not?—A. No.

Q. I would like to know why it does not?—A. You see the line cuts are taken out with a steam shovel and trained. The stuff you load from these cuts on the train would not be termed train-hauled filling, but the excess, to make up the rest of your dump, after you borrow outside of your line cuts, would make your train-hauled filling.

Q. But all the material which you call train-hauled filling is material that you take out of its original position, put on the train, and haul to a given point. Now, you have to bear all that expense for thirty-eight cents, but when you take it out of the line, you say: now, I will charge for the common excavation price and I will also charge for the train-hauled filling price. So you are paid for taking that out of the ground and moving it by your trains twice?—A. No.

Q. Start from the other end of it. . .the line excavation is your classified material and your common material, you have to excavate your line cuts. If you move that 500 feet you get overhaul, if you move that up to 4,300 feet you get 38 cents in regular overhaul price. In this train-hauled filling you charge for

the train-hauled full price and the common excavation price. Why don't you also charge the common excavation overhaul price, too? I don't see if you get one why you should not get the other. You are getting a double-headed charge for this anyway?—A. No, I am not.

By Mr. Gutelius:

Q. Is there anything which as a contractor you would like to lay before this investigating committee that has not been brought out in the questions so far?—A. Can I add a reference to pipelaying. They made a unit charge at so much a yard and so much a running foot for laying pipe, and they gave us an extra work order to do it. Then, since we finished our work they took and changed it all back into common or line cutting price.

Q. The price you thought you were getting for these ditches was considerably higher than your line-cutting price?—A. Yes.

Q. Did you get a work order which showed what those ditching prices are to be?—A. Yes.

Q. And that paper was signed by whom?—A. I do not remember, you have it here, probably the chief engineer, it came from Mr. Foss.

Q. And in good faith you carried out the work expecting you would receive a higher price?—A. Yes.

Q. And after the work was finished?—A. They changed back to line cutting price.

Q. Do you remember what these ditching prices were?—A. We had, I think, 50 cents for common excavation, $1.00 for loose rock, and $2.00 for solid rock, together with the price of common excavation, 21 cents for back filling.

Q. And you were given that on your progress estimates?—A. Yes, we were paid, and it has been taken away from us. They have changed it back to 21 cents for common, fifty cents for loose, $1.50 for solid in trench, and back filling 21 cents. I think that the pipe-laying should be the same as foundation excavation price if we laid the pipe under the track. If we laid the pipe under the track, twenty-four inches or any kind of an outlet, with a culvert pipe, we would be paid foundation excavation price for that. Now they take us off the main line out into the woods about 800 feet and they expect us to do it for the ordinary line cut price.

Q. This was a waterpipe line?—A. Yes, for the tanks.

Q. At what station?—A. At Chipman.

Q. Did you do this with your own force account or sublet it?—A. We did it with our own force account.

Q. How much money roughly was involved in that reduction?—A. $2,000 or $3,000.

Q. And that is a claim that is now before the Commission?—A. Yes.

MR. GUTELIUS:—I think I may say that justice will be done you when the matter is finally settled.

End of examination of witness.

(NATIONAL TRANSCONTINENTAL RAILWAY ENQUIRY COMMISSION.)

OTTAWA, JANUARY 23rd, 1913.

Present:—G. LYNCH-STAUNTON, K.C., *Chairman*; F. P. GUTELIUS, C.E.

JOHN D. MCARTHUR, sworn:

By Mr. Staunton:

Q. You are the J. D. McArthur of J. D. McArthur, Limited, are you not?—A. Yes.

Q. Who are your associates in that company?—A. There are two or three boys in my office.

Q. It is just a one-man company?—A. Practically.

Q. Has any person got any substantial interest in the company except yourself?—A. No.

Q. What is the capitalization of the company?—A. One million dollars.

Q. Do you own the whole million dollars' worth of stock?—A. Except just two or three shares.

Q. I understand you to mean that the other members of the company are mere nominal shareholders?—A. Yes.

Q. You wrote a letter to the late Mr. S. R. Poulin, district engineer of the Transcontinental Railway, dated at Winnipeg, February 10, 1910, in which you state that you are in receipt of estimate sheet for the months of January and February (1910); these sheets show deductions to the amount of about $185,000 from notes and estimate sheets; these deductions are made by the order of the chief engineer and we presume the reduction is made for overbreak; we consider this question of overbreak settled at a meeting held in Kenora on February 8, 1907, when Mr. Lumsden, chief engineer, Charles Young, one of the commissioners, and all the divisional engineers were present; the matter was gone into fully then and Mr. Lumsden agreed to allow overbreak as solid rock. Now, was that letter written by you, Mr. McArthur?—A. I think that was written by the engineer.

Q. It is signed, "J. D. McArthur & Company, by R. A. H."—who is he?—A. R. A. Hazelwood,

Q. He was your engineer?—A. Yes.

Q. You say that letter was written by him?—A. It was written by him, I believe.

Q. Were you present at Kenora at that meeting?—A. Yes.

Q. Will you tell us from your recollection who were there?—A. The chief engineer, Mr. Lumsden was there, and Hodgins, the district engineer, and the divisional engineers, A. G. Macfarlane, and McIntosh, and Reehan, and another; the divisional engineers were there anyway.

Q. What was the meeting called for?—A. The meeting was called for when the men that were doing the work were complaining that they were not getting their estimates for the overbreak.

Q. A complaint had been made then by the contractors or sub-contractors?—A. Well, from the subcontractors to the contractors.

Q. That they were not getting a just allowance for overbreak, is that it?—A. That they did not get anything in their monthly estimates for overbreak.

Q. And this meeting was for that purpose?—A. For what purpose, for the purpose of discussing that question?

Q. For the purpose of discussing and settling the overbreak?—A. Yes.

Q. That was in February, 1907, how much work had been done at that time?—A. I cannot tell you offhand.

Q. I am only asking you approximately, because we have the record?—A. It was certainly small, compared with the total work.

Q. Only a small amount of work comparatively speaking had been done then?—A. Yes.

Q. And you met there for the purpose of discussing and arriving at some understanding with respect to overbreak. Was that the idea?—A. Yes.

Q. What happened at the meeting?—A. That was discussed and settled.

Q. I want you to tell me the discussion; I want you to tell me what occurred, we will draw our own conclusions, did you say anything?—A. No, I do not think I did.

Q. You had no complaint then personally?—A. Not as much as the men who were doing the work.

Q. Who made any complaint?—A. All the other contractors.

Q. Tell me one?—A. There was Chambers Brothers.

Q. What did Chambers Brothers say?—A. They wanted to pull off the work.

Q. What for?—A. On account of that they would not get any overbreak. If that were continued they would have to throw up their job.

Q. At that time, as I understand you, the engineers took the position that the contractors were not entitled to any overbreak, is that the point?—A. That they didn't have any instructions.

Q. To allow any overbreak?—A. To allow any.

Q. And none was being allowed?—A. None was allowed.

Q. Then you say there was a general complaint that there was no overbreak allowed?—A. Yes.

Q. What did Mr. Lumsden say?—A. Mr. Lumsden gave instructions to Major Hodgins to allow overbreak.

Q. Did he give him a standing order to allow overbreak, or what occurred —A. As I understood, it was left with the resident engineer.

Q. To do what?—A. To use his judgment.

Q. That was not giving him any more discretion than he always had; he was to use his judgment in any case?—A. Yes, but still he had no authority to return any overbreak.

Q. Then you say that Mr. Lumsden gave him instructions to use his judgment, that does not carry us any distance?—A. To pay for overbreak and return it in the estimates.

Q. Return what overbreak?—A. Whatever he thought was just. The road could not be built unless it was allowed.

Q. You had a contract yourself with the Government for building a portion of the road?—A. Yes.

Q. Now, in that contract, your allowances are provided for; what you are to be paid for is provided for in that contract, is it not?—A. Yes.

Q. And you and the subcontractors were claiming you were entitled to overbreak?—A. Yes.

Q. And Mr. Lumsden told the engineer, as I understand you now, to make you such allowances for overbreak as you were entitled to under the contract?—A. I do not think it was put in that way.

Q. If you will not tell me what his words were, I will try and suggest to you what appears to be the natural thing for him to do. I would like you to tell me what occurred. You make certain statements in this letter and I want you to tell me what was your understanding of what occurred at that meeting?—A.

I am just trying to tell you that what occurred at that meeting was that they came to a conclusion they would pay for overbreak and they instructed the engineers to return it in the estimates and pay for it.

Q. Were you to get all the overbreak you had, no matter under what conditions it was made?—A. That was left for the engineer.

Q. To find out what was proper?—A. Yes.

Q. If you were to put in outrageously large shots and piled up large quantities of overbreak that were improper and unnecessary, do you think he had instructions to allow you that?—A. That was some years ago and it was on a work that I cannot account for at all; I was not there when they were working.

Q. I am not saying the contractors did so, but I want to know whether Mr. Hodgins had instructions from his chief to allow you unnecessary overbreak?—A. I do not think he put it in them words.

Q. Would the chief engineer's words lead anybody to conclude that that is what he did?—A. No.

Q. He was to make proper allowances for overbreak, would not that be the way to put it?—A. As I understand overbreak, that occurs and it cannot be accounted for till it happens, slides in cuts, you take a shot and there will probably be fifty yards slide down at the side of the cut.

Q. That is slip and slide?—A. Yes.

Q. That was what he was to allow?—A. That was what he was to allow.

Q. You see the word "overbreak" is not used in the contract, that is a term that contractors and engineers use, but the word itself is not used in the contract. But in Section 37 of the specifications, it says:—

> "37. Material in slips, slides and subsidences extending beyond slopes in cuttings will not be paid for unless, in the opinion of the engineer, such occurrences were beyond the control of the contractor and not preventable by use of due care and diligence."

You are familiar with that section?—A. I am.

Q. The contractors were contending that on the contract there was material which came within that description, not allowed for, and they called it overbreak, is not that right?—A. Yes.

Q. But it was not contended that the engineer should allow something that was not authorized by the contract, was it?—A. Well, it was left with the engineer.

Q. To use his judgment and make such allowances as were proper under that clause?—A. Yes.

Q. Now if the contractors put in unreasonably large shots and blew out unnecessary quantities, you would not expect to be allowed for that, would you?—A. No, I think they tried to protect themselves from anything of that kind.

Q. You would not expect that to be allowed if the shots were unnecessary and unreasonably large quantities were thrown out?—A. Well, that is a question that comes under the heavy shots; I do not know whether they were heavy shots or not.

Q. We are not talking about what occurred on the work, I am talking about what occurred at this meeting; did Mr. Lumsden tell them they were to allow the contractors where the shots were too heavy and the material was unnecessarily blown out?—A. I do not recollect that being discussed.

Q. I should not have thought it would have been, but you say the contractors contended they were entitled to be allowed for overbreak under the contract and they were not getting it?—A. Yes.

Q. And instructions were given by the chief engineer to the district engineer to give them proper allowance?—A. The pay for overbreak was left to the engineer as the best authority to say what he thought was just.

Q. Is that all that occurred at the meeting?—A. That is all, that is what the meeting was for, that was the grievance.

Q. You say in this letter that overbreak was to be allowed as solid rock?—A. Yes.

Q. You know how the overbreak under the contract is to be classified, do you not; it is to be classified as in the condition in which it falls into the cut after the shot, that is right, is it not? Section 38 of the specifications says:—

"38. The classification of material from slides shall be made by the engineer, and will be in accordance with its condition at the time of the slide, regardless of prior conditions."

A. That is just in slides and slips.

Q. Yes, that is to say that where there is a slide or a slip he is to go and look at the material after the slide or slip and see whether it comes within the solid rock or the loose rock class, and allow accordingly, is not that right?—A. Yes, of course there might be some loose rock come from the top of the cut you know, very often there is two or three feet of material or more, like that.

Q. So that he should not allow solid rock for small stones under a yard, should he?—A. Oh yes, we never expected but what we would get paid for anything that was all rock, even though it broke very small. It was solid rock in the first place and it was broken up. There might not be a yard in it after it was broken up.

Q. Why should you be allowed for that, when the contract said you should not?—A. It cost us more money to handle it than if it was two yards or five yards.

Q. Why should you be allowed for it when the contract said you should not?—A. There was only a small percentage of that.

Q. Whatever percentage there was under a yard in size, all these pieces of rock should be put in as loose rock, should they not?—A. I do not think it should.

Q. How do you get around the contract?—A. I do not know how you are going to get around it or anything of that kind, I am just speaking as a contractor moving rocks which cost me more money to move it.

Q. It may have cost you more money, I do not know anything about that, but when you make a bargain that states definitely that slips and slides must be classified in the shape in which they exist after the explosion, you surely do not expect it to be classified as it existed before the explosion?—A. I do.

Q. Notwithstanding the contract?—A. Notwithstanding the contract.

Q. You are an old contractor, are you not?—A. That is what they say.

Q. Were you ever on this contract yourself?—A. I must say that I was not.

Q. Did you do any of this rock work yourself?—A. No.

Q. Sublet it all?—A. Yes.

Q. You made contracts with your sub-contractors for this work in writing, did you?—A. Yes.

Q. Were those contracts similar to the contracts you made with the Government?—A. Yes.

Q. So that the sub-contractors had only the same rates as you had?—A. That is all.

Q. And they were only entitled to have slips and slides classified as against you in the same way as you were entitled to have it classified as against the Government?—A. Yes.

Q. I suppose that you have studied this specification?—A. No, I think not.

Q. Have you submitted it to your lawyer for advice on its meaning?—A. I have, this last eighteen months, when the work was finished.

Q. You knew though, at the Kenora meeting, that up to that time somebody thought you ought not to get overbreak?—A. That was the attitude that the engineers took.

Q. I thought at that time you submitted it to your Winnipeg lawyers, I think I saw a letter about it, Mr. Wilson was your lawyer in Winnipeg?—A. Fisher Wilson, yes.

Q. Did you not submit it to them at that time?—A. I might have done that, but I cannot tell you cannand.

Q. Fisher & Wilson did write the Commission for you, did they not?—A. Yes.

Q. Do you remember what they wrote about?—A. I do not.

Q. Who were your sub-contractors who were interested in the overbreak?—A. Chambers Brothers and McCaffrey, W. A. Dutton, it was Dutton & McArthur, but Dutton was really the man.

Q. Is McArthur, J. D. McArthur?—A. No, another one. There was Guy Campbell, Olsen & Larsen, and Wardrope, and James Walsh, and Anderson Johnston, and then there was what they called the Eastern Construction Company. That was the bulk of the contractors.

Q. Have you settled with these people?—A. No, there are four or five I have not settled with.

Q. Have you settled with Chambers?—A. No.

Q. Have you settled with Dutton?—A. No.

Q. Have you settled with Campbell?—A. No.

Q. Have you settled with Olsen?—A. No.

Q. Have you settled with Wardrope?—A. Yes, I settled with him.

Q. Have you settled with Walsh?—A. Yes, he is settled with.

Q. Have you settled with Anderson & Johnston?—A. No, they are not settled with.

Q. Have you settled with the Eastern Construction Company?—A. No. There is a little fellow named Charlie Patterson.

Q. Is Patterson settled with?—A. No.

Q. There are eight of them outstanding?—A. Yes.

Q. Have they large claims against you?—A. Yes.

Q. Have you settled with them for this overbreak?—A. I settled with them all along as we were getting our monthly estimates.

Q. I know that, but did you settle with them all along, because they would have only 10 per cent left if you did?—A. That is all they have.

Q. Do you mean to say that these men have got all that is coming to them except the 10 per cent hold back?—A. Do you mean the estimates with the arbitrators' cut?

Q. No, I asked you if you paid them the estimates to date for the whole claim?—A. I have.

Q. From these estimates were deducted what you call the arbitrators' overbreak, was it not?—A. No.

Q. They didn't allow that to them?—A. Yes, in the first estimates.

Q. Have they been all paid by the Government for this overbreak?—A. Yes.

Q. That is all paid?—A. Yes.

Q. And what claim they have now is the 10 per cent hold back?—A. Yes.

Q. That is the whole matter?—A. Yes.

By Mr. Gutelius:

Q. And the amount deducted from them by the arbitrators.

By Mr. Staunton:

Q. Have you paid the amount of the arbitrators' deduction?—A. Yes.

Q. So that the sub-contractors have no claim whatever against the Government except for the final ten per cent?—A. That is all.

Q. I want to understand this, let me put this question: The arbitrators were Mr. Grant, now chief engineer of the Transcontinental, Mr. Kelliher, chief engineer of the Grand Trunk Pacific, and Mr. Schreiber?—A. Yes.

Q. When did they go over the work?—A. About two years and a half ago.

By Mr. Gutelius:

Q. Was the work about finished at that time?—A. When they went over for the last arbitration, the work was just about finished.

Q. The rock excavation was about completed?—A. Oh, yes, that was completed. I thought you meant the whole line.

By Mr. Staunton:

Q. That was the second arbitration, they took about $400,000 off you?—A. Yes, more than $500,000.

Q. Which they said was not properly allowable under the contract?—A. Yes.

Q. The arbitrators went over the ground before that?—A. Yes.

Q. Who were they?—A. The same parties.

Q. When did they first go over the ground?—A. I think it was in the spring of 1909.

Q. What did they do that time?—A. They went over the work but there was no report and no deduction came in.

Q. Did they direct that deduction should be made?—A. I do not know that, I never was notified.

Q. Did the engineers act differently after the arbitrators went over the first time?—A. No.

Q. Was the work all done then?—A. Practically.

Q. You say all this work was completed before 1909?—A. A very great deal.

Q. The rock excavation?—A. Yes.

Q. Now, after the second arbitration, the Commission cut your estimates so as to deduct from you the amount the arbitrators said you were not entitled to?—A. Yes.

Q. And that amount has never been paid you?—A. They took off a percentage.

Q. And an amount equal to their deductions is being retained from you?—A. Yes, they kept my percentage back and cut this overbreak off it.

Q. What you say is that they went on paying estimates up to that time and that you got allowed overbreak without any deduction?—A. Yes.

Q. The arbitrators then came along and said, it is not proper to make allowances for this overbreak and they took off $400,000 from you?—A. Yes.

Q. And that is what you are objecting to?—A. Yes.

Q. Now, the engineers in the field did not deduct anything for overbreak?—A. Oh yes.

Q. Did they in the beginning?—A. No.

Q. They allowed you all the overbreak that occurred on the line?—A. I expect they did.

Q. Have you ever seen that work yourself?—A. Not very much while they were grading it.

Q. Have you seen it since?—A. Yes, I have been over the lines since the rails were down.

Q. There are some pretty wide cuts on it?—A. Yes.

Q. There is a lot of waste is there not?—A. Very little waste.

Q. Do you remember District F, Mile 5.8, Residency 19, just near the junction; here is a picture which shows an enormous piece of rock which stands

out of the ground about 18 feet and blown out into the side, don't you think it would take some shooting to do that?—A. Is not that more than five miles from the junction?

Q. It is over five and a half miles. Do you remember that big monument there?—A. Is there a ravine running below?

Q. Yes?—A. That was on Swanston's work.

Q. I do not know whose work it is on?—A. There is a cut down there, but I thought it was further west of the junction.

Q. Don't you think that would take a lot of shooting to throw that out?—A. Yes.

Q. Do you think they ought to get allowed for that?—A. If it is the cut I have reference to, but I thought it was further west on the line than that, if it is the cut I have reference to, you have seen it, Mr. Gutelius, it is a big cut and there is a ravine away below it.

Q. Here is the cut with the ravine below it, it is another picture?—A. That is the only thing I objected to on the line, was that one.

Q. But this big one here, didn't you object to that?—A. I must say that I cannot recollect that.

Q. You can see the size of that stone by comparison with the size of the persons standing around and the trees, could you think there is any justification for blowing a great big stone like that from the side of the cut?—A. It depends on how it was lying, very probably; it might be that it could not be moved or touched at all without throwing it there.

Q. It is not a boulder though, it is ledge rock?—A. Side work is different.

Q. This is not side work, it is right out of the cut, you would not expect that fellow to come out would you?—A. I would suppose they would adjust it as they were going on with the work.

Q. If by putting in big shots they did throw stuff up like that, do you think it should be allowed if the material was required in adjoining fills; that is clean waste of overbreak. I do not mean in the cut, clean waste of the overbreak?—A. That is the way I feel about it.

Q. Do you think that should be allowed?—A. No, that should not be allowed.

Q. And what would you say about that at Mile 24.6?—A. That is the ravine I refer to. I would say that certainly should not be allowed. That was intentionally done.

Q. Now, the arbitrators made these deductions because they thought it was improperly done?—A. I do not know what their intention was, I did not take any part in it at all.

Q. Do you think that three gentlemen of their standing and experience would make a deduction of nearly half a million dollars for unnecessary overbreak, if there was not some very good reason for it?—A. I claim that it was not all unnecessary overbreak, that it went into the work.

Q. But Mr. McArthur you could not go over that work as a fair-minded man and say that there is not unnecessary overbreak, could you?—A. I think there is very little overbreak there but what was used.

Q. I am not speaking about whether it was used or not, could you, as an honest man say, with your knowledge and experience as a contractor, that there is not a great amount of unnecessary overbreak on that contract?—A. At first we were pushed with the work.

Q. We will come to that after, I will give you a chance to show excuses for it, but I ask you a straightforward question as an honest man, and an experienced contractor: can you say that there was not a large quantity of unnecessary overbreak on that contract?—A. Well that is a question that creeps in in the answering of it, right with another, and that is that a lot of that overbreak was done because it was wanted in the work.

Q. That is a matter for us to discuss afterwards.

MR. GUTELIUS:—He could answer yes, and then say that they expected to get paid for it because they were going to use it in the fill.

MR. MCARTHUR:—That is correct.

By Mr. Staunton:

Q. Then, if it was not to be used in the fills, you admit that there was a lot of unnecessary overbreak?—A. What is that?

Q. Suppose they did not want to use it in the fills, would there be any justification for the great quantities of overbreak there were in that contract?—A. Of course that is a matter of engineering and how this rock lay.

Q. It seems to me it was a matter of engineering by the fellows who were putting in the shots. I am asking you that question and I want you to give a candid answer. If there had not been any use for that overbreak, would there have been any justification for the great quantity that is there?—A. You are talking about shots now, and that is a thing I do not know anything about. I never saw a shot in my life.

Q. You have great contracts and you are a contractor of great experience?—A. The men were on the work and the men doing the work had a great deal more experience than I had.

Q. You have been on work in your time?—A. I was not on this work.

Q. You have seen a lot of work done?—A. Most of my work was dirt work.

Q. This contract shows over 40 per cent and 50 per cent of overbreak. Was there ever on the American continent such great quantities of overbreak as on this road?—A. I do not know that.

Q. You cannot point me to any other similar case, can you?—A. I do not know.

Q. If you don't know, who would, can you justify this overbreak on any ground, except that it might have been wanted in fills?—A. That is the point.

Q. What do you say about that point?—A. I say if it was wanted in the fills, that would justify it so far as the overbreak was concerned, and it would remove any objection to paying for it, if the rock was wanted.

Q. But if the rock was not wanted and you had to pay for it, there would be a strong objection on your part?—A. If the rock was not wanted, there is room there for an argument.

Q. What do you mean by saying there is room for an argument?—A. If there was a case of overbreak from heavy shooting, and it was thrown out at the end of the dump and wasted.

Q. Then it ought not to be paid for?—A. I mean it should not probably be paid for at the rate per yard that we were getting, unless it was slip and slide.

Q. Oh, yes, of course. What is a reasonable percentage of overbreak?—A. I do not know.

Q. You do not know?—A. No, I do not.

Q. I am told that about 12 per cent is a reasonable percentage for overbreak, what do you think of that?—A. I do not know; I never had that experience.

Q. These three arbitrators ought to know, ought they not?—A. They ought to know what?

Q. What is the fair allowance?—A. Well, the overbreak was there. Of course, I do not see how they could come in at that stage of the game and cut down so much overbreak.

Q. Why should not they; they saw the cuts?—A. Yes.

Q. And they saw the rock that was taken out?—A. Yes.

Q. And they saw the condition in which the cuts were left?—A. Yes.

Q. Now, these men know how that kind of rock should be treated, don't they?—A. Well, it is the men that are on the work; they know the conditions at the time.

Q. Yes, but conditions don't change in rock you know. People may say they change in earth exposed to the air, but rock is everlasting and stays the same, does it not?—A. Yes.

Q. Now then, a man that is going to put a shot in, when he looks at the rock that he is going to blow out, he ought to know about how much powder to use?—A. They claim they do.

Q. And if he ought to know before he puts in the shot how much powder he should use, surely great engineers like these men should know how much powder should have been used on that amount of rock?—A. I do not know if these men, even if they had experience, had ever done any of that class of work themselves.

Q. But should they not know? Mr. Kelliher is chief engineer of the Grand Trunk Pacific and has had large experience, has he not had?—A. I do not know what experience he had before he came on the Grand Trunk Pacific, but he has had a large experience on the Grand Trunk Pacific, there is no question about that.

Q. Mr. Grant has been a railway engineer for twenty-five years?—A. Yes.

Q. And he has had large experience?—A. Yes.

Q. And Mr. Schreiber is I suppose one of the oldest and most experienced engineers in America?—A. He is one of the oldest.

Q. He has had great experience has he not?—A. Yes.

Q. These men are fair-minded men are they not?—A. I do not know.

Q. Why should they be prejudiced?—A. One reason why they should be prejudiced, a man like Mr. Kelliher he wanted to get the road built for less money, and if he took a thousand yards out of a cut it was so much less.

Q. You say that Mr. Kelliher's business was to get the road built for as little money as possible, and if that be so, then Mr. Grant's busines was to put all the cost he could on the Grand Trunk?—A. I do not know about that.

Q. Is not that right; Grant wanted to put all the expense he could on the road when the Government had to pay for it, and the Grand Trunk make a return in interest?—A. I do not know that.

Q. Well, if you know one thing you ought to know the other. If Mr. Kelliher was prejudiced on one hand, there would be the same reason for Mr. Grant being prejudiced on the other.

By Mr. Gutelius:

Q. If a large amount of money was spent on that work, Grant wanted to make sure that the Grand Trunk Pacific would pay interest on that money rather than to leave an opportunity for the Grand Trunk Pacific to say: no, we won't pay on that. That would be an incentive that would make Grant stand up for practically all the work that had been done. Grant must have been your friend on that Commission, I mean in the sense that, representing the Government, if the Government had to pay he did not want to give the Grand Trunk Pacific a chance to slide out?—A. He is chief engineer of the Government.

Q. You say that Kelliher wanted the work done as cheaply as possible so that the Grand Trunk Pacific would have to pay interest on as small a sum as possible; is that right?—A. Yes.

Q. Now then, on the other hand, Grant wanted to make the Grand Trunk Pacific to pay as much interest on as much of the money spent by the Government as he could possibly make them pay; is that right?—A. No; I do not say that is right.

Q. Why?—A. I suppose it would be his interest to see that the Grand Trunk should pay interest on all that the road cost.

By Mr. Staunton:

Q. You say they paid for this overbreak at that time, and so Grant wanted to load off all he could on the Grand Trunk, did he not?—A. I suppose so.

At the afternoon session of the Commission, when the examination of the witness, Mr. J. D. McArthur, was continued, Mr. McArthur was represented by Mr. John H. Moss, K.C., of Toronto.

Examination resumed.

By Mr. Staunton:

Q. Referring to the arbitration that we were speaking of before lunch, that arbitration was to settle difficulties between the Grand Trunk Pacific and the Commission?—A. That is what I claim.

Q. That is what you understood?—A. Yes.

Q. The contractors were not parties to that arbitration?—A. No.

Q. Under the Transcontinental Railway Act, questions in dispute between the Company and the Commission, which cannot be otherwise settled, are to be referred to an arbitration?—A. Yes.

Q. You understand that this was the arbitration under the statute?—A. I do not know anything about the statute.

Q. Under the Transcontinental Railway Act?—A. Yes.

Q. I believe you refused to take part in the arbitration?—A. Yes.

Q. You wrote a letter to the Commissioners that it was not your concern?—A. Yes.

Q. Did anybody on your behalf accompany the arbitrators?—A. No.

Q. Was your engineer with them?—A. My engineer was with them part of the way anyhow, because he was engineer and superintendent of the road; our engine was pulling their car.

By Mr. Gutelius:

Q. He did not take part in the discussion?—A. No.

By Mr. Staunton:

Q. Did you get a copy of the arbitrators' finding?—A. Yes.

Q. Do you remember how much money they took off?—A. In the second arbitration it was over $500,000 or nearly $600,000.

Q. That was in deductions for what they claimed were unnecessary overbreak?—A. I do not know what for, but it was put in.

Q. You understood it was on account of the overbreak?—A. It was for classified material and overbreak.

Q. Do you know what they did on the first arbitration?—A. No.

Q. You had no information concerning that?—A. No.

Q. Who are the Eastern Construction Company?—A. It is Alex. McDougall and Son; it is an incorporated company.

Q. How much work did they have?—A. They had fifty miles.

Q. I understand you have not settled up with your subcontractors until you get this question of overbreak settled?—A. Some of them.

Q. These contractors that you say you have not settled with, you are holding back from them until this question of overbreak is finally settled?—A. Yes.

Q. Have you held back from them the whole amount of this $500,000 or $600,000?—A. No, not that much.

Q. How much have you held back?—A. I held back somewhere I think about $300,000.

Q. Had you a uniform price with these men?—A. Oh, yes.

Q. What percentage did you get?—A. It varied; I do not know there is much difference between all of them, but there is a difference.

Q. What percentage do you get on solid rock?—A. I get in some cases fifteen per cent and in other cases it runs down to about twelve per cent or ten per cent.

Q. And loose rock, what percentage do you get?—A. It would be about five per cent.

Q. And on common excavation, what percentage do you get?—A. On common excavation it would not go one per cent.

Q. There was not very much common excavation in this district?—A. There was quite a bit.

Q. There was not a very large percentage of common excavation?—A. It was not a large percentage.

Q. About how many yards of solid rock do the estimates show up to date?—A. Somewhere about 6,000,000.

Q. And how many yards of loose rock?—A. I cannot tell that; I see from the statement shown me now that it is 1,900,000 odd.

Q. About how many yards of common excavation?—A. 2,470,000.

Q. With reference to overbreak, suppose that it had been classified strictly in accordance with the specification in which it says that these slides shall be classified as they fall in the cuts, what percentage of stones after the shots had been fired, in an ordinary cutting would be less than one cubic yard in size?—A. I cannot tell you.

Q. What is your judgment as a contractor about that?—A. I cannot answer that.

Q. Take an ordinary granite cut in which a proper shot has been placed, and you and I walk into the cut and see how much is broken and we are going to make an ordinary guess, how many pieces of that rock would be less than a cubic yard—certainly we would get somewhere between 10 per cent and 80 per cent, would we not?—A. I cannot say; I never was a foreman in a cut, and I never took out a cut.

Q. From your knowledge in a general way, such as I have spoken of, do you not know that they only need to block holes about one-third of the cut, would not that be a lot of block holing?—A. For the first shooting.

Q. You take out the loose stuff and would not one-third of it be pretty badly shot?—A. What percentage of block holing I would do for heavy shooting, I do not know.

Q. I have this information from other sources and I would like, if I can get some kind of idea from you?—A. I cannot answer it, because it would not be fair to you and to myself if I did, because I have never done any of that.

Q. The reason it is so important to you is that under the specification all overbreak found in a cutting, the pieces of which are less than a cubic yard ought to be classified as loose rock; you see the importance of it in connection with this very case?—A. Yes.

Q. And if you don't feel that you would like to make any kind of an estimate we will pass on to something else?—A. That is the way I feel about it, I did not study it.

By Mr. Gutelius:

Q. Now, with reference to the original contract, here are the two original bids, are they not?—A. Yes.

Q. You see both of these original bids?—A. Yes.

Q. Now take one copy and I will keep the other. Now referring in your copy to page 6, and particularly to item 58: Concrete facing 1 x 2 x 2 1-2 inches thick, including forms, what price did you get for that?—A. $15.00.

Q. You got $15.00 for that on these tenders?—A. Yes.

Q. What price did you get on Item 59, concrete 1 x 2 x 4?—A. $15.00.

Q. What price did you get on Item 60, concrete 1 x 3 x 5?—A. $15.00.

Q. What price did you intend to bid for concrete 1 x 3 x 5 here, I see the space is left blank?—A. I intended to bid $15.00.

Q. Then Item 61: Concrete 1 x 3 x 6, what did you bid on that ?—A. $15.00.

Q. What price did you intend to bid for Item 62; Concrete 1 x 3 x 5, arch culverts, including curves, I notice that is blank?—A. That would be $15.00

Q. On Item 63, Concrete 1 x 3 x 6, in arch culverts, including curving, your bid calls for $15.00?—A. Yes.

Q. On Item 64, Concrete 1 x 3 x 6 in box culverts, including curving, what did you intend this to be? I note that it is blank?—A. $15.00.

Q. On Item 65, Concrete 1 x 4 x 8, ordinary foundations, including curving, your bid for that is how much?—A. $13.00.

Q. On Item 66, Concrete 1 x 4 x 8, walls of buildings, including curving, I notice this is blank, what price did you intend to bid?—A. I should think that would be $13.00.

Q. It would appear that if you had put brackets in here, (indicating in the book presented to the witness) and taken these different items off, it would have made clear what you were bidding instead of leaving these items blank, am I right? A. Yes, that would be the proper way to do it, I guess.

Q. Or it would have been equally plain if the word "ditto" had been written in under each of these figures which I showed you?—A. Yes.

Q. Now, Mr. McArthur, I would like to have you compare the contract with the original tender in connection with the items I have just enumerated. In the contract Item 58 is $15.00 per cubic yard?—A. Yes.

Q. This is the contract I am showing you?—A. Yes.

Q. And Item No. 59, is $15.00?—A. Yes.

Q. And Item No. 60, is $12.00?—A. Yes.

Q. You remember then a moment ago that you told me Item No. 60 was intended to be $15.00, am I right?—A. Yes.

Q. Item 61 is $15.00 in the contract?—A. Yes.

Q. Item 62 is $13.00 in the contract?—A. Yes.

Q. You told me a moment ago that you intended it to be $15.00?—A. Yes.

Q. Item 63 in the contract is $15.00?—A. Yes.

Q. Item 64 in the contract is $11.00?—A. Yes.

Q. Item 64 you intended to be $15.00 in your bid?—A. Yes.

Q. Item 65 is $13.00 in the contract, which is the same as in the bid?—A. Yes.

Q. Item 66 in the contract is $10.00 and you intended it to be $13.00 in the tender?—A. Yes.

Q. Is that information new to you, Mr. McArthur?—A. I would have to say yes, and I ought to know better all right. It is through not just checking both up, I guess.

Q. You do not mean to tell us that this is the first information you have had that in the contract price for concrete they gave you in some cases $1.00, in other cases $2.00, in other cases $3.00, in other cases $4.00, and in other cases $5.00 a yard less than your tender called for?—A. Was there any of this done on the work?

Q. You have received on the $13.00 concrete $22,750.70, on the $12.00 concrete you have received $188,953 in your estimates. Was there not some informa-

tion in connection with this given to you, between the time that you handed in your tender and the time you signed the contract?—A. No, I do not recollect that there was on the concrete.

Q. There were other items that you overlooked, were there?—A. There were some small little things, I forget what they were, and we asked for prices and we did not get them and they did not amount to anything, something about tracks or connections or something of that kind, that is the only thing I recollect.

Q. I will refresh your memory in connection with twenty-seven items, where unit prices are given in the contract and not in your tender, and by reference to the contract and the original tender which I will place before you, you will be able to answer the question. While you are looking at them, I will call them off and when I read the items that are shown in the item and not covered in the tender you will say nothing in the tender. Now, Item No. 15, pole drains, 25 cents per lineal foot?—A. Nothing in the tender.

Q. Item 21: piling out reserved stone from rock cuttings, $1.00?—A. Nothing in the tender.

Q. Item 28: Cedar timber in culverts, 8-in. x 12-in. 10-in. x 12-in. and 12-in., per M. ft. b. m., $40.00?—A. Nothing in the tender.

Q. Item 32, vitrified pipe culverts—14-in. diameter, $1.25 a lineal foot?—A. Nothing in the tender.

Q. Item No. 33, Vitrified pipe culverts—15-in. in diameter, $1.35 a lineal foot?—A. Nothing in the tender.

Q. Item No. 35: Reinforced concrete pipe—12 inches in diameter, $1.20?—A. Nothing in the tender.

Q. Then Items from 35 down to 50 inclusive have all been interpolated in the contract and are not shown in the tender?—A. That is correct.

Q. The following are the Items from No. 35 down to No. 50, inclusive: 35—Reinforced concrete pipe, 12 inches in diameter; Item 36, Reinforced concrete pipe—14 inches in diameter; Item 37, Reinforced concrete pipe—16 inches in diameter; Item 38, Reinforced concrete pipe—18 inches in diameter; Item 39, Reinforced concrete pipe—20 inches in diameter; Item 40, Reinforced Concrete pipe—24 inches in diameter; Item 41, Reinforced Concrete pipe—30 inches in diameter; Item 42, Reinforced Concrete pipe—36 inches in diameter; Item 43, Reinforced Concrete pipe—42 inches in diameter; Item 44, Reinforced Concrete pipe—48 inches in diameter; Item 45, Reinforced Concrete pipe—54 inches in diameter; Item 46, Reinforced Concrete pipe—60 inches in diameter; Item 47, Reinforced Concrete pipe—4 inch agricultural under tile drains; Item 48, cast iron pipe culverts—16 inches in diameter; Item 49, cast iron pipe culverts—18 inches in diameter; Item 50, cast iron pipe culverts—20 inches in diameter?—A. Yes.

Q. These are all interpolated in the contract and are not shown in the tender?—A. That is correct.

Q. Items 54 and 55, cast iron pipes?—A. Nothing in the tender.

Q. Item 56, cast iron pipe?—A. Nothing in the tender.

Q. Item 57, cast iron pipe culverts?—A. Nothing in the tender.

Q. Items 60, 62, 64 and 66 are the concrete items the details of which we have gone over?—A. Yes.

Q. Item 81, Semaphores at stations, complete, $550?—A. Nothing in the tender.

Q. Item 82, Interlocking appliances, complete, eight levers, including all connections, signals, etc., $6,000?—A. Nothing in the tender.

Q. Item 83, Each additional lever $200?—A. Nothing in the tender.

Q. Item 86, rock sections (unlined) $75.00 per foot?—A. Nothing in the tender.

Q. Item 87, tunnels (lined), $85.00 per foot?—A. Nothing in the tender.

Q. Item 88, tunnel, concrete lining, per cubic yard, $15.00?—A. Nothing in the tender.

Q. Item 89, tunnel, masonry lining, $15.00 per cubic yard?—A. Nothing in the tender.

Q. Item 90, drainage tunnels, 4 cubic yards, $25.00 per lineal foot?—A. Nothing in the tender.

Q. Item 93, turntables, $3,000 each?—A. Nothing in the tender.

Q. Item 94, track scales, $1,000 each?—A. Nothing in the tender.

Q. Item 95, tunnel shafts, $5.00 each?—A. Nothing in the tender.

Q. Now, Mr. McArthur, I wish you to tell us how you permitted those prices to be put in in the contract which you executed and which were not covered in your tender?—A. In the first place, there were a lot of these items there that we never used in the road; there is no estimate for some of them today. There were no tunnels shown on the first profile.

Q. How about those items that were shown on the profile?—A. There were none of them shown on the profile as far as quantities or anything of that kind, but of course it was in the specifications.

Q. I wish you to explain very fully how you undertook a contract of that character?—A. In the first place the way we put in our tender, when putting in those figures, it was figured out that they did not amount to very much, that we didn't have a price. It was done in a very short time, and then when they were awarding the contract it was left to the chief engineer.

Q. Do you say it was left to the chief engineer to fill in the prices?—A. Yes, with his experience of that kind of work.

Q. How did you leave it to the chief engineer to fill in those prices, was it by any legal document?—A. No.

Q. Who did you tell to do that or that you would be willing to have that done?—A. Mr. Lumsden.

Q. Mr. Lumsden personally?—A. Yes. We talked over it and put it up to him that he had the experience and knowledge of these things.

Q. Be very sure just whom you mentioned it to that it would be all right for the chief engineer to fill in these figures?—A. As far as I recollect, he was the man that spoke to me about it.

Q. When he spoke to you about it you knew then that you were the lowest bidder, he told you that same time that you were the lowest bidder?—A. Yes.

Q. And that it took those prices he put in to get you the contract?—A. I don't know he put it exactly that way only I did not have the prices in and that if there was a price put in it would go in with his experience, and I was satisfied that it did not matter very much on a large contract whether I was a little out or not, it was a small amount. It is the way we do on contracts, as you know.

Q. Did you and Mr. Lumsden discuss the fact that the more expensive concrete there was going to be put in for the lower figure; that is, concrete 1 x 3 x 5 was $12.00, and concrete 1 x 3 x 6 was $15.00; did you know you were getting such an unbalanced bid?—A. Yes, it was a small item of arch in the $12.00 contract. The mass was in the other, in the foundations.

Q. You would be surprised when you look at your estimates, a copy of which I have before me, that the $12.00 concrete amounted to 15,700 yards, and the $15.00 amounted to 11,000 yards, that is, there is more of the $12.00 than there is of the $15.00?—A. I do not know that was discussed at the time; we thought the other was going to be the massive work.

Q. Did you know from your conversation with Mr. Lumsden that unless you allowed these interpolated prices to stand, you would not get the contract?—A. No.

Q. You are sure you did not?—A. No, it was not put in that way, I don't think.

Q. In your bid for piles, you wrote the pile items No. 10 and No. 11 in the tender. Item No. 10, piling delivered as per engineer's bill, per lineal foot, 25 cents. Item 11, piling driven, 15 cents. Now, after 15 cents, you wrote in the words "driving only." Why did you put the words "driving only" in there? —A. I don't remember. These words are not written in by me. It means that it only includes the driving and not the piles themselves.

Q. You did that because the specifications were not entirely clear as to whether the piles were to be included or not in the tender for Item 11?—A. The words must have been put in because it was thought the specification was not clear without them.

By Mr. Staunton:

Q. Did Mr. Lumsden bring these prices to you filled in or suggest that he would fill them in?—A. He mentioned that there were several items that I did not fill in.

Q. Did he suggest that he should fill them in?—A. No, I do not think so. I suggested that he would fill them in. There were some little items and things that I did not know the price of them and in his experience he could fill them in.

Q. Did you and he go over these particular items and arrive at the exact figures for them together?—A. No.

Q. Then he made them up by himself without consultation with you?—A. Yes, he mentioned to me that he put them in or before he put them in, I cannot vouch for that.

Q. All you know is that he spoke to you about that?—A. Yes.

Q. And you cannot recollect any further than that?—A. No.

By Mr. Gutelius:

Q. From information before us, you appear to have been paid for 408,220 cubic yards of solid rock in your progress estimates for material known as assembled rock, which is composed of pieces of rock smaller than one cubic yard mixed in with sand and clay and hardpan, what have you to say why this material, not being solid rock, should not be classified as loose rock?—A. I cannot tell you.

MR. MOSS:—Surely that is an engineering question.

MR. STAUNTON:—It is a contract question.

MR. MOSS:—It is a mixed engineering and legal question. There were pages and pages of evidence about that in the Lumsden investigation and opinions of all sorts.

By Mr. Staunton:

Q. You were to be paid for solid rock of a cubic yard and over in size and you were paid for solid rock which was under a cubic yard?—A. Yes, assembled rock was something I never heard of except on this job.

By Mr. Gutelius:

Q. And when you made your tender on this job you never heard of assembled rock?—A. No.

Q. So that any advantage or disadvantage that accrued from the adoption of assembled rock was a new feature to you?—A. Yes.

By Mr. Staunton:

Q. Did you see any of this assembled rock yourself?—A. No.

Q. Do you know where it occurred mostly?—A. I know it occurred particularly in the east end of the contract.

By Mr. Gutelius:

Q. Tell me one thing about rock removal, Mr. McArthur, is it not a fact that in the last few years contractors are shooting material, blasting material, which ten years before was taken out with pick and shovel, only just blasting it to loosen it?—A. I suppose a great deal of the blasting and shooting on the contract you are speaking about was probably done in the winter months when the ground was frozen.

Q. Generally speaking, is there not a change in the method of removing loose rock as compared with ten or fifteen years ago, don't they shoot stuff now that they did not shoot then?—A. I guess we do.

Q. I think I recognize a tremendous change between now and the time I was resident engineer watching work of that kind in the methods they employ, that is my reason for asking the question?—A. Of course it is changed some alright, I think. They are using more explosives now to loosen it up where they used to pick it more.

Q. It has been said that larger shots were used on this work on account of hurrying the works to completion, what have you to say about that?—A. I guess that is probably right.

Q. Did you receive many communications from the chief engineer yourself in connection with rushing the work?—A. No, not so very many.

Q. And it did not cut much figure in the way of handling the work?—A. You mean the letters we got?

Q. No, the haste. There were no great amounts of money expended on your part or on the part of your sub-contractors on account of any haste in completing that work?—A. Yes, I am sorry to say there was.

Q. I wish you would tell me more about that, if you can?—A. One of the things was the conditions of labor we were up against and the work that was going on in the country at the time and we spent large sums of money trying to get labor on the work to hurry it along, as the commissioners were urging us to push the work; we were trying to comply with their wishes.

Q. Who paid for getting the men in?—A. I paid a great proportion myself, the large proportion I expect, the sub-contractors also.

Q. When you were given this contract, Mr. McArthur, was there any stipulation, verbal or otherwise, as to whom you should buy your powder from?—A. There were two powder men in the field at the time. They tendered for the supply.

Q. And you gave it to the lowest tenderer?—A. Yes.

By Mr. Staunton:

Q. But were you asked to give it to any particular firm?—A. No, I don't think I was asked to say you have got to give it to any particular firm. I may have been told what-you-call-him will be able to supply you, they are a good firm.

Q. Who were you told was a good firm and would be able to supply you?—A. These people in Montreal, I think it is the Standard Explosives Company and the Hamilton Powder Company were the two.

Q. Who gave you that information?—A. I cannot tell you offhand who it was, someone around the Russell House, each one had its friends, they were both strangers to me.

Q. What we want to know is, did any person in connection with the Commission suggest to you that it would be well to buy your powder from any particular firm?—A. I do not recollect anyone on the Commission.

Q. Anybody in connection with it?—A. I do not recollect of any of them going that far.

Q. How far did they go?—A. I cannot say that I ever mentioned it at all, myself.

By Mr. Gutelius:

Q. I would like very much to get this cleared, because there is an impression that has prompted this special enquiry about the powder?—A. I do not see that I can clear it up more than I am giving you just now. I do not know that probably if Mr. Moss were around the hotel he would mention somebody.

MR. MOSS:—No, I am not in that business.

By Mr. Gutelius:

Q. You can say that there was no pressure brought on you by any member of the Commission or anyone connected with the Transcontinental Railway to have you purchase your powder from any one special firm?—A. I can certainly say that.

By Mr. Staunton:

Q. Do you know of any pressure being brought to bear on any of your sub-contractors to purchase their powder from any particular firm?—A. No, not that I know of. Under my contract with the sub-contractors, they were supposed to take their powder from me.

By Mr. Gutelius:

Q. You undertook to supply your sub-contractors with powder?—A. Yes, but they bought from other firms.

Q. Why were you interested in supplying the powder to your subs?—A. Well, because I was trying to make 10 per cent.

Q. On the supplies?—A. Yes.

Q. Did your sub-contractors buy all their supplies from you?—A. No, they did not.

Q. Were they supposed to?—A. Oh they were, but I left them off to suit themselves. There were not very many of them that could buy without coming to me, they were not strong enough.

Q. I lead from your evidence a moment ago that if the new classification of assembled rock had never been born, that you would have expected to have completed the same as on railroads with similar specifications, by giving solid rock only for solid rock, the fragments of which are larger than a cubic yard, is that right?—A. That is right.

By Mr. Staunton:

Q. Before you made your tender, what information was furnished by the Commission to you?—A. All the information that was furnished was the profile and what we were getting from the engineer out in the field, Major Hodgins.

By Mr. Gutelius:

Q. And the copies of the specification?—A. Yes.

By Mr. Staunton:

Q. What were you getting from Major Hodgins in the field?—A. I sent a man down there and gave him a letter for him to get all the information he could from Major Hodgins.

Q. This Major Hodgins gave you a copy of the engineer's preliminary estimate?—A. No.

Q. What kind of information did he give you?—A. Oh, it was rough information, just the direction that the line was going through, and you see that was not final. They did not have a profile of the whole line at the time that they asked for bids for this work, and particularly the profile they had the location was all changed and, as I said a while ago, there were no tunnels shown in the first profile or anything like that and the line was changed afterwards as they considered better for the road.

Q. Do I understand you to say that you did not see or get any information which gave you any knowledge of what the preliminary estimate of the engineers was as to the cost of this work?—A. No, I did not get it in figures more than that it was approximately spoken of.

Q. By whom?—A. Well by Major Hodgins.

Q. Do you know whether he had a copy of the preliminary estimates made in the office by the engineers?—A. No, I do not.

Q. He did not show you any?—A. No.

Q. Did any of the commissioners show you any?—A. No, not by really showing it to me. They may have talked over it but I do not recollect them showing me the figures.

Q. Did any of the commissioners tell you approximately what the estimates of the engineers were?—A. I think probably they did, just the same as Major Hodgins did and he was down here at the time.

Q. Who probably told you?—A. I guess probably Young told me and Reid.

Q. So that you had a more or less accurate idea of what the Commission expected this work would cost?—A. These figures were mentioned.

By Mr. Gutelius:

Q. To clear up that pile-driving note, did anybody know you wrote that in there except you and your men who wrote it, did anyone connected with the Commission or their engineers know that you had written in the words "piles driven"?—A. I do not think so.

Q. You feel that that was your own idea because the specification was not quite clear?—A. I think that was put in so as to make it clear.

Q. I want you to be very sure on this point, because, as I told you before, you would not have got the contract if you had not written these words in there; you can quite understand why we would want you to tell us very candidly about it.

Mr. Moss:—Its a pity he wrote it in; he would not be here this afternoon if he had not.

Mr. McArthur:—That is true. I do not know of anybody knowing that was written in except my own man and myself.

By Mr. Staunton:

Q. Item No. 62 is concrete 1.3.5. in arch culverts, including curving; Item 63 is concrete 1.3.6. in arch culverts, including curving; you said to Mr. Gutelius that you thought more of Item 63 would be used than of Item 62; why did you think that?—A. We figured out, whatever one it comes under, that there was one of the items there would be more of such as foundations and piers.

Q. But you would not put the more expensive mixture in the massed concrete, would you?—A. The other item did not amount to very much.

Q. You would not expect as a contractor to use a richer mixture in mass concrete?—A. That would be left to the engineers, I suppose.

Q. You said you expected to use more of 1.3.5. than of 1.3.6. because you said that you expected 1.3.5 would go on largely massed concrete?—A. Yes.

Q. That is not the usual custom to put the richer mixture in the massed concrete, is it?—A. No.

Q. So that you would naturally expect that 1.3.6. for which you charged $15.00 would be more used than 1.3.5. for which you charged $13.00, would you not?—A. Yes.

Q. And you were going to get a bigger price for the cheaper concrete than for the more expensive concrete?—A. Yes, there was more of it.

Q. How on earth did you ever arrive at that conclusion?—A. Oh, that follows contracting; you cannot expect you are going to win on everything.

Q. You would not expect me to accept a tender from you and to pay you more money for a cheaper article than for a dearer article?—A. No, but there is the figures and the other fellow didn't beat it.

Q. Concrete 1.3.5. is more expensive to the contractor than 1.3.6., is it not?—A. I do not think it is very much more.

Q. Then why did you make a difference of $2.00 per yard between these two items?—A. As I said before I figured there was more of that.

By Mr. Gutelius:

Q. Lumsden put those prices in for you; he put that cheaper price in for you; you were going to bid $15.00 all through, except for the foundation stuff?—A. Yes.

Q. He put these other prices in?—A. Yes.

By Mr. Staunton:

Q. What I cannot understand is how the two of you could sit down and not laugh at each other when you put in these figures.

Mr. Moss:—He did not sit down with Lumsden.

By Mr. Gutelius:

Q. One other question, you signed up that contract, knowing that Lumsden had made some changes in your figures, some additions and changes in your figures, and you did that without studying what these changes were?—A. Yes, it was figured at the time such a small item that we did not consider it one way or the other.

Q. They must have told you it wasn't so; Mr. Lumsden must have given you that idea; you could not tell yourself?—A. Perhaps he did when he mentioned to me this items that were not filled in in the tender.

Q. And you did not feel as if it would make much difference and you let it go?—A. Yes, the big things are two or three items in the contract, which make the contract as a rule.

By Mr. Gutelius:

Q. Before closing this enquiry, is there anything you have in your mind that you would like to tell the investigating Committee that has not been brought out, if so let us hear it?

Mr. Moss:—That is a wide question.

Mr. Gutelius:—There may be little things we have not asked about. Nearly every contractor has some little things he wants to tell us and we give him that opportunity.

Mr. Moss:—I was going to say, before Mr. McArthur answered that question, that Mr. McArthur has attended here voluntarily and without any notice of the matters that were to be discussed and of their bearing, and that a number of points have been touched on to-day which it is obvious he is speaking about off-hand, after recollection of two or three years, and if it is proposed to make any findings, which would reflect in any way on Mr. McArthur or his business, he should have an opportunity of giving further evidence and explaining further if necessary. I do not know what importance is attached to them at all in the mind of the Commission, but I should think it would not be proper to make any public finding based on them on this very informal and unprepared evidence.

Mr. Staunton:—If Mr. McArthur wished to prepare himself to give evidence, he could have told us so. True, we did not subpœna him, but we asked him to come here and give us this evidence. You came yesterday to see us, and I told you generally what we wanted to ask about, and if Mr. McArthur was not prepared to give evidence he should state so. Now, this evidence is taken for the purpose of the Commission, for the purpose of making our report, and we expect to rely upon it. We do not regard it as taken informally or in any other way than in

the ordinary course. We do not exactly understand what you mean by that, Mr. Moss. We do not desire to get evidence from any person who is not ready and thoroughly posted on what he testifies to, and if Mr. McArthur desires to give us any further information in connection with this case, we will be very glad to hear him. He certainly is not very clear on a good many things, but we are not responsible for that. Our desire is to get all the information possible. So, if there is anything else.....

Mr. Moss:—I think, for instance, in reference to what was said about the assembled rock, I do not think Mr. McArthur's evidence in regard to that was quite clear or quite of the kind to be brought out in further explanation.

Mr. Staunton:—What Mr. McArthur told us was, that he knows nothing about it; I suppose that is correct; and that he never heard of assembled rock before.

Mr. Moss:—I think what Mr. McArthur meant was that he had not experience with that class of material before.

Mr. Gutelius:—If you have a private talk with Mr. McArthur you will find, I think, that everything he told us is just what he believes.

Mr. Staunton:—I wanted Mr. McArthur to tell us as a contractor what he knows about classifying stones of a smaller size than a cubic yard, when they are mixed with a matrix composed of clay, sand, or other material.

Mr. Moss:—Cemented together so as not to be removed without blasting, that was Lumsden's definition.

Mr. Staunton:—He may tell us what he thinks about that, and then he may qualify it in any way he chooses.

Mr. Moss:—Lumsden's definition of assembled rock, as I remember it, is that these have to be cemented together in such a way as is best removed by blasting.

Mr. Staunton:—That is interjected afterwards. There is nothing at all about that on the blue print.

Mr. Moss:—It was interjected by him.

Mr. Staunton:—Not in the blue print.

Mr. Moss:—May I have a conversation with Mr. McArthur?

Mr. Staunton:—Certainly. We would like Mr. McArthur to tell us all about that and if he desires I will take him over it.

This ended the examination.

(NATIONAL TRANSCONTINENTAL RAILWAY ENQUIRY COMMISSION. MEETING AT OTTAWA, JANUARY 30th, 1913.)

Present: G. LYNCH-STAUNTON, K.C., *Chairman;* F. P. GUTELIUS, C.E.

M. J. O'BRIEN, sworn:

Examined by Mr. Gutelius:

Q. You are one of the principals in the following contracts on the National Transcontinental Railway: Contract No. 10, from Mile 50, west of Quebec Bridge westerly for 100 miles; Contract No. 11, from La Tuque to Weymontachene, 46.4 miles; Contract No. 12, from near Weymontachene, westerly 107 miles; Contract No. 13, from about 107 miles west of Weymontachene, westerly 115 miles; Contract No. 16, from west of Contract No. 15 (Fauquiers'), westerly 100 miles; Contract No. 17, from the west end of Contract No. 16, westerly 100 miles; Contract No.

19, from the westerly end of Fauquier's contract No. 18 to near Dog Lake, a distance of about 126 miles; Contract No. 20, from near Dog Lake westerly about 25 miles?—A. Yes.

Q. With reference to Contract No. 10, I find that this contract was assigned to McDonald & O'Brien by Hogan & McDonald, to whom the contract was originally awarded, is that right?—A. Yes.

Q. How did you happen to get this contract?—A. At that time I tendered with Mr. Mullarkey and Mr. Hogan tendered with Mr. McDonald, being an old partner of his, and it would appear that Mr. Hogan became ill and was not able or did not want to proceed with the contract and they asked me if I would come in in his place, which I decided to do, after seeing Mr. Mullarkey. I simply came out of the other firm into this one, taking Mr. Hogan's place in this contract.

Q. Was there any consideration passed between you and Mr. Hogan in connection with that transfer?—A. None whatever.

Q. Now, contract No. 11 was sublet to McDonald & O'Brien by the Grand Trunk Pacific Railway Company?—A. Yes.

Q. How did you happen to get this contract and what was the consideration?—A. We were tenderers for that work against the Grand Trunk Pacific, and, of course, they outbid us by a little. Then, we being on the ground and having the plant, approached them about taking the work off their hands. We were to give them 5 per cent, if my memory serves me right; that is all they got.

Q. 5 per cent of the gross returns on the contract was given to them and you retained the balance?—A. Yes.

Q. On Contract 12, you were the original successful bidders?—A. Yes.

Q. And you received your contract direct from the Commissioners, in the name of McDonald & O'Brien?—A. That is correct.

Q. I note that there were only two bids in connection with this contract No. 12, did you know at the time of putting in your figures that there was only one other competitor?—A. Oh, no, certainly not.

Q. You had no knowledge of how many tenders were being placed on contract No. 12?—A. No.

Q. You are certain of that?—A. I am, in fact I was under the opinion that there was more than two tenders on that work.

Q. Then contract No. 16 in which you are interested, I note was originally awarded to M. P. Davis and J. T. Davis, and subsequently sublet to O'Brien, McDougall & O'Gorman?—A. Yes.

Q. What were the conditions in connection with that subletting?—A. Well, we being working up in that section west of these sections, we formed this combination and took these two sections from Mr. Davis, giving him a margin.

Q. What was that margin?—A. 10 per cent.

Q. 10 per cent on the gross estimates?—A. Yes.

Q. Contract No. 17 was taken from M. P. & J. T. Davis by you, on a 10 per cent basis also?—A. Yes.

Q. On contract No. 19, O'Brien & McDougall Brothers were the successful bidders and received their contract from the Commissioners direct?—A. Yes, O'Brien & McDougall Brothers. I think it was O'Brien, Fowler & McDougall Brothers.

Q. Did not Fowler come in afterwards?—A. Yes, perhaps he was not here at the time of the tender, I think you are right.

Q. You tendered as O'Brien & McDougall Brothers?—A. I think so, I was not here at the time.

Q. Contract No. 20 you received direct from the Commissioners of the National Transcontinental Railway?—A. Yes.

Q. Did you know that there were only two tenders for contract No. 20; had you any knowledge of that fact?—A. No, I was not here at the time, I was in the Province of Nova Scotia when these tenders were put in.

By Mr. Staunton:

Q. You are a contractor of very large experience, are you not?—A. Extending over a good many years.

Q. In contracting for work of the description to be performed for the National Transcontinental Railway, when you have worked for other railway companies, have you ever been required by these other companies to put up security for the due performance of your contract?—A. Yes.

Q. Does the C.P.R. require security?—A. Well, let me see, I know in the case of the Quebec & Saguenay Railway, I was obliged to put up security, that is the only case I remember, I wish I had not put it up there.

Q. As a matter of fact, the C.P.R. and the G.T.R. and the Canadian Northern Railway Company do not require security?—A. Not so far as I am aware.

Q. In a contract of this kind, is there the slightest necessity to ask a man to put up security?—A. If the contractors are responsible, I would say no.

Q. And it is the business of a man who has a contract to let to see that he gets a responsible contractor?—A. Yes.

Q. And if he goes about the business in the proper way, he can ascertain whether or not the intending contractor is responsible financially and experienced sufficiently to perform the contract, is that right?—A. Yes, it appears to me to be right, looking at it from the contractor's point of view, certainly.

Q. Looking at it from the business point of view, if you had a railway to build you would want to get all the contractors who are able financially and experienced sufficiently to perform that contract, to tender, would you not?—A. Yes.

Q. And it would be to your interest not to put any difficulty in the way of such men if you could avoid it?—A. Quite true.

Q. So that both from the contractor's point of view and from the proprietor's point of view, the requiring of security is an unnecessary impediment put in the way?—A. Well, let me tell you that in the shape of cash it is certainly a great impediment. In the shape of the bonds which perhaps should be exacted in most cases, it would not be so bad.

Q. Why should a bond be exacted?—A. So that we would carry out the contract and be sure to carry out the work undertaken.

Q. Why should it. The C.P.R. has spent many millions, and they have not found it necessary to have bonds taken. Why should a bond be taken from a responsible contractor who is going to put a large plant on the work?—A. That is my own view of it, that is what I would say.

Q. My view is that it is a very imprudent thing to ask a contractor to put up security and I want to find out whether you agree with that or not?—A. So long as the contracting firm is financially strong and capable in every respect, I would say that there would be no need of asking for security, that would be my answer.

Q. And a person who had a big work to let would be very foolish not to find out if his contractors were strong before he let them have the work?—A. Yes.

Q. Now, in this Transcontinental Railway competition, the Commissioners advertised in the newspapers for tenders?—A. Yes.

Q. And those advertisements advised the contractors of Canada and the United States that each tender must be signed and sealed by the parties to the tender and must be accompanied by an accepted cheque on any chartered bank of Canada, payable to the order of the Commissioners of the Transcontinental Railway, in the advertisement I am looking at, ranging from $75,000 up to $100,000, according to the size of the work. Now, with each of your tenders you had to enclose a certified cheque on the bank for a large sum of money?—A. Yes.

Q. And it was necessary for you to furnish that money and to lose its use while these tenders were being considered?—A. Yes.

Q. The advertisement goes on to provide further, that any person whose tender is accepted, shall, within ten days after the acceptance thereof, furnish such additional approved security as may be required by the Commissioners. So, you had to put your head into the noose, or your cheque into the hands of the Commissioners, and then if they said to you: Mr. O'Brien, your tender is for a million dollars and we want a million dollars security, you had to put up that million dollars security or lose your deposit of $100,000?—A. That is the meaning of it, as I understood at the time.

Q. Did you know though, at that time, that although the commissioners did not so advise the public, they had made up their minds that the security to be required in addition to the certified cheque would be limited to 33 per cent of the estimated cost of the work?—A. You are asking me if I had knowledge of that?

Q. Yes?—A. No, we did not know exactly where we were on the basis of that advertisement.

Q. I have heard it said by substantial contractors, men of large experience and large men, that they did not tender on this work because the security required was so unreasonable?—A. They said they did not tender on that account?

Q. Yes, they were afraid to put up $100,000 because they did not know what the commissioners might exact from them afterwards, and they might lose their money as their money is to be forfeited if they did not sign the tender; you know that?—A. Yes, that is the way the advertisement reads.

Q. That the deposit is to be forfeited if they did not sign the contract in the event of its being awarded to them and put up this security which the commissioners might demand, whatever it might be?—A. The commissioners had that power.

Q. Did you make any enquiry from the Commission to find out what securities they were really going to ask you for?—A. No, we imagined that the accepted cheque sent in with the tenders would be all that would be asked.

Q. That is what Mr. O'Brien imagined?—A. Yes.

Q. But it was pure imagination?—A. That was all it was.

Q. Didn't you take the trouble, Mr. O'Brien——I do not think there would be anything improper in your doing so, I think it would be a most prudent thing to do—to come to the Commission and say; have you made up your mind what security you will require?—A. We did not do so. We took the documents as they were. We accepted the contract, we accepted the specifications as they were.

Q. Did you ever hear of large works being let on such conditions before?—A. Well, I have no recollection of any such stipulations and such a large security being asked; in this case, we had to have 15 per cent.

Q. The Government does not require such a large security in connection with its works?—A. No, it is 5 per cent I think.

Q. In the Railway & Canals Department there is a standing order in Council saying that you shall give security to the amount of 10 per cent if your contract is $250,000 or less, and if the contract is over $250,000, the security is 5 per cent; that is the Government practice?—A. That is, as I understand it.

Q. And that is the advertisement put in the newspapers?—A. As to the amount to be deposited?

Q. Yes?—A. It was in this case.

Q. But in the Railways & Canals Department the 5 per cent and the 10 per cent as stated in the advertisement?—A. I suppose so, I don't remember, but I thought it was 5 per cent all around.

Q. It is 5 per cent up to a certain limit. The difficulty put in the way of contractors was enormously increased in the case of the Transcontinental?—A. Yes, and especially in the first tendering.

Q. The total amount of the contracts you have on the Transcontinental Railway, according to the estimates of the engineers is about $26,800,000?—A. Yes.

Q. Do I understand from you that you were required to furnish cash security to the extent of 15 per cent on that?—A. No, that is a misunderstanding. The 15 per cent only applied to the first contract of ours, No. 10.

Q. How much cash security were you required to supply in that case?—A. I should say in the neighborhood of $1,000,000 more or less.

Q. The total estimates of that contract were about $6,000,000?—A. Yes.

Q. And you put up as security $1,169,000?—A. That I think is about right.

Q. Now then, Mr. O'Brien, they did not keep that money, did they?—A. Keep it, oh no.

Q. They gave it to you back again?—A. Yes, as the work progressed.

Q. Did you get it all back or nearly all back long before you had finished your work?—A. They handed me the draw back, that is customary in contracting practice.

Q. It is not customary in contracting practice, because it is not usual in contracting practice to make you put up a security at all?—A. I think in all Government contracts they ask for a security of 5 per cent and this being a Government contract I suppose they thought they would do the same thing and the contract provides that from time to time they can make advances to us for the purpose of carrying on the work.

Q. Where is there any right under this contract entitling the commissioners to give you up the security before the work is completed?—A. I am not so sure that they say anything in the contract providing for that.

Q. They may if they so choose, being satisfied that the security is sufficient, pay you any portion of the 10 per cent drawback on your performed work? That is what you refer to?—A. Yes, I was referring to that.

Q. The fact is, that although it appeared in the public newspapers that you had to deposit a cheque with your tender, and although it appeared that you had to give security afterwards to the satisfaction of the commissioners, and although it appeared when you signed your contract that you had to give security up to 33 per cent of the engineers' estimates on the cost of your work, they eventually did take 10 per cent of the estimates as deposit and then paid it back to you before the work was completed?—A. Not before the work was completed.

Q. I think so, I think you personally got all your security back?—A. No.

Q. Not your drawback, but your security?—A. No, we have not, No. 10, No. 11 and No. 12 are practically finished contracts.

Q. McDougall & O'Brien got back in July, 1910, $150,000 on contract No. 12, and they got on contract No. 19, in May, 1910, $200,000, and on contract No. 20 the same thing; I am not saying there is anything wrong in this?—A. No, there could not be for the simple reason that the security has changed its form; it has taken the form of plant.

Q. They gave up the cash, that is all I am talking about?—A. To buy plant.

Q. They gave up the cash?—A. Yes.

Q. You did not give them any lien on your plant?—A. By virtue of the contract?

Q. They had that lien anyway?—A. Yes.

Q. The security that the commissioners had was a cash deposit, a drawback, and a lien on the plant. By the contract they had that?—A. We remonstrated with them.

Q. I know you did?—A. We said this to them; you have now the plant, we have $1,800,000 worth of plant on your works. It was nothing more than reasonable they should release our security because they had it in the form of plant which by virtue of the contract became theirs until the work was finished.

Q. I quite agree with you, I think your statement is perfectly reasonable, but they would have had that plant as security anyway, even if they never had asked you to put up any other security?—A. Quite true.

Q. You do not approach the matter from the point of view I am approaching it from. I think it was ridiculous to ask for that security, and, as a matter of fact, after the Transcontinental commissioners got it, they gave it up, and they only had the same security for the performance of the work as they would have had if they never had asked for security at all; they had your plant and your drawback?—A. They had it in a different form.

Q. But if they kept the $200,000 you would have to get your plant anyway?—A. Yes.

Q. Then you would have the plant and the $200,000 which I agree with you would have been quite unreasonable?—A. It would be away up in the millions; it would be so unreasonable that we could not proceed.

Q. You think I am trying to make you say that they did something improper in your case in releasing that security, but I am not at present enquiring into that phase of it at all; I am trying to get you to say that in the course of the performance of this contract, the Commission found themselves eventually in no better position than if they had not asked for security at all in the first place; I think they should not have asked that security, is not that correct?—A. Well, all I can say is that it is Government custom.

Q. We will leave the Government out for the present, we are talking about the Transcontinental Railway Commissioners. Nobody is condemning anybody for that at the present time, but that was the result—for example, in contract No. 19 you got back that $200,000 and you say the way you got it back was by saying to the Commission; I need that money to put it into plant?—A. Yes.

Q. But if they had not acceded to your request, you would have had to put the plant on anyway?—A. Certainly.

Q. You will agree with me then, that in the end the Commission were in the same position as if they had given you this contract on the same terms as the C.P.R. would have given it to you so far as the security is concerned?—A. Yes.

Q. What I am driving at is this: this Commission, in my view, did not adopt a businesslike method in encouraging people to bid on the contract, and although they put impediments in the way of bidders with regard to putting up security, they had no more security in the end than an ordinary railway would have?—A. Do you mean for the reason that they made the contracts larger and asked for larger security?

Q. Yes?—A. As to that I do not know.

Q. You do not pass any opinion on it?—A. No.

Q. Now I will come to the question of the large contracts. They divided this railroad, for the purpose of tendering, into very large sections mostly?—A. Yes.

Q. So that an ordinary man with a good plant and a good experience could not come within gunshot of getting a contract on this road?—A. Well, it tested the strength and the ability of the contractors. It was open to all to come in and tender.

Q. Oh yes, just the same as it is open to me to buy the Chateau Laurier if I had the price?—A. We were not always successful; we were as often sub-contractors as chief contractors on the works; they outbid us.

Q. I am only saying that a man had to have very large resources in order to successfully tender for this work?—A. Quite true, and that is the kind of men they wanted.

Q. But the number of such men is very limited in Canada in the contracting business, is it not?—A. They are not very numerous, I am free to admit.

Q. And the result was, that there was only on most of these works two or three people who tendered?—A. It would seem so, I do not know how many tenders were in.

Q. For instance, J. D. McArthur got a $13,000,000 contract and he never did any of the work himself at all, he sublet it to fifteen or twenty other contractors?—A. Yes, that is the grading.

Q. Now then, if the Commission had divided J. D. McArthur's Section F into three or four divisions, they would have had perhaps twenty tenders?—A. And twenty sets of contractors to deal with and twenty troubles.

Q. They would have had the twenty tenders anyway?—A. Yes.

Q. And where did the trouble come in, because in any case they had to give estimates to all the sub-contractors; they had to keep track of all these sub-contractors just as if they were chief contractors?—A. Pardon me, it is hardly that way. We have our own engineers, we get the estimates from the Commission, they give us the estimate on the whole section in one lot; we then subdivide them according to our subcontractors and the Commission has nothing to do with that.

Q. Yes, but these Commissioners were public servants, they were being paid to get this work done in the most economical way they could for this country; now then, if Mr. O'Brien were building that work, he would have thought about the money end of it, would he not?—A. Well, I should say so.

Q. You seem to think that these Commissioners only should think about the trouble to themselves. If they could save, for instance, on the M. P. Davis contract $1,000,000 by letting it to Mr. O'Brien in the first place, it would have been a laudable act on their part to have done so, would it not?—A. I suppose so.

Q. You know, as a matter of fact, that M. P. Davis got that contract one year before he sublet it to you?—A. All of that.

Q. He never did a thing on it?—A. He was unable to reach it.

Q. He knew that when he tendered?—A. I don't know that.

Q. Didn't he? Do you suppose he tendered for a ten or twelve million dollar contract without knowing where it was, I don't think he would do that?—A. Contractors do foolish things.

Q. You knew it was inaccessible?—A. At the time?

Q. Yes?—A. Well, we did not give it much attention at the time because we were not tendering.

Q. Why didn't you tender?—A. We were not close enough to it.

Q. You were not close enough to what?—A. Close enough to it with our western work.

Q. You mean you were not close enough to it geographically?—A. Yes.

Q. That work was advertised, why did not you tender on it?—A. Well, I may say this to you right on that point; we had a very large amount of security up at the time and the Bank of England has its limits and we were not inclined to tender on that at that particular time.

Q. You did not want to put up any more money?—A. No, we had so much money in securities and drawback and plant that we did not feel disposed to put up $300,000 there to carry out that work. We were not close enough to it.

Q. One of the great stumbling blocks in your road was putting up more security?—A. That is a very great stumbling block in the way of all contractors.

Q. When you took these contracts Nos. 16 and 17 east of Lake Nipigon, off the hands of Davis & Company, did you go over the work?—A. We sent a man over it.

Q. And you looked it over?—A. Yes.

Q. And you made a bargain with Mr. Davis to take it off his hands?—A. Yes.

Q. Were you substituted for him in the contract, or are you sub-contractors under him?—A. I think if my memory serves me right, that we just stepped into Mr. Davis' place.

Q. And his security remained?—A. Yes.

Q. Did you put up any security?—A. Not in that case, we are paying our share of the amount.

Q. What do you mean by saying you are paying your share of the amount?—A. We would have to pay that money anyway.

Q. Do you mean to say that you pay the interest on the deposit?—A. Half of it.

Q. And you also pay Mr. Davis 10 per cent on the gross?—A. Yes.

Q. How much more did you pay him?—A. That is enough I suppose.

Q. I think so, but I was just wondering how generous you might be?—A. It is conceded that I am generous.

Q. On that work which you took from Mr. Davis, do you think you will have a fair profit?—A. Yes, I think we will make a fair profit.

Q. You took the contract after sending a man over the work?—A. Yes sir.

Q. Did you negotiate this bargain with the Davises?—A. Well, I concluded it in Montreal.

Q. When you negotiated with the Davises, did they want any more than 10 per cent?—A. Yes.

Q. What did they ask you?—A. 15 per cent I think.

Q. Did they also ask you to pay interest on the deposit?—A. Well you see it was like this: Mr. Davis' deposit was up. His deposit is there yet. I said to them; the first thing to do was to leave that undisturbed, the Commission is paying 3 per cent for this deposit, and the money will cost us more. Of course we could not get it for 3 per cent so I suggested myself paying the other 3 per cent, which made 6 per cent and it cost Mr. Davis nothing. My suggestion was accepted and that is the way it stands.

Q. So that you and the Government are paying the interest on the deposit?—A. Quite true.

Q. And Davis gets clean and clear 10 per cent on the gross cost of the work?—A. Yes.

Q. How did you bring him down to 10 per cent and give away half a million dollars difference between the 10 per cent and the 15 per cent?—A. We would not give him more than that and besides there were others who were negotiating as well as us and they were not offering as much, so that I think we went a little better to get the work.

Q. As compared with the prices on the adjoining contracts, how do the prices on contracts 16 and 17 compare?—A. I think they compare favorably with the prices on the adjoining works.

Q. That is to say they are higher?—A. That is what I mean.

Q. You could afford to pay Davis 10 per cent on the gross cost and still make as well out of it as you did on the adjoining works?—A. That is my recollection of the figures.

Q. That is the way you viewed it?—A. Yes.

By Mr. Gutelius:

Q. Coming back to the security and what you have told us as a reason for your not bidding on contracts 16 and 17 originally, you would have bid on that work if no special security had been demanded of you?—A. We might have done so.

Q. Don't you think that in the light of the fact that you did take it up later on that you might have bid?—A. We might, although we had our hands pretty full at the time.

Q. Now referring to the newspaper advertisement in connection with these Transcontinental contracts, which provided that the Commissioners could demand any security they liked, if that same provision had been made by a railway company or a railway promotion syndicate such as Mackenzie & Mann, would you

have put your original marked cheque in, knowing that a private concern or a railway company could have demanded from you any securities that they desired; would you have considered it a business proposition. I refer now to the phrase: "Such additional security as the Commissioners may require"?—A. We would hesitate a good deal.

Q. It would not be a business proposition?—A. It would occur to us as giving them powers that we would not like to have in their hands, because they might ask us, after our tenders were submitted, to put up such security as would be altogether unreasonable, and it is too much power to have in the hands of anybody, I think.

Q. If they wanted to, they might defraud you out of the deposit that you put up with the tender?—A. Well the powers given there are very great; it would depend on the men, of course.

Q. Don't you think that many good Canadian contractors, I mean standing high financially, were deterred from bidding on the National Transcontinental Railway contract because of that very security clause?—A. I do not know of any that were deterred. Of course, I am free to admit this: that had the sections been cut into smaller sections and the security made smaller, that there no doubt would be more tenders, there is no question about that.

Q. I noticed recently in looking at a report of the royal commission on the original construction of the C. P. R., that that Commission show in their report the various tenders given for the different sections, and these tenders average about twenty tenders to every section. Now, when I see nine contracts on the Transcontinental Railway, in each case there being only two bidders, the idea occurred to me that this additional security which the Transcontinental Railway Commissioners demanded is a reason for having only two tenders instead of twenty. Does it not look like that to you?—A. What you say there is right; that open book in the advertisement there would scare off perhaps a good many contractors and I have no doubt it did. We had the moral courage to go in.

Q. Did you know when you sent in these tenders that you were absolutely in the hands of the Commissioners to the amount of security that would be required?—A. I say their powers were very great. Yes, that is so, especially in the first two contracts.

Mr. Staunton:—But the provision as to that is the same in all the contracts.

By Mr. Gutelius:—The reason the subsequent contracts were not so alarming to you, was because in the first two or three you found they did not take advantage of the whole 33 per cent?—A. Well, I do not know that any percentage was mentioned; it was only 15 per cent we put up.

By Mr. Staunton:

Q. But you signed an agreement that you would put up to the extent of 33 per cent?—A. Is that in the contract?

Q. Yes. In your tender, in fact, you say so, you knew it when you signed your tender. It says: "And we do hereby agree that in case of refusal or failure to execute the said contract with the Commission and also to furnish an approved security to an amount not exceeding one-third of the estimated cost of the work, you shall forfeit your deposit." You knew it at the time?—A. Is this the original tender?

Q. Yes, they are all the same?—A. They are not exactly all the same.

Q. On that point they are?—A. Oh, yes.

By Mr. Gutelius:

Q. Recognizing, as you must have, the tremendous powers of the Commission in demanding additional security after holding this first big marked cheque, did you not have some information that led you to believe that they were not going to hold you up to the whole amount of the 33 per cent?—A. No. You see, as

I remarked before, when we tendered first and when O'Brien & Mullarkey were not the accepted tenderers, and when Mr. Hogan became ill, I came into his place on the contract. We then were up against it as to security. We remonstrated with the Commission at that time and we were here quite a long time getting that security fixed up.

Q. They wanted a larger security?—A. They wanted 15 per cent but we were not inclined to put that up and we asked them to accept a cheque. We had a siege here at that time but were not successful. They exacted 15 per cent security. I remember myself saying at the time that I had no recollection of any such security being demanded by any Government or any company in the country. 15 per cent was wery large and it was no use.

By Mr. Staunton:

Q. Did they offer to let you out of the contract?—A. No.

Q. Did you say: I cannot put up the security; did you put up any bluff at all?—A. I did not say whether we would put up the security or not.

Q. Did you say you would not?—A. We never went that far.

Q. Was it said to you, if you don't put up the security you can drop out?—A. Not to me.

Q. Did they tell you they would keep your money?—A. I have no recollection of their saying that, that was understood.

Q. Did they ever say: now, Mr. O'Brien, put up that security or withdraw, did you ever have a position like that taken with you?—A. No, I have no recollection of that, it never went that far, they would not do that with me, I don't think.

Q. What did you understand from them would happen if you did not put up the security?—A. They did not say that.

Q. Did they intimate it to you?—A. No, I cannot even say that.

Q. What did you expect would happen?—A. Well, if we failed to put up our security I suppose we would have to step aside.

Q. And lose your deposit?—A. Well, we would come back for that later on and see what we could do; you know what contractors do.

Q. From the negotiations that took place between you and the Commission or the individual members of it, what conclusion did you come to would happen to you if you failed to put up the security?—A. They did not intimate to me anything of the kind, they simply asked for the security.

Q. You had no idea that you would get your money back and be allowed to go if you did not put up the security?—A. No.

Q. You had no idea of it from any of these Commissioners?—A. No, they sat down flat on the 15 per cent and we had an awful siege of it. We tried every means to get them down to the original cheque and we were not successful, we could not do it.

Q. Do you know anything yourself about the actual work on any of your contracts?—A. Not very much.

Q. When you tendered for this work I suppose you took an interest in your tender?—A. If I was here I did.

Q. You signed it, did you not?—A. I do not know that I did. I do not think I signed them all. I commissioned someone else to sign for me.

Q. In your contract you signed a tender which contained a unit price list. No. 4 of that unit price list is called solid rock, and you were to get a price per cubic yard for item No. 4, what is solid rock?—A. Is that the specification there?

Q. Yes, what is solid rock to you as a contractor in that specification?—A. It depends on the specification under which we were working.

Q. What does solid rock mean to you as a contractor?—A. Solid rock is that which can best be removed by blasting; anything that is difficult and expensive to take out is solid rock, from a contractor's point of view.

Q. Forget this contract for the moment, and tell me what does a contractor understand by solid rock?—A. That which is expensive to move is solid rock excavation; that which is as expensive to move as solid rock excavation is, should be classified as solid rock.

Q. If you saw a sand bank that was as hard as you could imagine, do you say that that could be called solid rock?—A. Yes, if it becomes sandstone.

Q. I did not say sandstone?—A. You said as hard as it could be.

Q. I did not mean that it was in the form of sandstone, I meant in the form of sand, can you imagine clay being solid rock?—A. I cannot imagine clay to be solid rock.

Q. But that would come within your definition when you said that solid rock was anything that could best be removed by blasting?—A. Yes, continuous blasting, you asked me what was solid rock, and I say that rock could be mixed with clay.

Q. Keep along the line you started on; you said anything that could best be removed by blasting?—A. Continuous blasting.

Q. You have found indurated clay that could best be removed by blasting?—A. Yes.

Q. You never had the confidence to ask that that should be put in as solid rock when there was no stone in it?—A. If we were entitled to it under the contract.

Q. Have you ever got solid rock prices for that clay when there was no stone in it?—A. I do not just remember. We struck a lot of that in the Province of Nova Scotia in the eighties. If it was as expensive to take out as solid rock, it should be classified as such.

Q. Did you ever get paid for clay, where you had the three classifications of solid rock, loose rock, and common excavation; did you ever get paid for clay with these classifications at solid rock price?—A. I have no recollection.

Q. If you signed a contract embodying the three classifications, solid rock, loose rock, and common excavation, in your most bountiful frame of mind you would never expect clay to be classified as solid rock?—A. Ordinary clay?

Q. Yes?—A. Oh, no.

Q. You would not have clay, no matter how hard, if it was not mixed with stones, classified as solid rock?—A. I think not.

Q. So therefore when you talk of solid rock you mean rock?—A. Do you mean rock ledge?

Q. You mean rock, stone?—A. Yes.

Q. And when you talk of indurated clay, you expect that is to be loose rock, don't you?—A. Well, it depends. As I said before if it is mixed with rocks of all sizes and kinds, then I think it should be classified as solid rock.

Q. Where did you ever get it before?—A. I never worked on specifications like that before.

Q. I am not talking about specifications, when, under Heaven, did anyone every pay you for clay mixed with rock of less size than a cubic yard, as solid rock, before the Transcontinental Railway commissioners set the pace?—A. I have no recollection myself, except as I say in Nova Scotia in the eighties.

Q. In Nova Scotia, where you had signed a contract for solid rock, loose rock, and common excavation, did they ever pay you solid rock prices for any kind of clay intermixed with stones of less than a cubic yard?—A. I have no recollection of it.

Q. You have no recollection, have you, of anybody or of any railroad ever paying solid rock prices for clay intermingled with stones of less size than a cubic yard?—A. Well, where the stones are thickly assembled.

Q. Keep outside of the Transcontinental practice now, and give your answer?—A. I said before, so far as the other roads are concerned and under the specifications under which we were working, I had no recollection that it came that way, and perhaps we were not properly entitled to it.

Q. Have you worked for the C.P.R.?—A. Yes.

Q. Have you worked for the Canadian Northern Railway?—A. Yes.

Q. You have worked for these corporations in grading?—A. Yes.

Q. Now then, have you not, as a matter of fact, in the case of the Transcontinental Railway, been paid for material as solid rock for which you were only paid as loose rock in these other cases, never mind the specifications now?—A. I have no doubt as to that.

Q. That is right, is it?—A. That is right I believe.

Q. To use a familiar phrase, this assembled rock was a new one on you when you got into the Transcontinental?—A. Do you mean that assembled rock is a new phrase?

Q. Yes?—A. Yes.

Q. It is a new phrase and a mighty good one for you, is it not?—A. It is very appropriate.

Q. When did you last have a contract with the C.P.R. or the C.N.R.?—A. The Canadian Northern, two or three years ago.

Q. How did the prices compare with the Transcontinental prices?—A. My memory does not serve me as to that, I cannot recollect what our prices were on the Canadian Northern.

Q. Well, what would be more favorably impressed on your mind, how did the profits compare?—A. I do not know that a contractor should be telling what his profits are.

Q. Did they compare favorably on the Transcontinental?—A. I do not know about that. I think on some of our sections, the Canadian Northern was just as profitable.

Q. But these sections on the Canadian Northern that were just as profitable as the Transcontinental, were rare birds?—A. Well, they might not be in the majority.

Q. I suppose, as a matter of fact, your most profitable sections on the Transcontinental were where assembled rock did most congregate?—A. Where it existed, yes.

Q. And assembled rock was very plentiful on section B, in the vicinity of La Tuque?—A. Yes.

Q. That was the best section you had, was it not?—A. Well, I do not know that, I am not prepared to say it was the best, do you mean in so far as rock is concerned?

Q. So far as profit is concerned?—A. I do not know that, it might be.

Q. If you were betting you would pick that out as a winner, would you not?—A. Well, I do not know.

Q. That is the banner contract, is it not?—A. I am not so sure about that.

Q. I would like you to think it over?—A. Pardon me, you see we were chief contractors you understand on that section.

Q. I know, and you did not get as much fat out of it, you think?—A. Let me explain that. We have about the same margin of profit on that section that we have on the others.

Q. As a matter of fact there was more profit on the entire work on that section than on any others?—A. Our margin of profit would be the same as on any other section.

Q. But in that case you had such an enormous amount of assembled rock?—A. We only had a margin of profit.

Q. But the profit to you and the subcontractor combined would be larger on that than on any other section?—A. I cannot say about the subs.

Q. I am not talking about your individual profit, I am talking of the profit on the work above actual cost, was it greater on that than on any other contract?—A. On account of the mileage?

Q. Yes?—A. And the magnitude of the work?

Q. Yes?—A. Around La Tuque I happened to be there myself. Around La Tuque, these cuttings are full of what they call assembled rock.

Q. I am talking about La Tuque now, and I am asking you if on that contract there was not in your opinion a larger gross profit than on any other contract in which you were engaged?—A. Not to us, I don't think.

Q. No, not to you, but the gross profit to everybody?—A. As to that I cannot well say.

Q. What is your judgment?—A. My judgment in the matter would not be worth much; some of our contractors did not make money.

Q. If you don't know, you need not tell me; you were at La Tuque?—A. Yes.

Q. I was at La Tuque, Mr. Gutelius and I were there, and we went all over that work, and we took the engineers over it, and I can tell you this; that we asked them to point us out where there was any cementing material, and they could find none, and afterwards in their evidence they said that they did not think there was any on the whole work. Now can you tell me where I can find anything of that extraordinary thing, cementing material, in La Tuque district?—A. I cannot name a cutting, but the cuttings we went over at that time with the old chief engineer and the whole outfit, these cuttings were at that time in progress and there was nothing else but thickly assembled bunches of rock, gravel, and stone of all kinds, and we had to use blasting.

Q. Mr. Schreiber said that he could find no cementing material?—A. No cementing material?

Q. No cementing material. The assembled rock was there all right, I am not denying that, but what we have been searching for with great anxiety is this cementing material and it seems always to be like the fish, a little further up?—A. Well, we came to the conclusion that day when we saw the work in progress that there was lots of cementing material in some of those cuttings and that at all events they were one mass of boulders.

Q. They were a mass of boulders, we will not quarrel about that, but what I want to get at is this cementing material. If anyone can tell me where it is, I can send someone there to see it. Mr. Doheny has not pointed it out to us and we tried him. It looks to me as if this was clay and sand mixed with these stones, am I wrong?—A. There was no clay in the cutting I have in mind.

Q. It was a fine white sand?—A. It was not exactly sand.

Q. What was it?—A. It was closer to what you call cementing material. These rocks laid there as thick as they could be in the cutting. In fact, the cutting was what is called assembled rock mixed up with this stuff, so much so that we could not do anything else than blast it.

Q. Don't mind the blasting, you would not build a house with that cementing material?—A. No.

Q. It would tumble down, it would not cement?—A. If you could put cement in it it would.

Q. You did not salt these cuts by putting cementing material in them?—A. Oh, no, we are bad enough without doing that.

Q. Now, Mr. O'Brien, frankly and candidly, is there any cementing material, as an ordinary man would understand it, along there at all, is it not just simply

that these small stones and large stones are packed tightly in in clay or fine sand, is not that a fair description?—A. It may not be what you call conglomerate or cementing material, but it is just as difficult to remove as solid rock.

Q. I am not quarrelling with that?—A. I think some of the cuttings were more expensive than solid rock.

Q. I am asking you to be fair with me and to say if I am properly describing these cuts, when I say that they were composed of stones, large and small intermixed, and packed into sand or clay?—A. It might be that.

Q. What you saw might be that?—A. No, not in that big cut, it was not that, there was no clay at all in this cut.

Q. It was sand?—A. It was gravel and boulders.

Q. Let us get away from the boulders?—A. I want to get away from the sand.

Q. Now, I could not find anything but sand or clay, or boulders, or stones there, did you?—A. I counted that mixture of all kinds in these cuttings as just as difficult to remove as solid rock, and requiring blasting, I will say positively as a practical railway man, without fear of successful contradiction, that that could best be removed by blasting. It is the most economic way and the only way it could be done.

Q. I agree with you that it might be most economically done that way and you may be right, but so will a cutting which might be entirely cemented gravel, would it not? Take a cutting of this hardpan, or cemented gravel, you have to remove that by blasting every inch of it?—A. It is the most economical way of doing it.

Q. That is loose rock?—A. It is better to take it out that way than to wear it out, and there are only two ways of doing it.

Q. Well, that is loose rock and the specifications say so. Section 35 of the specifications says:—

> "35. All large stones and boulders measuring more than one cubic foot and less than one cubic yard, and all loose rock whether in situ or otherwise, that may be removed by hand, pick or bar, all cemented gravel, indurated clay and other materials, that cannot, in the judgment of the engineer, be ploughed with a 10-inch grading plough, behind a team of six good horses, properly handled; and without the necessity of blasting although blasting may be occasionally resorted to, shall be classified as 'loose rock.'"

A. That says that blasting may be occasionally resorted to, but the other refers to continuous blasting.

Q. You cannot get away with it as common excavation, it is loose rock?—A. It is solid rock excavation, according to this specification.

Q. What is?—A. Anything that may best be removed by blasting.

Q. Not at all, here is what is described as solid rock excavation:—

> "Solid rock excavation will include all rock found in ledges or masses of more than one cubic yard, which, in the judgment of the engineer, may be best removed by blasting."

A. That word "masses" there, is masses of anything.

Q. No, it reads:—

> "Solid rock excavation will include all rock found in ledges or found in masses."

Of course, for the purposes of this contract, you read it as you describe, but when you saw that first and put your first interpretation upon it, would you ever have thought of that?—A. Yes, sir, the very first shot out of the box, that was the interpretation put upon it by A. R. McDonald and Mr. Barwick and myself. We did not come to the chief engineer and ask any questions either with reference to that or train fill, we took the documents as we found them.

Q. Then, what sort of cemented gravel is to be loose rock?—A. That would be, I suppose, where you found it occasionally, and where an occasional shot would be required to take it out. That would probably be classified as loose rock.

Q. Then what kind of indurated clay would be loose rock?—A. The same.

Q. Do you mean to tell me that you thought indurated clay under this specification would be solid rock?—A. No.

Q. But you did say so just now. You said that all masses of any material which could be best removed by blasting, was to be solid rock?—A. It is just like this: Solid rock excavation includes all rock found in ledges. That is so since the time of Adam. And then it reads: or masses of more than one cubic yard which can best be removed by blasting. It does not say solid rock.

Q. Then it means indurated clay?—A. It might.

Q. Where did you ever, in the whole course of your experience, make the contention on a contract that you were entitled to be paid solid rock prices for indurated clay?—A. I never had these specifications before.

Q. You said just now that from the beginning you construed this specification in such a way as you thought it entitled you to solid rock prices for indurated clay, which could best be removed by blasting?—A. I said anything in masses.

Q. That brings in indurated clay, does it not?—A. Yes.

Q. Did you ever before put in such a claim as that?—A. We never had the opportunity, because we were not entitled to it under our other specifications.

Q. Did you ever, even against the Transcontinental Railway, set up a claim to be paid solid rock prices for clay of any kind?—A. Well, we did not specify the material.

Q. They never allowed it to you; they have never allowed you solid rock prices for indurated clay?—A. If they did not, and it could best be removed by blasting, then they were doing us an injustice.

Q. But you know they did not?—A. I was not close enough in touch with the work to know.

Q. No person on your works, to your knowedge, has ever claimed until today that they are entitled to solid rock prices for indurated clay, have they?—A. I am not aware.

Q. You said you were alive to that fact in the very beginning?—A. Yes.

Q. Then why did you not see that you were getting solid rock prices for it?—A. The great complaint is that we are over-classified and getting something we are not entitled to.

Q. There is not a single claim to be paid on solid rock prices for clay?—A. If it is stuff that can best be removed by blasting.

Q. Did you ever make any claim for solid rock prices for cemented gravel?—A. Personally?

Q. Yes?—A. I did not.

Q. Did your partners, to your knowledge?—A. I am not aware.

Q. Did they ever claim solid rock prices for any material in which there were no stones?—A. I cannot say, I am not aware.

Q. It would mean a difference to you of many millions of dollars if you did or did not get solid rock prices for indurated clay or cemented gravel?—A. Yes, if we were properly entitled to it and did not get it.

Q. I would have thought that if you were alive to your rights from the very beginning, you would have taken sufficient interest to have at least made a claim during the last four or five years?—A. Let me say this, that this time I was at

La Tuque it was in the very early stages of the work, and we had a battle royal on the ground, and as a result of that meeting there were instructions issued by the late chief engineer and he issued a blue print.

Q. And that blue print distinctly says that you shall not be paid solid rock prices for any kind of clay or material in which there is no stone?—A. It may, I do not know.

Q. You saw the blue print?—A. I just had a glance at it.

Q. And you never protested against them excluding indurated clay and cemented gravel as solid rock?—A. We have been protesting all the time from our office, but I do not know what the nature of it was exactly. I say right here now that any material in these cuttings that can be economically removed by blasting, we are practically entitled to solid rock excavation for that.

Q. That is to say, that all stuff that is not free shovelling is solid rock?—A. No.

Q. You have to blast everything that is not free shovelling?—A. Not continuously.

Q. When you come to a place where you don't blast it, it is free shovelling?—A. Where we don't require to blast it.

Q. Everything that is not free shovelling, has to be blasted, for its economical removal?—A. Yes.

Q. And your contention is that everything that has to be blasted is solid rock?—A. Not at all, the specification provides for that.

Q. What is your contention?—A. Where the cutting is either one thing or another mixed up, and can best be removed by blasting, I don't care what it is, if that cut is a solid mass of indurated earth and we cannot take it out any other way economically except by blasting, we must resort to blasting, and we are properly entitled to that as solid rock excavation.

Q. Would you say that all material that is not free shovelling is solid rock?—A. I did not say that.

Q. Free shovelling is the only thing that you do not class?—A. I do not know about that.

Q. Be serious, don't you blast everything that does not come under the head of free shovelling material?—A. Yes, an occasional blast.

Q. Don't you blast everything that is not free shovelling?—A. We might.

Q. And therefore, according to your argument, that is all solid rock; they have done you terribly if that is so?—A. That is my claim and my contention.

By Mr. Gutelius:

Q. Before you signed your first tender did you have the idea that that word "masses" would be interpreted to cover other than rock larger than a cubic yard?—A. I do not know as to that.

Q. Did you form your opinion before you signed your first tender?—A. Yes, that is the only time Mr. McDonald and I were here together. There were several omissions in the first specification and one of them was "train filled". Mr. McDonald wanted to come down and discuss the matter with the late Chief Lumsden, and Mr. Barwick and I were a unit in saying: no, when we come to train fill, which was omitted altogether, we would deal with it. We dealt with this at the same time. We read the thing over very carefully. There must be something more than solid rock to be classified as such from the reading of that clause 34. If it was only solid rock in ledge that was to be specified as such, they need not put that in about masses.

Q. If you did not discuss it with the chief engineer and did discuss it between yourselves, was not that really a joker in the pack when you were making your first bid?—A. It might be so, it might be considered so.

Q. That expression is a little strong?—A. Yes, and the train fill was the same thing.

By Mr. Staunton:

Q. What do you mean by the train fill?—A. There was no figure for it.

By Mr. Gutelius:

Q. If you had that idea in mind, that you could get solid rock for anything that could more economically be done by blasting, did you convey that idea to your sub-contractors?—A. I do not think we did.

By Mr. Staunton:

Q. I should think you would not like to put your pen to it?—A. We gave the sub-contractors whatever we got, you know.

By Mr. Gutelius:

Q. If there was any advantage to you in connection with that, on account of your interpretation, you would not get the benefit of that unless you wised up your subs?—A. Quite true, but it was immaterial to us as chief contractors, whether we got a margin on loose rock or solid rock; it would have been the same per yard.

Q. You were up at La Tuque with the engineers at that time?—A. Yes.

Q. That discussion at La Tuque was Woods and Lumsden on one side, and the balance of you on the other?—A. That is right.

Q. You were satisfied when you left La Tuque that you had the Commissioners with you?—A. Well, I could not say just then what the result of the discussion was.

Mr. Staunton:—Lumsden says the Commissioners argued with the contractors?—A. Well with regard to that, I may say that I myself read that very clause. I was the only one that happened to have the specifications in my pocket and I read the clause in this way: Solid rock excavation will include all rock found in ledges; I said there can be no dispute about that, that the chief engineer agreed, and I said there must be something in the mind of the framer of the subsequent part of the clause, that something more than solid rock in ledges would be classified as such.

Mr. Staunton:—Sure, boulders

A. It says: masses of more than one cubic yard which can best be removed by blasting. It does not say boulders nor anything else. There happened to be two lawyers among the Commissioners, the chairman, Mr. Parent and Mr. McIsaac. They took this thing out of my hands and they commenced reading it, and they were all trying to interpret it then. We had it interpreted long before that.

Q. What did the two lawyers say?—A. They did not say anything just then and we did not know where we were when we left.

Q. Did they seem to favor your view or the other view?—A. They were at sixes as to how it read. I think the legal minds took the view I was right. The ex-chief was inclined not to express himself.

Mr. Staunton:—Lumsden said he said it had to be rock, and the Board agreed with the contractors?—A. When I asked the late chief engineer what was solid rock under the specification, his words to me were; solid rock is solid rock, and loose rock is loose rock, and I said it was so since the time of Adam, but what was it in the specification.

Q. What did he say to that?—A. He repeated that twice, and then, of course, we had to get into some kind of a discussion. I wanted to know what it was in the specification and when I read that in the way I did, he seemed to be a little dumbfounded about it.

By Mr. Gutelius:

Q. What reduction did you make in your solid rock prices, because you discovered this joker?—A. I cannot say as to that. Our price was low on solid rock, going to show that we were not building on that very much. I think it was the lowest in the schedule; $1.50, that is a low price for rock.

Q. You would not like to say how much reduction you made, because you expected masses to be made up of loose rock material?—A. No, we figured it more closely on that account, but I cannot say that.

Q. Now, separating this assembled rock, stone on one side, if the stone was less that a cubic yard, it would be called loose rock?—A. Separating them one by one they might.

Q. And the matrix material, if separated, and had no stones in it would be loose rock, or common excavation, would it not?—A. It might be.

Q. And the reason you say it is solid rock is because the two are associated in such a way as that they can be most economically removed by blasting?—A. That is it, exactly.

Q. And you never knew of that interpretation being placed on it in any other specification in your career as a contractor?—A. I have no recollection of it.

Q. Do you think that specification was drawn by a person who was inexperienced in framing specifications?—A. I would not like to say that. I tell you the opinion I would offer on that question would be that I thought whoever framed the specifications were trying to be fair and to pay for that which would cost as much as solid rock or could best be removed by blasting.

Q. From the information before us, it appears that in your various contracts you have 1,000,000 cubic yards of solid rock, that is composed of stones less than a cubic yard, and a matrix of sand or clay or indurated clay which when combined formed this material which is known as assembled rock, what reasons can you give this Commission for not having it classified in its component parts as loose rock, and your estimates revised accordingly?—A. What reason can I give?

Q. Yes, why would it not be right and fair for us to recommend that that reduction be made?—A. I have this reason to give, that inasmuch as we were chief contractors, as I said before, and we have paid our sub-contractors right along on the estimates given to us, from time to time by the engineers of the Commission, and on which we have paid our sub-contractors in the best of good faith, that we do not think the estimates should be revised. In fact, I think it would be the grossest injustice to us. If there was anything wrong we had no knowledge of it and the estimates should not have been issued and they should not have been certified to, and we should not have been instructed to pay the sub-contractors on that basis, in fact, we were urged to pay them in many cases.

By Mr. Staunton:

Q. That is what you consider the real meritorious reason for being paid?—A. That is one reason.

By Mr. Gutelius:

Q. Is there anything else you would like to tell this investigating Commission that has not been brought out in our discussions to-day?—A. I do not know there is anything I could recall at this moment that I would like to tell. I have nothing at the moment that I think it would be necessary for me to state. I do not know what you have in your minds.

Mr. Staunton:—Mr. Gutelius does not want, after this Commission is closed, for a contractor to come and say: if they afforded me an opportunity I could have explained things and given evidence which would have put another light entirely

upon the facts which were before them. We have asked all we could think about, and if you have anything more that you think would help us or would put a different light upon the facts which are before us, you can tell us now, in connection with anything that you have been interested in, in this work?—A. I repeat that at the moment I can think of nothing more. If I do at some future time and think about it, I may.

Mr. Staunton:—If anything occurs to you before we make our report, that you wish to have added, will you communicate with us.

Mr. O'Brien:—Yes.

The witness was not further examined.

(NATIONAL TRANSCONTINENTAL INVESTIGATING COMMISSION, OTTAWA, FEB. 4th, 1913. EVIDENCE TAKEN IN N.T.R. OFFICES, BEFORE THE CHAIRMAN AND MR. GUTELIUS.)

E. F. POWERS, sworn:

By the Chairman:

Q. How long have you been engaged in concrete bridge foundation construction?—A. Fifteen years I have been connected with deep water work in different ways.

Q. Taking all your work together in the fifteen years, what do you think it would amount to in dollars?—A. I could not give you it. We have been doing about $200,000 worth of work a season; that is different kinds of work.

Q. So that it might amount to as much as $3,000,000?—A. Yes.

Q. You were a sub-contractor, were you, under Mr. Kitchen?—A. Yes.

Q. In the name of Powers and Brewer?—A. Yes.

Q. What was your sub-contract?—A. To complete all the concrete masonry under Kitchen & Company's contract.

Q. You used a mixture of one-two-four, instead of a mixture of one-three-five, in massed contract in some portions of your work, did you not?—A. I did not quite catch that.

Q. You used a mixture of one-two-four instead of one-three-five, as specified in the contract?—A. Yes.

Q. In some of your massed concrete pedestals?—A. Yes.

Q. Why did you do that?—A. We did that through instructions from the engineers.

Q. Where did you use it?—A. In the pedestal shafts only.

Q. Where?—A. At Salmon River, Caton Brook, and a part of the pedestal shafts at Graham Brook.

Q. Take the Little Salmon River first: why did you use at the Little Salmon one-two-four?—A. We were instructed to use it.

Q. By whom?—A. Through chief engineer Grant, and Mr. Balkam.

Q. Did they instruct you personally to use it?—A. Yes.

Q. Why did they instruct you to use it?—A. Owing to the size of the structure and the great weight to be added on to these concrete blocks.

Q. Are those the only reasons?—A. And probably a question of the material not being sufficiently good enough to use the leaner mixture.

Q. Are you a professional concrete man?—A. No, I do not say that I am.

Q. What experience have you had in it?—A. I have been in concrete the last ten years.

Q. Was there anything the matter with the gravel or sand at the Little Salmon, in your judgment?—A. No.

Q. It was all right, was it?—A. I would think it was.

Q. Was it any different from any other gravel or sand that you used in other portions of the work?—A. No, I cannot say that it was, with the exception of Little River, where we brought in outside sand.

Q. You say that at Little River it was inferior to this?—A. Yes, a portion of Little River.

Q. What you mean is that the sand at Little River was not as good as the sand at Little Salmon?—A. No.

Q. So there was no good sand used by you which was better than this sand at Little Salmon?—A. Except the sand we brought from Magaguadavic, so called.

Q. Did you use any 1-3-5 mixture at Little Salmon?—A. In the footing courses.

Q. Is that all you used there?—A. And in the bodies of the abutments, I think the west abutment.

Q. And in the remainder of your work at Little Salmon you used 1-2-4, did you?—A. Yes.

Q. Did you get any instructions in writing to use 1-2-4?—A. Yes.

Q. Who were the instructions in writing from?—A. From concrete inspector Lowe.

Q. What date?—A. On April 27th, 1909.

Q. What does the inspector say?—A. To put in 1-2-4 in all shafts, under letter same date from divisional engineer Ballock:—

"George Lowe, concrete inspector, Salmon River, N.B.: Dear Sir:—1-3-5 concrete is to be used in all pedestals, footings and west buried piers, and both in footings and pier bodies, the pedestal shafts are to be built of 1-2-4 mixture, without fillers.

"Yours truly,

"GUY R. BALLOCK, *Div. Eng.*"

Q. Is this the original?—A. No, a copy.

Q. Where is the original?—A. It is in our fyles. I did not think it was necessary.

Q. Was that letter handed to you?—A. Yes.

Q. By the concrete inspector?—A. Yes.

Q. Did you say anything to him about the price at that time?—A. Yes.

Q. What did you say to him?—A. I asked if it was to be paid for at 1-2-4 prices, at our price, and he said it was.

Q. I see in this letter Mr. Kitchen wrote to us, that you wrote on the 4th November to him:—

"We have asked to be allowed to use this gravel in a 1-2-4 mixture, and we were told that we might do so, but we would only be paid for 1-3-5 mixture, as the price for the 1-2-4 mixture was too high. This we consider unjust, for the other contractors are putting in a 1-2-4 mixture and are being paid at their 1-2-4 prices for it".

That does not accord with your statement that you have given me?—A. We never thought for a minute of going on with the work—

Q. Never mind what you thought about it; that is not in accord with what you have told me just now, that when you were ordered to do it you were promised a higher price?—A. Well, we would not go—

Q. How do you reconcile these two statements?—A. I do not quite understand you.

Q. You stated to me that you were ordered in writing to use 1-2-4 mixture in the parts of the structure mentioned in the letter which you have just read, and that you were told by the inspector that you would be paid a 1-2-4 price: that is correct, is it not?—A. Yes.

Q. Now, in your letter written on November 4th, 1908, to Mr. Kitchen, you state that you were told you would not be paid a 1-2-4 price. How do you reconcile these two statements?—A. I do not see any answer to that. I do not quite catch the meaning of it.

Q. It should be pretty clear. You wrote a letter, did you not, on the 4th November, 1908?—A. Yes.

Q. To Mr. Kitchen?—A. Yes.

Q. And you stated in that letter: "We have asked to be allowed to use this gravel"; that is the gravel at Little Salmon, is it not?—A. Yes.

Q. "In a 1-2-4 mixture, and were told that we might do so, but would only be paid for a 1-3-5 mixture"?—A. Yes.

Q. Is that statement true? Did you write that letter?—A. Yes.

Q. And is that statement that you made there true?—A. Well, I should say it was.

Q. Then your statement that you were to be paid for a 1-2-4 mixture now is not true?—A. Well, we were told by someone not in authority. At the time I wrote that letter, it was not our intention to go on with a 1-2-4 mixture until we were paid for it.

Q. That letter, April 27th, 1909, is apparently written long after?—A. Yes.

Q. You put in a whole lot of this mixture before you got orders to put it in?—A. We put a lot of it in on the rings of arch culverts and were paid for it 1-2-4 the arch culverts, the first concrete work we did on Kitchen & Company's contract.

Q. Stick to the Salmon River part; you were not putting in arch culverts at Salmon River?—A. No.

Q. You are speaking in this letter of the Salmon River?—A. Yes.

Q. And you told me that you were told you might put it in 1-2-4 with that gravel, but that you would not be paid for it. Now, where else did you put it in?—A. At Graham Brook.

Q. How far is Graham Brook from the Little Salmon?—A. I judge about three miles.

Q. Why did you not use 1-3-5 at Graham Brook?—A. I do not know; we had the same instructions.

Q. Had you another letter about Graham Brook?—A. The concrete inspector at Graham Brook had a letter the same date.

Q. Have you that letter?—A. No; I think it was the same date.

Q. What was the matter with the gravel at Graham Brook?—A. I am not prepared to say.

Q. You do not know anything wrong with the gravel there?—A. We were ordered to put in a mixture and we adhered to it, 1-3-5.

Q. You say in your letter:—

"We are advised by the division engineer that all of the sand which we planned on using in the concrete work at Salmon River, Graham and Caton Brook has been condemned as unfit for the work, and it has been suggested that we bring in sand from Magaguadavic. We are bringing in this sand at great expense to use at Little River, but in the case of the other work, the cost of the sand would be more than doubled, owing to the long haul. At the time we contracted with you for this work, Mr. Mitchell, in company with Mr. Balkam and Mr. Balloch and in the presence of yourself and the writer, examined the sand at Salmon River and Little Salmon River, and pronounced it O.K., and it was mainly owing to this sand being accepted that we entered into contract for this work. We have had a hard season and have spared

no expense to get all the culverts finished, so as not to delay the grading in anticipation of better work on the viaducts next season. We have asked to be allowed to use this gravel in a 1-2-4 mixture and were told that we might do so, but we would only be paid for a 1-3-5 mixture, as the price for the 1-2-4 mixture was too high. This we consider unjust for other contractors are putting in 1-2-4 mixtures and are being paid at their 1-2-4 prices for it. If some satisfactory arrangement cannot be made, we would like to cancel our contract with you."

Mr. Kitchen goes on to say that Mr. Grant came down in January, 1909, and went over the work with you. What do you say Mr. Grant did when he came down?—A. On January 1st, 1909, Mr. Grant told Mr. Balkam in my presence that he would allow 1-2-4 in all shafts of pedestals at Salmon River. I asked him if that meant the entire work of all the concrete, and he said no, the shafts only, and I remember asking him the yardage; he told me about 7,000 yards; that looked a little larger; and then again I thought it might cover Caton and Graham Brook, where we put in about that much of 1-2-4.

Q. Did you ask him if it covered Caton and Graham Brook?—A. No. I asked him how many yards at 1-2-4.

Q. You did ask him about the Salmon River then?—A. Yes.

Q. You had no right to think it was in some other place?—A. No.

Q. On that authority, whatever it amounted to, you put it in in the three places; is that right?—A. Well, we had instructions to put it in—at least, the concrete inspectors had instructions to see that it was put in at Caton and Graham Brook.

Q. They told you so?—A. Yes.

Q. Who told you so at Caton and Graham Brook?—A. The inspector.

Q. What was his name?—A. I cannot recall his name; I think it is Patterson; I would not be positive.

Q. Can you say how much more concrete did you put in, in making a 1-2-4 mixture than you would have put in, in making a 1-3-5 mixture—how much more cement?—A. Well, it would be pretty hard for me to answer that question.

Q. You can tell it roughly?—A. The engineers made tests of the sand and gravel from time to time, and they would have to change the quantity of cement—

Q. What does the "1" stand for?—A. One of cement.

Q. And the "2"?—A. It would be sand.

Q. And the "4"?—A. It would be crushed stone, or whatever you might use.

Q. So that you would use those proportions in a cubic yard, if you used that mixture?—A. Well, that would not make a cubic yard.

Q. It would, if you had enough of it; 1-2-4 is only a division of a cubic yard?—A. Yes, that is quite right.

Q. And one seventh, in that case, would be cement, would it not, in a 1-2-4 mixture?—A. I am not quite clear on that.

Q. There are seven parts and only one of cement; so that one seventh would be cement?—A. Yes.

Q. In seven yards of concrete there would be one cubic yard of cement, would there not?—A. Well, it might.

Q. That would be the proportion theoretically?—A. Yes.

Q. If you make it 1-3-5 it would be one-ninth of cement; eight parts of sand and gravel and one of cement?—A. I am not familiar enough with that to tell.

Q. Why should you be paid any more than for the additional amount of cement you put in in the richer mixture, when it was done in order to relieve you from going abroad for gravel? Can you answer that?—A. No.

Q. The only difference in cost to you was the additional cement, was it not?—A. Well, more than that, Mr. Chairman.

Q. What would be the difference in cost to you?—A. There was more waste in connection with the bags. We have a great number of bags of cement to carry to our work; more loss in bags, and, generally, mixing 1-2-4, we just mix that proportion and put it in. We do not mix up a yard. We mix it both by hand, and it would cost the same to mix a batch of 1-2-4 as 1-2-5, only we do not get the quantity of concrete at each mixture.

Q. You did not mix this stuff by hand?—A. The greater part of the pedestal shafts; they were only small.

Q. Do you know what it really cost you?—A. No.

By Mr. Gutelius:

Q. Don't you know what your cement cost you?—A. Well, we could hardly determine that. You understand, hauling cement practically for miles in the country, there is more or less loss, loss of bags, and it would be hard to determine the cost.

By the Chairman:

Q. I should think there would be an infinitesimal difference in the loss. However, that is what you say. That is the difference to you?—A. Yes.

Q. In your judgment it was not necessary to make the change, anyway, was it?—A. I think the sand would make an average concrete, using it in a 1-3-5.

Q. How many thousand dollars' difference does it make in the work?—A. I could not tell you off-hand; I really do not know.

Q. Did you get any cost at all on your work, or any price as to how you were doing, or did you just do the work and draw the money and take the chances on whatever profit there was in it?—A. I cannot say that: it is hard to refresh your memory on work that has been done three years.

Q. Did you make this concrete work larger than the specifications required?—A. You mean the shafts?

Q. Yes?—A. No, we built our shafts as directed.

Q. But you had a specification for them?—A. We had a plan.

Q. Did you exceed the plan?—A. No.

Q. In quantities?—A. I am not so sure about that. The shafts varied in height.

Q. Did they vary in thickness?—Not on top.

Q. Anywhere?—A. Well, along the shaft, of course, the greater the batter the greater the base would be.

Q. That would be shown on the plan?—A. No; they built the pedestals, as far as I can understand, to suit the contour of the ground.

Q. Was there any specification showing the size of these pedestals?—A. Yes.

Q. I am asking you now, did you exceed in the quantities the amount shown on the plan in these pedestals?—A. I am not familiar with that.

Q. You ought to know something about this business?—A. Well, we were directed to put in a pedestal a certain height here, and a certain height over there, as the case might be. There were not any two, I do not think, the same height from the footing course to where the shoe plate of the steel rested.

Q. The height would be regulated by the contour of the earth?—A. Yes.

Q. But the size of the pedestals would not be, except as to height?—A. No, the size on top would not be.

Q. Nor the size at the base?—A. The base increases as it goes down.

Q. Did you build the culverts according to the specification?—A. Most of them, I think, we were ordered to increase the depth of the footing on account of requiring a good foundation.

Q. Were you ordered to increase the depth of the footings in many cases?—A. I do not remember, Mr. Chairman; in a few cases, I think.

Q. Was it necessary, in your judgment?—A. Yes.

Q. You say there were only a few cases of that kind; is that correct?—A. Well, I could not tell you the number of them off-hand; no doubt there would be several on a contract of that size.

Q. Do you remember how many culverts you put in?—A. No.

Q. Did you have any claim for extra work?—A. Yes.

Q. What for?—A. For diverting watercourses with culverts and increasing the size of foundations.

Q. What did your extras amount to in cash?—A. I do not remember.

Q. Was it a large or small amount?—A. Not a large amount at all.

Q. $1,000?—A. Yes, there would be more.

Q. You know about what it was, do you not?—A. I cannot recall the exact amount.

Q. You can recall it approximately? Give me it in round numbers?—A. I would not like to say just what it was.

Q. What is your recollection?—A. I would think two or three thousand dollars.

Q. All over your whole contract?—A. Well, it would be—yes, it would be more than that over all the contract. Some of our work was sublet.

Q. What prices did you get for 1-2-4?—A. Off hand I could not give you the exact figures.

Q. Surely you remember something about this?—A. I have not seen our contract for so long.

By Mr. Gutelius:

Q. I have a copy of your contract before me and it reads: "concrete, 1-2-4 $10; 1-3-5 $8.50; 1-3-6 $8?—A. Yes.

Q. The difference between 1-3-6 and 1-2-4 then, in your contract with Mr. Kitchen, was $2 a yard?—A. Yes.

Q. 1-3-5 is $8.50; it was to be 1-3-5 originally in the pedestals and 1-3-6 in the footings; was that the original mixture?—A. I am not sure.

Q. It was understood with you that the price for 1-2-5 of $11.50 was to be used, was it not?—A. Yes.

Q. And this Little Salmon River viaduct is on your contract?—A. Yes.

Q. So that it would be included?—A. Yes.

Q. Your price for 1-2-5 is $8.75?—A. Yes.

Q. So that the difference, so far as you are concerned, is between $8.75 and $10 for the concrete in question?—A. Yes.

Q. I know you are a concrete man, and I know you have some general ideas about the cost of various mixtures, and I want to help you get this cleared by suggesting that the difference in the amount of cement used in 1-2-4 and 1-2-5 is one bag of cement when you are making batches of a cubic yard. Does that sound about right to you—one bag more of cement in the 1-2-4 than in the 1-2-5? Just roughly?—A. No. I think it would take more.

Q. Did you use one yard batches in your machine?—A. In some of our machines I did.

Q. Does not an extra bag of cement strike you, as a concrete man, as being about the difference between 1-2-4 and 1-2-5? About three bags for 1-2-5 and four bags for 1-2-4 in mixing yard batches? Does that not look about right?—A. No, I cannot say that it does.

Q. Well, what is right?—A. We used seven bags of cement to a yard, 1-2-4.

Q. What was the size of the bags?—How many bags in a barrel?—A. Four.
Q. You used seven bags to a yard?—A. Yes; no fillers allowed in the work.

By the Chairman:

Q. How many bags in the 1-2-5?—A. I cannot say; there was not very much 1-2-5 used.

By Mr. Gutelius:

Q. That is what you used to start with. Would five bags be about right?—A. Five would be about right.

Q. The difference, then, between 1-2-5 and 1-2-4 is two bags of cement, or half a barrel?—A. Yes.

Q. What would that cement cost you at the railway station?—A. I do not recollect just what it would be, it is so long ago.

Q. Well, you know within ten cents?—A. If I remember right, it was $2.20.

Q. How far did you have to haul it to Salmon River?—A. Some of it nine miles.

Q. How far did you haul the remainder?—A. Fourteen.

Q. Would the average haul be twelve miles?—A. The average haul would be about 13 miles.

Q. How many barrels would they haul on one sled?—A. It varied, according to the road ronditions.

Q. Did you haul on your own teams?—A. No.

Q. What did it cost you to have it hauled?—A. It cost us 40 cents a barrel and in some cases sixty.

Q. The average 50 cents a barrel?—A. Yes.

Q. That would make your cement cost you $2.70 a barrel?—A. Yes.

Q. And your difference between 1-2-4 and 1-2-5 being half a barrel, would be $1.35 a yard?—A. Yes.

Q. I see that you bid for 1-2-5 $8.75 and for 1-3-5 $8.50; 25 cents a yard difference between those two mixtures, when the cement difference is practically the same. According to that statement, you would be losing $1.10 if you had to build very much 1-3-5, as compared with your price for the 1-2-5? (No answer.)

Q. The point I want to make is that the difference in cost to you between these two mixtures of cement, according to your own figures, which have been liberal, is $1.35 a yard?—A. Yes.

Q. Referring to the letter which the chairman read to you a few minutes ago, in which you stated to Mr. Kitchen that other contractors were being paid 1-2-4 price for 1-2-4 mixture, what other contractor do you refer to?—A. I refer to a bridge at Four Mile Brook on Lyons & White's contract.

Q. Do you happen to know that that was a special arrangement between the chief engineer's office and Lyons & White?—A. No.

Q. Simply hearsay?—A. No.

Q. Why did you make the statement?—What authority had you for making the statement?—A. From the contractor who was putting in the concrete.

Q. He told you they were getting the 1-2-4 price for that material?—A. Yes.

Q. Did you know it was the result of a special arrangement or bargain?—A. No.

Q. If he had told you it was the result of a special bargain, you would have endeavoured to make a similar bargain?—A. No.

Q. You would have tried to have done the same thing as he did?—A. No, I cannot say that.

Q. Did you have any definite understanding with Mr. Balkam or Mr. Foss that you were to receive $10 a yard for that 1-2-4 concrete?—A. Verbally.

Q. With either of these gentlemen?—A. Yes.

Q. Did not Balkam simply tell you he would put it in?—A. He and Mr. Grant would allow 1-2-4 mixture.

Q. You are resting on Mr. Balkam and Mr. Grant telling you personally that they would allow 1-2-4 price for that 1-2-4 mixture?—A. Yes. If they would allow 1-2-4, we had a price for 1-2-4, the same as any other mixture. If they had said 1-2-4 I would expect to be paid for it in the same way. They mentioned 1-2-4.

Q. But what they really intended to do, as I read it, is that they agreed to permit you to use 1-2-4 of that native sand and gravel and would pay you the schedule of 1-2-5? Permit instead of allow?—A. We had a letter from Mr. Balloch ordering us to discontinue the 1-2-4 at Graham Brook and putting in 1-2-5.

Q. I have a statement before me showing that on your work there was used 1-2-4 concrete in masses, item 59a, 5136 yards, covering work on 37 different structures; does that look about right?—A. Yes; that is on the 31 miles—

Q. On the whole contract of Mr. Kitchen?—A. Yes.

Q. I would like you to be quite clear as to whether Mr. Grant said he would allow you 1-2-4 for that concrete. Do you remember distinctly that Mr. Grant said it?—A. I have a note of it here, taken at the time, both Mr. Grant and Mr. Balkam, in my presence.

Q. You are quite sure about that?—Yes. He told Mr. Balkam in my presense that he would allow 1-2-4 in the pedestal shafts.

By Mr. Kitchen:

Q. When you were ordered that two would not be paid for the 1-2-4 mixture, did you intend to go on using 1-2-4 and get paid for it at the 1-2-5 price?—A. No.

Q. When you were ordered to go on with the 1-2-4 mixture, did you expect to be paid for that mixture at the 1-2-4 or 1-3-5 price?—A. At the 1-2-4 price.

Q. I thought I heard you say you had a letter from Mr. Mitchell, the chief inspector of cement, writing to you from Ottawa, saying the sand was all right?—A. Yes.

Q. You have not that letter?—A. No, I have a note of it here.

Q. About the payments of your estimates, were you being paid for the 1-2-4 mixture before Mr. Grant came down?—A. Yes.

Q. After Mr. Grant told Mr. Balkam this in your presence, and you afterwards received word from Mr. Balloch to go on with this work, how long did you get the 1-2-4 price?—Did you get it afterwards?—A. No; it was returned in the estimates until some time in December, 1912.

Q. Was it not 1913? You did not know about it till you got your final estimate?—A. No.

Q. You did not know it was cut out?—A. No.

Q. It was fair for you to assume it was the 1-2-4 price, and you were being paid for it right along?—A. Yes.

Q. And no talk that you would not get the 1-2-4 price?—A. No.

By Mr. Gutelius:

Q. What was the greatest depth you had to go for foundations of the footings of the Little Salmon River Viaduct?—A. 22 feet.

Q. What method did you use to reach that depth?—A. We built an open caisson and excavated inside.

Q. To the bottom?—A. Yes, and we put on rails and rocks to weight it down and have it properly braced.

Q. You had no trouble to make it 22 feet with that character of open caisson construction?—A. No; and we used the pumps all the time while we were doing it.

Q. To keep out the water?—A. Yes.

Q. Supposing you had been compelled to go to 40 feet, would you have used the same method of sinking?—A. The same method of sinking, but with a heavier style of dam.

Q. That is, you would puddle on the outside?—A. Yes; we used pockets to make it puncture through.

Q. Filled with concrete?—A. No, filled with sand, so as to increase the weight sufficient to carry down the open caisson with your excavation.

Q. Suppose you had a pier 40 feet long and 16 or 18 feet wide, and 40 feet to solid foundation, would you have adopted the same method of construction?—A. Yes. The same method of construction, with a heavier type of cutting edge, and use concrete for weight instead of sand.

Q. That is, your puddling space would be filled with concrete?—A. Yes, to make the walls stronger.

Q. To make the walls strong enough to withstand the external pressure?—A. Yes.

Q. If it were necessary to go through eight or ten feet of water, would you use the same method?—A. Overlaying the mud?

Q. Yes?—A. Yes.

Q. In such a case as last described to you, would you, under any circumstances, use pneumatic caisson, 40 feet, 18 by 40, ten feet of water? Forty feet total depth; you have 10 feet of water then 30 feet of mud, then solid foundation; would you use the same method?—A. Yes.

Q. Would it be cheaper than the pneumatic caisson?—A. In my experience it would be.

Q. You might tell us of the deepest of your open caisson pier construction?—A. The deepest done to date would be 69 feet, in 38 feet of water, at low water, to begin with.

Q. And at high water?—A. About 62.

Q. And you went into the mud how deep at that place?—A. About 23 or 24 feet into the mud.

Q. Where was that pier located?—A. At the Bear River bridge on the Dominion Atlantic Railway.

Q. Do you think of another one deeper than 40 feet from the top of the water?—A. We have one we are preparing for now 105 feet from low water to ledge.

Q. To the bottom of the foundation?—A. Yes.

Q. And that is being built in open caisson?—A. Yes.

By the Chairman:

Q. Why did you build it with open caisson? Was it because you could do it cheaper?—A. Yes.

Q. Could you do it as quickly?—A. Yes, when I consider our excavation is done by means of orange peel buckets.

Q. The open caisson work is cheaper and more expeditious than the pneumatic caisson?—A. Yes, in my experience.

Q. Is there a marked difference in the price?—A. Well, yes, I would say there was. I have known cases where there has been as high as $14 a yard paid for excavations in pneumatic caisson.

By Mr. Gutelius:

Q. Whereas in the open caisson you could do it for——A. The average price would be $5 to $7.

Q. So that the cost of the excavation in the open caisson is about half what it would be in the pneumatic caisson?—A. Yes.

(EVIDENCE TAKEN IN N.T.R. OFFICES, OTTAWA, APRIL 9th, 1913.)

ALEXANDER MACDOUGALL, sworn:

By Mr. Gutelius:

Q. You are a member of the firm of O'Brien, Fowler and Macdougall?—A. Yes.

Q. Did your firm have a contract with the Commissioners of the National Transcontinental Railway for the construction of an engine house at Graham?—A. Yes.

Q. Was this to be paid for by schedule prices, or by a lump sum?—A. Schedule prices.

Q. With whom did you arrange these schedule prices?—A. The Chief Engineer Lumsden, and Chief Engineer Grant, and I think some of them with MacPherson.

Q. But the final effect of whatever arrangement you made was with the Commissioners?—A. Yes, they approved afterwards.

Q. Did you build this engine house yourself?—A. Well, we sublet it.

Q. To whom did you sublet?—A. Farlinger and Macdonald.

Q. Among the schedule prices, I notice that you received $17 a cubic yard for concrete of 1-3-6½ mixture; is that correct?—A. Yes.

Q. The records show that the total in connection with this concrete was $90,191?—A. About 5,000 yards, yes. Could I make an explanation there?

Q. Yes.—A. The price of the concrete was taken from the price of concrete in the main contract, you know.

Q. Then you received $17 a cubic yard for concrete in bridges and culverts?—A. Yes, and walls of buildings and foundations; it ran from $16 to $20, and $17 was arranged as a fair price.

Q. What did you pay these sub-contractors per yard for concrete?—A. $10.

Q. And you paid them on the same yardage basis that your own estimates were made?—A. Yes.

Q. How did the other items in the schedule of prices with your subcontractors compare in the matter of profits with the concrete prices?—A. Do you ask me if the percentage of profit on the other item was the same?

Q. Or something near like it?—A. No, it was not.

Q. Was there a fair margin of profit in each of the items?—A. Not on each of them, no.

Q. Not a fair margin?—A. No.

Q. What is a fair margin?—A. A fair margin ordinarily—oh, fifteen per cent, I presume.

Q. Have you any idea what the total profits of that contract with Farlinger and Macdonald amounted to?—A. In the neighbourhood of $50,000, practically.

Q. Is this the only building you had under your concrete contract?—A. No; the Armstrong roundhouse.

Q. How did that compare in prices with the one at Graham?—A. A little higher.

Q. Margin of profit a little higher?—A. No.

Q. About the same?—A. No, a little less.

(NATIONAL TRANSCONTINENTAL RAILWAY INVESTIGATING COMMISSION; QUEBEC, MARCH 12th, 1913.)

(EVIDENCE TAKEN IN THE OFFICES OF THE TRANSCONTINENTAL RAILWAY.)

ALFRED CURZON DOBELL, sworn—

By the Chairman:

Q. You are a practising advocate in Quebec?—A. Yes.

Q. And have practised here for several years?—A. Yes; eleven years, I think.

Q. I believe you have a power of attorney to act for the Duchess of Bassano in connection with her business in the Province of Quebec?—A. No, it was only regarding the property she owned up Champlain street in the City of Quebec.

Q. Did you make any lease of any portion of the Duchess of Bassano's property?—A. On the 25th February, 1908, I gave a lease, and this lease ran out on the first of May, 1909, but it was tacitly renewed from year to year. There was a provision in the lease that I could give the lessee six months' notice to quit.

Q. What you mean is that, after the expiry of the lease by effluxion of time, the tenant continued in possession of that property as a tenant from year to year, subject to be put out of possession on six months' notice, ending with any one year?—A. Six months' notice at any time.

Q. What was the name of that tenant?—A. Napoleon Martineau, junior.

Q. Where does he live?—A. He lives in Quebec, and he rented this property at that time for an ice house.

Q. Where is this property?—A. 2525 Champlain Ward.

Q. What do you mean?—A. It is designated and known upon the Cadastral plan, and in the book of reference for Champlain Ward in the City of Quebec under number 2525.

Q. And it is situated where?—A. Near the west end of the City on the River front.

Q. Below the citadel?—A. Below the citadel, further west than the citadel.

Q. But below the cliff?—A. Yes.

Q. What is the size of the property?—A. A piece of land measuring 37 feet by 60 feet.

Q. 37 feet frontage, running from the street to the water?—A. Well, I could not tell you that.

Q. Look at the plan. Do you know whether it ran to the water edge?—A. The building, no.