SESS. II.—1897.
NEW ZEALAND.

RAILWAYS COMMITTEE:

REPORT ON THE PETITION OF MURDOCH McLEAN AND ANOTHER.

Report brought up on the 20th December, 1897, and ordered to be printed.

REPORT.

PETITION No. 203.

PETITIONERS state that they were the contractors for the Makarau Tunnel on the Helensville Northwards line of railway. That they have been heavy losers by the collapse of said tunnel, which latter they assert was caused by the removal of certain supports by order of the Government Inspector of Works.

I am directed to report that the Committee, having considered the petition, and having taken expert evidence upon the several matters referred to in the said petition, have agreed as follows:—

That the said petitioners met with unforeseen and serious difficulties in the execution of their contract.

That, notwithstanding the difficulties encountered, they completed their work at a loss at least of £7,000.

That your Committee, having carefully weighed the evidence, recommend that the sum of £5,000 be paid to the petitioners, in full of all demands, as an equitable settlement between them and the colony.

20th December, 1897.

W. W. TANNER,
Chairman.

PETITION.

To the Honourable the Speaker and Members of the House of Representatives in Parliament assembled.

THE humble petition of Murdoch McLean, of the City of Auckland, and Neil McLean, of the City of Wellington, contractors (trading together under the style or firm of "John McLean and Son"), showeth,—

1. That your petitioners were the successful tenderers for the Makarau contract for the Helensville Northwards Railway at or for the contract sum of £26,616, and as such tenderers have carried out such contract to completion as hereinafter appearing.

2. That the principal work in connection with such contract was the construction of a tunnel of a length of 28½ chains.

3. That, prior to calling for tenders for this contract, the Government caused borings to be made for the purpose of ascertaining the nature of the ground through which such tunnel would pass on the then contemplated line or course of the railway, and these borings, at the shallowest part of the proposed tunnel, about 12 chains along its course, showed the class of the country at this point to be sand-rock, and in basing the tender upon which such contract was to be carried out your petitioners accepted these borings and the details given in these specifications relative to the tunnel as indicative that the tunnel would pass through hard or firm ground, and consequently they had no price or schedule, or made any allowance for a tunnel through soft ground.

4. That the whole of the details given in such specification relative to such tunnel show conclusively that the Government were of opinion and convinced that the tunnel would pass through firm or hard ground, and that it was never anticipated by them that the class of country would prove any other than firm ground.

5. That unfortunately the borings so made as aforesaid were not made on the line of railway ultimately adopted by the Government, as the position of the tunnel was subsequently shifted or deviated a distance of a chain from the originally proposed line; but there was no reason to suppose

that on such deviated line of tunnel any class of country different to that found by the borings on the first proposed line would be met with, and the specifications relative to such tunnel showed that the Government were satisfied that the same class of country would be encountered as was ascertained to exist by the borings on the first originally proposed line.

6. That it was found subsequently, as hereinafter appears, in the prosecution and carrying out of the works of the contract, that the class of country in which the tunnel passed onwards from 8 chains from its commencement was not the same class as that shown by the borings on the first originally proposed line, and the borings therefore were misleading both to your petitioners and to the Government.

7. That after your petitioners had driven 8 chains or thereabouts of the tunnel, which brought the work to about 2 chains distant from the point of the boring on the first originally proposed line, your petitioners found the sand-rock gave way to hard clay, which required timbering closely to keep it up.

8. That after your petitioners had driven 3 or 4 chains into this country, and bricking up as specified, they noticed the foundations coming in, and immediately advised the Resident Engineer of the same, whereupon he altered the design of the tunnel from a tunnel on firm ground to another class of tunnel by modifying the sections shown in the drawings by the addition of another ring of bricks to the arch and side-walls, making them 18 in. thick, and putting a 14 in. invert under it and the portion showing weakness, being that portion of the tunnel already constructed through the clay.

9. That, owing to the proximity of the sand-rock on the east side of the tunnel, which your petitioners carried alongside of them all the way, sometimes touching it and at others being only a few feet distant from it, the clay-ground frequently became heavily saturated with water, and on the 20th day of January, 1893, the length of brickwork broke in, letting down the timbers placed ahead by your petitioners, and filling the length that was then nearly ready for bricking.

10. That such fall or breakdown of the tunnel arose from two causes: First, because the brickwork was not of sufficient strength to carry the bars that were necessary to support the earth above while the excavation was advancing; secondly, because Mr. Witheridge, the Government overseer, much against your petitioners' judgment, and in spite of your petitioners' remonstrances, insisted on the removal of the miner's sills, which supported the timbers, instead of leaving them in, as is usually done in heavy ground of this description, until the length was bricked up. Mr. Witheridge objected to your petitioners leaving the ends of the sills in the brickwork, and your petitioners then offered to cut the ends off the sills, thus keeping the sills clear of the brickwork, yet at the same time continuing to sustain the weight on the timbers. Mr. Witheridge again objected, saying that he would not have the sill or sole-plate that supports the legs of the main sill left in the bottom of the invert, notwithstanding that your petitioners offered to take it out immediately the length was bricked, filling in the recess with concrete. Mr. Witheridge asserted that the brickwork was strong enough to support the whole weight, and, much against your petitioners' judgment, your petitioners were compelled to depend on the brickwork entirely to support the ends of the bars. The consequence was, as your petitioners feared, the collapse already described.

11. That your petitioners had up to this point been carrying on the construction of the tunnel from the point where clay-ground was first met with in the manner described and laid down by F. W. Sims on "Practical Tunnelling," a standard authority on this class of work, and throughout whilst clay or soft ground was encountered your petitioners continued the carrying-on of such construction in manner laid down by such authority.

12. That the timbers placed in such tunnel by your petitioners were of adequate strength, and the collapse occurred entirely through the brickwork not being of sufficient stability to sustain the weight thrown upon it.

13. That the effect of the collapse was to disturb the ground right through to the surface, 100 ft., and the water coming from the sand-rock into the clay-ground through which the tunnel had been driven made the earth of the consistency of mortar, and your petitioners were unable for some considerable time, and then only after the expenditure of much labour and exhaustive experiments as hereinafter shown, to drive through the remainder of the tunnel.

14. That your petitioners, immediately after such collapse, brought the same under the notice of the Resident Engineer, and appealed to the Hon. the Minister for Public Works to favourably consider your petitioners' position, and to pay your petitioners the cost of tunnelling in soft ground at actual cost price, and not at the schedule rates mentioned in your petitioners' tender, as such rates were based by your petitioners only on the supposition that the tunnel would prove to be one in firm ground, a supposition held in common, as previously stated, both by the Government and your petitioners.

15. That as your petitioners received no reply from the Hon. the Minister for Public Works, and obtained no relief or adequate concessions from the Resident Engineer, one of your petitioners (Murdoch McLean) proceeded to Wellington and interviewed the Hon. the Minister for Public Works on the position, when the Hon. the Minister stated that, as the contract was an incomplete one, and still subsisting, no concession could then be made, and that your petitioners could not be relieved from the further prosecution of the contract, but that if the contract was completed by your petitioners the Government would, on its completion, meet your petitioners with equity and justice.

16. That your petitioners then endeavoured for some months to make further progress in the work, but after the expenditure of about £2,000 your petitioners found that they had not made any progress whatever, as the earth kept coming in on your petitioners as fast as any was removed, and your petitioners then proceeded to make exhaustive and expensive experiments for the purpose of diverting the water that flowed into and saturated the clay-ground, which difficulty until surmounted was an absolute barrier to any further progress of the works.

17. That your petitioners were able, as a result of these experiments, to divert the water, and to proceed with the work in the tunnel in manner as previously modified by the Resident Engineer, with the addition of an extra ring of bricks at the portion where the collapse took place.

18. That Mr. Witheridge had during the suspension of the works been, in the course of his official duties, removed to another part of the colony, and Mr. McGonegal had been appointed as overseer in his place, and acted as such up to the completion of the tunnel. From the time that he was in charge of the work, and up to such completion, he approved of and concurred in the course of construction of such tunnel previously suggested and desired by your petitioners, as referred to in paragraph 10 of this petition, and the work was carried on in such manner without any further breakdown or collapse. The brickwork completed under such system has proved sound in every respect, whilst the brickwork completed under the system insisted on by Mr. Witheridge against your petitioners' judgment and remonstrances shows signs of weakness, proving conclusively the error of judgment on the part of the Government authorities in charge of the construction of the tunnel up to the time of the collapse.

19. That, notwithstanding the enormous extra expenditure incurred by your petitioners in the completion of such tunnel by reason of the facts hereinbefore set forth, the Resident Engineer declined to allow your petitioners any sum therefor in excess of actual schedule rates, which were based by your petitioners, as hereinbefore appears, solely on the supposition that the tunnel would prove to be one in firm ground, and, in consequence thereof, your petitioners have incurred an enormous pecuniary loss.

20. That during the progress of the works of the contract several slips occurred, necessitating the removal of 11,605 cubic yards of earth, which slips your petitioners contend were due to insufficiency of slope, and not to any other cause. The slopes were constructed by your petitioners strictly in accordance with the specifications relative to slopes and with the approval in all respects of the Resident Engineer, and were protected by drains as required. Notwithstanding such slips the Resident Engineer has declined to allow your petitioners payment for the same, and your petitioners consider that they are justly and equitably entitled to payment therefor, as such slips occurred through no faulty construction of the slopes or through any neglect or omission on the part of your petitioners.

21. That your petitioners have carried on the works of the contract to completion in a faithful and workmanlike manner at enormous pecuniary loss to themselves, relying on the promise of the Hon. the Minister for Public Works that on the completion of the works your petitioners' position would receive at the hands of the Government favourable consideration, and that your petitioners' claim would then be justly and equitably dealt with by them.

22. That the Government have received the full benefit and advantage of the whole of the moneys expended by your petitioners in respect of the contract in addition to the actual contract sum, and such contract could not have been completed for the Government by any person at a less cost to the Government than the total moneys expended by your petitioners in connection therewith.

23. That your petitioners have been contracting for the Government and local authorities for some twenty-five years, and have always given satisfaction to their principals, and have never up to the present contract had occasion to bespeak the favourable and equitable consideration of their position under any contract by any of their principals.

24. That your petitioners consider that the exceptional and extraordinary circumstances connected with the Makarau contract entitle them to the favourable consideration of your honourable House, and to an equitable settlement of their claim.

Your petitioners therefore humbly pray that your honourable House will take the foregoing facts and statements into its favourable consideration, and that your honourable House will grant to your petitioners such relief and concessions respecting the same as to your honourable House may seem meet and just.

And your petitioners will ever pray, &c.

MURDOCH MCLEAN.
NEIL MCLEAN.

MINUTES OF EVIDENCE.

TUESDAY, 7TH DECEMBER, 1897.

Mr. MURDOCH MCLEAN examined.

Witness: The statement in the Departmental Report that prior to calling for tenders the Government had caused borings to be made, so that we might understand the nature of the ground through which the tunnel would pass, is not correct. In our petition we do not make any statement that the Government had supplied these borings for the contract—we simply state that the boring was there. There was no price in our schedule, nor was any allowance made for a tunnel through soft ground. I put the matter of the boring in the petition to show the basis upon which we framed our schedule. In estimating for a contract we can only go upon the information at our disposal. All the information that was given us in connection with this contract led us to understand, as it would have led all other contractors, that the tunnel would go through firm or solid ground. I shall be able to bring evidence to show that tunnelling through soft ground is the most expensive of all kinds of tunnelling. The statement that tunnelling through rock or other hard substance is the more expensive is an error: tunnelling through soft ground is frequently the most expensive kind of tunnelling there is. We stated in our petition that we built 8 chains of tunnel in hard ground, and as a matter of fact we had a fair profit, notwithstanding that the report of the Engineer-in-Chief stated that our prices were low for that kind of work. The only indication given of the nature of the ground was the description of the brick lining. If you refer to the specification you will see in clause (13) what is stated there. If it were heavy or soft ground, three days are not sufficient to allow the concrete to set. That is the only reference made to the material. There is nothing described in the specification as to tunnelling and lining in soft ground, or of the nature of it. There is a section on the drawings showing a tunnel through soft ground with brick lining, but that section was not adopted. The section that was adopted was intended for firm ground with a "footing" placed under it. That was the brick lining that was adopted. There was no "invert" in the original specification. I might say that it was a brick lining for a tunnel going through the best class of ground. Such was the only information we had on which to base our contract. In going over the ground we saw where the boring was put in. We examined it. It was sandstone rock, which is the very best material for boring through. As I have already stated, there was no description given in the specification of the nature of the ground. In clause 7 of the report of the department [clause read]. Our statement as to the change in the ground is admitted.

1. *An Hon. Member.*] You were paid for the extra brickwork?—Yes.

2. *Mr. Morrison.*] And for the invert also?—Yes; but we are not claiming for extra brickwork. We were paid for nothing extra; there is no question of dispute about extras so far as the schedule has any bearing on the work. What we contend for is that, unforeseen circumstances having arisen in connection with the work, we are entitled to the amount we expended on it. Then, with regard to the cement-mortar not having time to set, I can only say that if we were obliged to wait until the cement-mortar had time to set before we proceeded with the next length the time taken in doing the work would have extended over a number of years. The real fact is that the brickwork was not of sufficient strength to carry the weight. It might have taken weeks to set, and if we had to wait for each length we might not have done with the works for years. As to the collapse of the tunnel, that was owing to different causes. In reference to clause 10 of the report, I might state that our men had been working continuously—day and night, and sometimes even on Sundays—for a very long period. That was in 1893; nearly two years. They had done everything that was necessary; but you must be be aware that you cannot get men to work during the Christmas holidays. It is no use keeping a few men—half a dozen or so—upon a work of that kind, and you cannot change such men whenever you like. They are experts, and you must keep them if you can. It became necessary to allow them their holidays. I may also say in connection with this matter that we took every precaution to block up the face of the tunnel, so as to do away with any chance of injury. We put the brickwork up to the heading, and left it solid practically, so that the contention in the report of the department has not proved anything in this particular. I now come to the statement relative to Mr. Witheridge. I am prepared to substantiate the statement we make in our petition with reference to Mr. Witheridge, not only by myself, but also by special witnesses whom I will bring before the Committee. We state in our petition that the brickwork was not of sufficient strength to carry the bars. I will endeavour to substantiate that statement. There is a clause later on in the report stating that he was appointed to supervise the work, and that in that capacity he had nothing to do with directing the contract or the manner of carrying it out. Now, Mr. Witheridge, as inspector or overseer, was there actually representing the department. Any instructions from him would have weight

with us as if it came from the Resident Engineer or even the Engineer-in-Chief. It is said that he had no authority. In the general conditions you will find that the Resident Engineer can order the contractor to carry on the works in any way he wishes, but he will not be responsible. But the contractor is responsible. That is in the general conditions. I am not sure which is the clause. The Engineer-in-Chief has power to give directions as to the manner of doing the work. He would not be responsible; but the contractor would be responsible in carrying out such directions. For every level shown on the drawings, according to the general conditions, the contractor is responsible. In the same way the Resident Engineer or the Inspector is empowered to direct the contractor, and the contractor is bound to carry out their instructions. I have a note from Mr. Witheridge somewhere relative to the discharge of a workman. There is a clause (11) of the report which I wish to refer to in regard to the work, Sims's "Practical Tunnelling." It is a standard work, and, though stated to be somewhat out of date, it is a work of authority.

3. *An Hon. Member.*] Who do you get your experience from?—From the best expert workmen we can obtain. The men we employed were John Riordan, who had been in the employment of Mr. Danaher, and who was in charge of our work, until he met with the mishap in the tunnel which caused him to lose his life. We employed Patrick Smith, who had been previously employed in the Poro-torau Tunnel; also John Bate Clemow, who had been also engaged in the construction of the Poro-torau Tunnel. We employed one other man named John Hunter. We worked in three shifts: each of these men were responsible for the work during the shift. With these men we considered ourselves capable of doing the work of this contract, and quite equal to anything in work of this class. With regard to the Inspector, I am told that he had never anything to do with tunnelling. I am not saying anything against him as a mechanic. I am not aware he had ever had anything to do with tunnelling. I may say the same in regard to the Resident Engineer. I have no knowledge of his ever having been in charge of works of this kind and magnitude. It is stated that it was through our inability to carry out this work that this accident occurred. That is not in accordance with fact. Referring again to Sims's work on "Practical Tunnelling," it has for a long period been a work of standing authority. There never has been any better method discovered. But we did not rely on that work. We used our workmen's experience and our own, and expert experience by practical men who had been long engaged in work of this kind. Referring to the sills spoken of in the petition: The end of the sill is left in the brickwork until the arch is built up to what is termed the key, when it is drawn, when the weight is thrown on the brickwork, but only for perhaps a couple of hours, during which the work would be without support. The work is run up as quickly as possible until the arch is complete. There is always a leading-sill to keep the weight off the brickwork until the whole thing is arched and the work is complete Now, with regard to the interview with the Premier: I do not say that an actual promise was given to us by the Premier. But, from the conversation I had with the Minister, I left him having the opinion that, our case being exceptional and very hard upon us, it would be equitably dealt with. Just before leaving, Mr. Jackson-Palmer was with him, and he certainly had that opinion also.

4. *Mr. Taylor.*] Was he present at the interview?—Yes, he was present. In clause 17 the report states "When the contractors were ready to recommence the lining, the Resident Engineer had already increased the brickwork right through." But he did not do so until we called his attention to the fact of the tunnel caving in. He came there one evening, put his level along the crown of the tunnel, and found it had come down 5 in. He stated that we had taken the wrong levels. I hardly understood the cause of it at the time; but afterwards my brother, being with me, we thought it so serious a matter that we took the measure of the tunnel, and, applying the level, found that it had come in 9 in. at formation-level. That seemed to us a serious condition of affairs. We informed the Engineer, and, without instruction, we placed parallel timber along the footing, and put transoms across, and put props up, and other cross-bearers. We found that the brickwork had come in 2½ in. in a period of four hours. The Engineer was up two days after. Referring to clause 18 of the report: McGonagle is an experienced man. I will bring him and other witnesses, who will show that such is the case. He has had charge of works of this kind. What we say is that he was an experienced man in connection with tunnelling; he had at that time just come up from the Manawatu Gorge Tunnel, where he had been previously engaged. He was an Inspector nearly the whole of the time the tunnel there was being constructed. He had had experience of other tunnels also. Mr. Witheridge is a competent mechanic, I admit. He is a stonemason by trade. I do not know whether the work which he had previously been in charge of was satisfactorily carried out, until the case of this Makarau Tunnel. What we contend is that he was not a capable Inspector for works of this class. We had been working on that tunnel for two years. In these two years we contend that a man of average mechanical knowledge in these matters would become competent. It was, no doubt, anticipated that the tunnel would go through sand-rock. Sand-rock is the best, or one of the best, materials which a tunnel could go through. I feel certain that the department was satisfied that such was the nature of the ground. I would ask that you have the Government estimate of the job, so that it may be clear how much we were below the Government. It will enable the Committee to see what the Government thought would be the proper cost of such work. I can say that the work we did in connection with this was good work for this class of work; and until we came upon this soft ground we made a fair profit. In connection with this clause (8 of specification), Mr. Blair was Engineer-in-Chief. He had decided to put a clause of this description into the contract. This was the first contract in which I saw a clause of this kind put into the specification. It was considered that the contractor was responsible for all slips. Our firm had done some work for Mr. Blair in the South Island. He paid us for slips. When this was first introduced, Mr. Blair having come to such a decision, it appeared to us that the Government would pay for slips. We had not made any provision for slips. We based our estimate on the supposition that if we carried out the work to completion, although the Minister made us no promise, our case would be favourably considered.

As a matter of fact the Minister made no promise, except that the matter would be considered. If the actual nature of the ground had been ascertained by the department, as was generally done in works of this kind, we would not have been misled, so that this tunnel could not have been done for less than £8,000 more than we are claiming—that is, to allow the contractor a fair amount of profit. But the claim we are making is not for the actual amount of loss we have sustained. Our total expenditure was something more than £39,000. We submit, if all the circumstances are taken into account, we have an equitable claim. I would remind the Committee that the railway has not been used for general purposes; it would not have been used if it had been completed at contract time. That would have been in 1892. The railway was ready to remove timber. That was the only product to be removed. It was ready for the timber when the timber was ready for removal. They are now taking timber on it. I wrote a letter to the Minister for Public Works in 1893, to which I received no reply. That letter embodies everything that is in our petition. There are some other letters in connection with works, and in connection with the slip that occurred at the north end after the eastern wall was bricked up (29th January, 1896). Mr. Vickerman, the Resident Engineer, came up on receiving that letter. This is his reply, which he made in the course of our conversation (Letter, 4th February, 1896). Then I had a letter (12th February, 1896). Then there is the letter (17th February, 1896), and then a letter (20th February, 1896). We next sent in our claim with a letter attached.

5. *Mr. Blow.*] What is the date of that letter?—I have not the date of that letter.

6. Have you any idea of the date?—It was some time in August.

7. Would not the first paragraph in letter of the Engineer show it?—The date of the letter must have been the 2nd July. Our claim was in due form. We enclose our claim for extras in addition to those admitted, and then we refer to the correspondence. The reply we received was dated the 20th August, 1897. Now, we ask the Committee to consider that we come here for equity. All Government contracts are more or less one-sided. The Engineer is the sole arbitrator: he should be a wholly unbiassed man in connection with any work he has to decide upon. I do not see how the Engineer-in-Chief can arbitrate upon questions of dispute with officers appointed under him with an unembarrassed mind.

8. *Mr. Hales.*] Is that so? Was not the Engineer to notice a difference of 10 ft.? The whole of these matters are details?—We received Mr. Vickerman's letter, that of the 4th September, 1897. It seems strange that the responsibility for land washing away into the creek should have fallen upon the contractor. It is a small matter, but, in justice, I think we should receive the amount for it. According to the data given in the specification we concluded that it would be firm ground. There was no part of the tunnel shown to be on soft ground. But this specification was not followed by the department. We consider that, with respect to the ironwork, we ought to be paid for the bolt-ends.

9. *Mr. Blow.*] You have been paid for them?—We again wrote appealing for the favourable consideration of this matter. To that letter we received no reply. We claim £5,371. I have endeavoured to make these matters plain to the Committee: to make the Committee understand what were the conditions of the contract. I do not think I can say anything further.

10. *The Chairman.*] You invite the attention of the Committee to the passage in the specification which states that the contract boards were not to be removed in less than three days?—Yes.

11. You understood it was to be sandstone rock. Would that be a reasonable time if it was wet?—It would not be a reasonable time if the ground was heavy. The mere wet would have nothing to do with it.

12. Did you understand from the authorities that the ground was firm, and upon that understanding you calculated your contract; and you say that you would not put in the same contract if you knew the ground was "heavy"?—That is so.

13. How did you get this boring; of what did it consist?—We were informed by men who had been boring on the survey, and that the boring was there.

14. Did you get any details as to the boring?—No more than that it was sandstone.

15. How many were made?—Only one, as I have stated in my petition.

16. *Mr. Duncan.*] Did you examine the ground to see where borings had been made?—Yes.

17. Upon examining the ground previous to tendering, was the ground pointed out to you where the boring had been made?—Yes.

18. Did you know it was not on the line?—We knew it was not on the line.

Mr. McLean: We were running alongside the sandstone all the time.

19. *Mr. Morrison.*] The department has made the statement that your tender was too low. Did you not know you would have to go through to the creek?—I made no assumption whatever that the ground would be soft. Whether it would be soft was shown by the price obtained in tenders for tunnel-excavation. My contention is—and I can have it substantiated by expert witnesses—that tunnelling in soft ground is the most expensive kind of tunnelling which it is possible to do, whereas sand-rock is the best kind of material to tunnel through. Soft ground may be even more expensive than the hardest rock.

20. What is your meaning when you speak of soft ground?—It is not soft in the opening up—it is hard, consolidated clay—it is close, dense clay; but in the opening up it is hard. It becomes soft by exposure; in consequence of water percolating through it, it becomes of an extremely soft nature. It is a consolidated clay, of a blue colour.

21. Is it hard to cut?—It is very hard to cut. The immediately-adjacent ground is sand-rock, which carried water on to the work.

22. Thus converting the hard clay into soft puddle?—Yes.

23. Did you complain of it?—To Mr. Vickerman, the Resident Engineer.

24. He seems to have made no report of your complaint to Mr. Hales?—At the time we complained to Mr. Hales himself.

25. *Mr. Hales.*] When?—On the occasion of my visit to Wellington.

26. You may have complained to the Minister?—You were present.

Mr. Hales: Yes.

27. *Mr. Morrison.*] You made all the usual arrangements, as the contractor, to secure the tunnel—such as shoring and bracing up?—Yes.

28. Did anything occur during the three weeks' stoppage?—Nothing whatever.

29. There was no fall-in?—There was no fall-in.

30. You stated that you employed the very best gangers and foremen that you could obtain?—Yes, that is true.

31. You were not able to cope with the difficulty that had arisen?—Not at that time.

32. Do you know whether Mr. Witheridge had ever previously inspected a tunnel?—Not as far as my knowledge goes. Clause 20 of the department report deals with slips.

33. Do you know if Mr. Vickerman had any experience of tunnel works?—Not as far as my knowledge goes.

34. You made your slope-cutting according to the specification laid down here?—Yes.

35. Did you receive any orders involving alterations in connection with these slope-cuttings?—No; not one.

36. Do you mean that the slopes would be cut according to specification, and that they should be cut with a considerable slope?—Yes; we contend that the stuff came down through the steepness of the slope.

37. Should not the contractors take the usual precautions themselves by examining the ground to ascertain the character of the material?—So far as we were able to do it, yes: so far as it could be done. We were bound to go into the whole of the information given to us. As a rule a month is given to contractors to go through the work when tendering. I contend that a month is not sufficient time. It entails considerable expense, and contractors as a rule cannot go to such expense.

38. Is it customary on the part of any person letting a contract to have borings and examination of all material made?—It is certainly the proper mode. It is customary in Australia: it is done there in every case.

39. You have had experience extending over a quarter of a century, and you state that it is the invariable custom on the part of corporations and public bodies, when letting a contract, to have borings made, thus giving some idea as to what the contractor would have to contend against?—That is my contention.

40. *Mr. Massey.*] Will you tell us why the tunnel was not constructed on the line of boring?—That I know nothing about.

41. If it had been constructed on the line of boring, would you have avoided this ground?—We would: the boring was a chain distance from the line of tunnel which is now constructed. It is no great distance up to the fall. The water came in upon us nearly the whole way. If the tunnel had been constructed on the original survey, it would have been through solid rock—there might be a little of other ground at the far end.

42. I understood you to say that there was rock along the side, where the water came in?—If it had been constructed on the original plan we would have been in the rock.

43. You said something about basing your information on the plans?—The plans and specification are there.

44. *Mr. Wright.*] You were misled by the single boring that was taken as to the nature of the ground which the tunnel would go through?—We took that as the general basis to estimate upon, together with the clauses in the specification.

45. Did you ascertain from any officer of the department why, having put down a bore on the abandoned line, they did not put down any bore on the finally-selected line?—That I could not make out, except that they were satisfied that the bore on the originally-proposed plan would cover the one that was finally adopted.

46. *Mr. J. W. Thomson.*] You said that part of the ground was good for tunnelling: can you say what would be the extent of soft ground you complain of where the water came in?—There were 8 chains which we drove through, and which we consider was the best ground for tunnelling. To give you an idea of the expedition with which the ground could be worked through that class of country, I may give you some information as to the time it took. We had thirty men employed, and during the last month we were working in that material we did about 3½ chains of the full size of the excavation—that would not amount to more than about 4s. or 5s. a yard.

47. That was the most difficult part?—No; that was the best of it.

48. *Mr. Crowther.*] You stated that three days were not sufficient time to allow concrete to set. What does that imply; did the removing of the supports depend on the concrete?—We understood that the boards had not to be removed for three days.

49. You said that three days were not sufficient?—Not sufficient if the ground was of a heavy nature. I understood that it was to be a tunnel through hard or firm ground.

50. Was there any necessity for taking out these boards at the end of three days, even if it was advisable to take them out?—I only made that remark to show that the department was satisfied that the tunnel was in firm ground. We did not do the work in concrete; we did it in brick. If the tunnel had been assumed to be put through soft or heavy ground, the department would have insisted on them being left a considerably longer time than three days.

51. You seem, by inference at any rate, to put particular stress on the manner in which you had to conduct the work under Mr. Witheridge: did he at any time give you instructions in connection with the work contrary to the specifications?—No; but he was empowered by the general conditions, I consider, to give instructions.

52. You had no reason to believe that he was in any way officious in carrying out his duties in such a way that he would prejudice your success in carrying out your contract?—I do not quite understand.

53. *Mr. Morrison.*] He did not put difficulty in your way?—We consider that it was difficulty.

54. He did not put difficulties in your way, but he was officious?—Yes, he was officious.

55. *Mr. Crowther.*] You say he did not give you any instructions contrary to the specifications?—With respect to the materials for construction and brickwork, he did not vary from the specifications in carrying out the work, or in the method of carrying out the contract, until we came into heavy ground.

56. You said something about discharging one of your staff, but you did not follow it up; that Mr. Witheridge was in no way responsible as Inspector on account of your staff?—He was in no way responsible for the work; the contractors were responsible.

57. Had he any power to interfere with your staff?—We only presume to show that he had authority, being the representative of the Engineer, to do anything that was necessary in connection with the work.

58. He had authority only within the specifications; he was subject to authority of the specifications?—Properly so. The Resident Engineer had authority to give directions as to the mode of carrying out the work, but the Government was not responsible—the contractor was responsible.

59. *Mr. Blow.*] There is a special power for that in one of the clauses?—We say that the Inspector is the representative of the Engineer while he is on the work.

60. In regard to the boring—having reference to the Wellington drainage tunnel—you said there were instructions there: how many borings were made?—There were five sections; there were five different kinds of ground.

61. What was the length of the Wellington tunnel?—71 chains.

62. What length was this?—28½ chains.

63. *Mr. Taylor.*] How is it that when "boring" is mentioned it is referred to as "borings"?—It is referred to in the plural; we had no intention that it should carry with it that impression.

64. Only one boring and that not on the line?—Yes.

65. Did you have no idea whether they would pay you for this work?—I certainly thought they would.

66. What personal experience have you with regard to Australia?—We had it through men who had been working for us.

67. Suppose a series of borings made over the line of the actual tunnel—you said the material was hard when first cut through, and that it only became soft by exposure to the air: would not that show the nature of the material; would it give you a hard material?—It is well known that material of that kind would expand; then our prices would have to be considerably more. If it had been through papa—that is a fairly hard material, of about the same hardness as sandstone—our prices would have been considerably over what they are in the schedule now.

68. You say that for the first few chains you made a large profit?—Yes; a very fair profit.

69. What would you consider contractor's risk on that line; is it a custom to guarantee material?—I think it should be so. A contractor's risk is minute if proper information is given to him.

70. Yet you admit there was no boring on the actual line?—If there had been borings over the line, I think that, under those circumstances, we might have a legal claim in connection with this matter. If the borings turned out to be contrary to what was shown we would certainly have had a legal claim. But we are appealing to the House in respect of exceptional circumstances connected with it.

71. *Mr. Holland.*] With respect to timbering the ground, was the timbering shown in the plan?—No.

72. Is it not usual in contracts of this sort to show how it should be timbered?—No; I do not think so.

73. You say you were compelled to take the sills out before the arch was set?—Yes.

74. Why?—We were instructed to take them out by the Inspector first of all. I have unfortunately lost the letter connected with that, instructing us either to take the sills out or cut the ends off.

75. That would be taking out the timber-work before the arch was keyed?—Certainly.

76. *Mr. McLean.*] Clause 11: You were in sole charge; you had no experience of your own in tunnelling. Is that so?—That is so, previous to this contract.

77. Then, as to clause 10, the Inspector had nothing to do with directing the contractors as to the way they conducted the work?—That is our contention: that he did direct us to shift the timber; that he had no authority to do so. We contend at the same time that he was the representative of the Engineer who had such authority, and we acted upon that authority.

78. *Mr. Wright.*] You stated that the brickwork had moved, that at the crown it came down 5 in.?—Yes.

79. And that the side-walls caved in 9 in.?—Yes.

80. Had the lining been altered before?—No.

81. It was afterwards?—Yes.

82. Did you call attention to it in writing?—Yes.

83. Can you produce it?—Yes; I now produce it.

84. *Mr. Duncan.*] Was the effect of interfering with the timbers to allow the brickwork to cave in?—We contend that was so.

85. The timber was taken out before the arch or its lining was completed; that was the cause of the collapse. [Letter, 26th September, 1891, put in.]

86. *Mr. Crowther.*] When did the Engineer go up?—He came immediately after the letter we sent; he came to the works.

Mr. Blow, in answer to a question, said he had witnesses who would negative what the petitioner stated. He did not think it was necessary to ask him any question.

THURSDAY, 9TH DECEMBER, 1897.

Prior to proceeding with the general examination of witnesses a discussion took place with regard to the statement of claim of the petitioners, in the course of which—

Mr. Blow asked whether the petitioners had put in any such claim, and, if so, whether he might be favoured with a copy of the same.

The Chairman replied that a claim had been put in, and that Mr. Blow could receive a copy of it at the first opportunity.

Mr. Graham: A specific claim was made on the Public Works Department, part of which they have admitted: what is the balance now?

The Chairman: The claim as submitted was for the sum of about £7,000. (Cries of "No—£5,000.")

Mr. Graham: I wanted to know what was the amount of the claim made upon the Public Works Department, and how much has been paid since the claim has been made?

The Chairman: I do not think it is possible to answer that question specifically; we do not ourselves know the exact amount that has been paid since.

Mr. Graham: But Mr. Blow should be able to tell us what this balance was.

The Chairman: Mr. McLean can tell us the actual amount. (To Mr. Blow): But you, Mr. Blow, can tell us accurately the proportion of that that has been admitted and paid; and I want to know what the balance is.

Mr. Murdoch McLean: £5,371 16s. 3d. is the balance claimed. Mr. Blow can produce the total of the claim.

The Chairman (referring to a paper handed to him): The total given here is £5,371 16s. 3d.

Mr. Blow: The claim sent in was for £5,637 16s. 9d.

Mr. Graham: And the amount of that that has been admitted and paid?

The Chairman: The difference is £266.

Mr. Blow: This would be for a number of items not separately moneyed out. I can work out the difference for you.

Mr. Graham: So that out of a claim of £5,637 only £266 have been admitted and paid, so that the balance that Mr. McLean considers due is £5,371.

The Chairman (to Mr. McLean): Do you admit that the claim now alleged is for £5,371 16s. 3d?

Mr. Holland (interrupting): This is the money he has lost, and he asked the Government to assist him to that extent because of these losses. Therefore he comes before the Committee to see if the Government can assist him over these losses: he cannot make the claim.

The Chairman: It has been handed in, and has been printed here as a claim for extras—that is, a claim lodged with Public Works Department, but not a claim lodged before this Committee.

Mr. McLean: No; it is not a claim lodged before this Committee.

The Chairman: Then, it is brought here as a statement of your claim against the department?

Mr. McLean: Yes.

Mr. R. McKenzie: We heard what Mr. Blow said, that for a long time after this claim was made on the department they refused to pay a shilling of it. Until the petition was brought before Parliament the department did not admit a shilling of this claim.

Mr. Blow: The amount was paid at once—well, before the petition was presented to Parliament.

Mr. Flatman: I understood Mr. McLean to say he did not understand what was being paid into his bank account before he left Auckland. Has this £266 been paid in?

Mr. McLean: The final payment of something over £3,000, I understand from Mr. Blow, has been paid into our bank-account in Auckland since we left there, and this £266, which I understand is the amount that the department has allowed us for our claim.

Mr. Blow: No, it is not all that; part of the claim you have abandoned.

Mr. McLean: One or two small items, but with these exceptions that has been the amount that has been paid in.

Mr. Blow: The amount paid in, I believe, is £101; the rest has been abandoned by the petitioners.

Mr. JAMES STEWART, Civil Engineer, Auckland, examined.

1. *Mr. McLean.*] You have had considerable experience in tunnelling, Mr. Stewart?—Yes, I have considerable experience in tunnelling, including the Makarau Tunnel, when in rather an advanced state during construction.

2. It has been stated in the report from the department that it is cheaper to build a tunnel through soft ground than it would be through firm ground. Now, I want you to answer, is it cheaper to build a tunnel in firm or hard ground—we will say a tunnel that would only require a lining, as described in the specification—than through soft ground, such as you know the Makarau Tunnel to be?—Well, as a rule there is no question about it. In hard, firm ground the cheaper is the work of tunnelling through it. In soft ground it costs more, and it might cost a very great deal if the ground is very soft.

3. Ground requiring such lining as described in the specification you would consider to be moderately firm ground, and cheaper to work than what you saw yourself in the Makarau Tunnel?—Yes; in the amount of brickwork specified and shown as in the contract, I should say that that was intended for firm ground.

4. In the specification there is no mention made of an invert—it is just the side walls and the arch?—I believe that is so.

5. Do you consider it safe in ground such as the Makarau Tunnel was driven through to remove the sills or even to cut off the end of the sills until the lining was sufficiently advanced?—I

never heard of such a thing as the sills being removed. They ought to be kept in till the very last —till the brickwork is in. They are made so that they are movable after that, and the holes in the brickwork are filled up after they are moved. The old-fashioned way of scarfing is useless, but they should be butted up underneath.

6. And these sills are put in in two so that they can be removed when the ground is heavy? —Yes; otherwise they would have to be cut out, and would be useless for anything else.

7. Our schedule price was 6s. 6d. In addition to that we claim from the department 6s. Do you consider 12s. 6d. per cubic yard a high or low price for excavating a tunnel consisting of material such as this tunnel was?—Well, it would depend on the sort of material the tunnel was in. I am not quite sure, seeing I only saw part of it; but I may say that in soft ground—that is, with moderately good clay—10s. to 12s. 6d. per cubic yard would be a fair price for taking out the tunnel. That includes all the timber necessary, of course.

8. It would not be a high price?—No.

9. There has been reference made in the report from the department as to the fact of Sims's work on tunnelling being an obsolete work. Would you state to the Committee what you consider about that work?—For such tunnelling—that is, brick-lined—there is no other way of working than that mentioned in Sims's book. It has remained the standard; but very soft-ground tunnelling is generally done now by means of cast-iron lining and air-pressure.

10. That is very soft ground?—Yes, and in any sort of clay. I may say it is only in very soft ground that that has been used, such as the tunnels under the Severn and Thames, and various other places.

11. But you consider that in that class of tunnel Sims is right up to date?—Yes; it is not obsolete. There is no way of doing it unless you simply duplicated with timber.

12. You have read clause 8 of the specification. Would you consider the contractor should be paid for slips under that clause?—It is very difficult for me to answer that.

13. This is the clause: "All cuttings shall have a width of base at formation-level as shown on the drawings, according to the material through which they are made. Slopes shall be ¼ to 1 in solid rock, 1½ to 1 in sand, and 1 to 1 in all other material; but, should the Resident Engineer require any other slopes, the difference in cost, estimated at schedule rates, shall be added to or deducted from the contract sum. The Resident Engineer shall be sole judge as to what class the material in the cuttings belongs. Any alteration in the slopes of cuttings will be ordered in writing. No slips will be paid for under this clause except those that are in the opinion of the Resident Engineer due to steepness of slope, and for which an order has been given beforehand." Now, I will put it in this way: If you were tendering for a contract would you consider that that clause covered the question of slips? That is, if slips occurred through no fault of the contractor—slips not brought down for any ulterior purpose, but genuine slips—would you consider the contractor would be justified in considering that they would be paid for?—Yes, I think that is very clear. If the ground is so soft and mucky that it will not stand, say, 1 to 1, there is no use in the Resident Engineer not ordering a flatter slope. Otherwise they could not open the railway; it would just continue to run in. The natural slope is the one the engineer should set all his cuttings by. If it will not stand at 1 to 1 there is no use an engineer not doing it, because it will take its own slope. I think it would be a monstrous thing that any individual of the community should have to pay for that which is inevitable, and for which the whole community gets the benefit. I may say that that was always my own practice when in the department. When a slope would not stand at a certain angle, I, either with or without authority, increased the slope until it would stand.

14. Is it customary to put borings down to ascertain the nature of the country that a tunnel should go through as a guide to contractors tendering?—Well, I have never known a tunnel put into ground that was not carefully examined—certainly none that I had anything to do with—without examining it, not every yard, but certainly in two or three places every chain, and cross-examining it too. I have generally put down at least three borings every chain.

15. In the Auckland District the strata below the clay is usually sand, is it not?—I could hardly answer that question.

16. At any rate, the clay in the Auckland District is greatly underlaid with sand-rock?—Yes. The only tunnel I have had north of Auckland is the Waitakere Tunnel, and it was through ground of that character.

17. That material is very easily excavated?—Very easily.

18. You know of no material that is cheaper to excavate than sand-rock?—That is the cheapest for a tunnel that I know.

19. In calling for tenders for a tunnel that is to be through sand-rock under clay, would you, as an engineer, have the site of the tunnel bored?—Yes, as I have said before; but I would not guarantee anything to the contractors.

20. As a matter of fact, you had all the cuttings bored on the Rotorua Railway?—All without exception—every heavy cutting. I had borings put down every chain, sometimes nearer and more frequently—as a rule three of them to the chain—so as to give the nature of the cross-section. Similar cuttings on the level ground I did not bore at all.

21. No, it would not be necessary where the ground was shallow?—It was easily seen what they were in that case.

22. But, at any rate, in driving almost any length or kind of a tunnel, unless the ground were very shallow you would have it bored?—For my part I could not go on without.

23. There has been some kind of a reflection placed on us as contractors for this work, you know. As a contractor for a considerable number of years, I would just like to ask you to state to the Committee your opinion of us as contractors. That is rather personal, but as it has been brought up as a reflection against us I would just like them to have your opinion?—I should have no hesitation, and never would have any hesitation, in accepting you as contractors for engineering,

or dock-work, or any other sort of work. My experience has been this: Where a man is contracting it matters very little whether it is earth or iron or stone or wood he is working in: he gets specialists for each kind of work, and he knows that is the only way of putting it through. It is generalship and management which is the first necessity in a contract.

24. And you are satisfied that we as contractors are capable of exercising sufficient ability to carry on works of this kind?—Certainly.

25. We carried out a number of works under your supervision—for instance, we carried out a very large contract in the Rotorua Railway under you as Engineer, and you are satisfied that we carried out the work as systematically and as cheaply as any other contractors you have had?—A long way cheaper than any I have known.

26. On the usual railway contract?—Yes; and with about as heavy earthwork as existed in the colony.

27. Prior to the Makarau Railway contract you had no knowledge of us as railway contractors—I mean in constructing railways?—I do not know the date of the Makarau Railway contract. You had done bridge-work before that.

28. And notwithstanding that we were able and capable of carrying out this work?—Yes; there is no mistake about that.

29. *The Chairman.*] I gather from what has been said that you have been in the Government service, and have in that capacity had considerable experience in supervising public works?—Yes.

30. And you have supervised contracts that have been carried out by the petitioners?—Practically the whole of the Auckland railways, with a few exceptions.

31. And your answer to the petitioner is that you have the fullest confidence in the way he carried out his work and the general way he goes on with it?—Certainly.

32. *Mr. Flatman.*] Are you in the service now?—No.

33. Would you mind stating why you left the service?—I left the service when reductions were made in 1881, when the Hall Government succeeded Sir George Grey.

34. You stated that you visited the Makarau Tunnel?—Yes.

35. Were you officially there, as a Government servant?—No, advising Messrs. McLean.

36. And you found it to be in a bad state?—Very bad.

37. Was it due to the faulty work of the contractors?—No, I could not say that. The statement that was made to me I could hardly believe at the time—that was, that they were forced to take out those miner's sills—for I found that the brickwork a few chains behind where they were working had showed signs of weakening. That was the explanation given me; and that the sills were ordered out. The catastrophe that occurred could hardly be wondered at. But the tunnel was in an exceedingly bad state when I saw it, so much so that you could not take a single poling-board away without the mud squirting out. It was a very long time before they got round it; and, as I was told, they had been months before that and had made no progress whatever. They could not get in another timber, and it was so very bad at that time that the only way I saw of effectually getting through was to cut it open from the top. They got through in another way, but they had a very great deal of work over it.

38. Do you consider the thickness of brickwork, as specified in the specification, was strong enough for the tunnel?—Not for the tunnel as it turned out. An invert had to be put in; and, besides, there were cracks, showing the weakness of the sides. I do not know whether they still exist or not, but they existed when I was there. I have only been there once.

39. And you consider it was necessary that there should afterwards be an extra ring of bricks for the safety of the tunnel?—If they had not put in that invert there would be no tunnel there now. There would have been a collapse.

40. *Mr. R. D. D. McLean.*] You say you always bore the ground. Is that customary?—Yes; and it has always been customary for me to let the contractors use the information so obtained, but it has been my custom to take no responsibility for it. All information that I procured I have allowed them to use freely for their guidance, but there was no guarantee that it was correct.

41. Is that the custom of the department?—I believe I explored the ground more than was generally the custom of the department.

42. *Mr. Massey.*] I think I heard you say you were of opinion the undertaking, so far as Messrs. McLean were concerned, was done in a workmanlike manner?—Yes. The brickwork was first-class, and they had a thoroughly systematic method of getting the ground taken out and the brickwork put in.

43. In this matter of the sills, do you think because the overseer insisted on the removal of the sills, that he was to blame for the collapse of the tunnel?—It was stated that Mr. Witheridge ordered them to be removed. I must believe it; but it was a most mistaken thing in my experience. There is no question in my mind that the removing of the sills was the cause of the catastrophe.

44. Then do you think the Government is responsible for the mistake of their overseer?—Well, I should think so.

45. *Mr. Wright.*] Tell the Committee, Mr. Stewart, what general experience you have had in the supervision of railway tunnels?—During the eight years in which I worked as an engineer in the Old Country I filled only subordinate positions. In the tunnels here there was the Parnell Tunnel——

46. *Mr. Massey.*] May I ask, was the Parnell Tunnel constructed under your supervision?—Yes. It is a short tunnel of about 14 chains with very bad ground at the end of it

Mr. Crowther: Shocking bad ground.

47. *Mr. Wright.*] But although in a subordinate position you have, I suppose, had experience of tunnel-work. Will you mention it?—Well, there was part of the Caledonian Railway.

48. *Mr. Lawry.*] You stated that when you saw the Makarau Tunnel the earth was squirting out through the augur-holes?—Yes, through augur-holes and anything of that kind.

49. It was in a semi-liquid state?—Yes, it was fluid mud.

50. If you had drawn up the specifications, knowing the nature of the ground, would they have been similar to those under which Mr. McLean worked?—I believe they would, because the specifications are drawn by the department in Wellington. I have never drawn any specifications during the nine years I was a District Engineer.

51. And, considering the nature of the ground, in connection with the specification, did you see anything there beyond what was covered by an ordinary contractor's risk?—Of course I did not know what information they had got. I have never seen the contract.

52. You have seen the specification since?—Yes.

53. Do you think that Messrs. McLean, who had the contract, had to contend against something which was not covered by the ordinary contractor's risk?—Most certainly, provided there was no indication as to what sort of ground they were coming upon. If I intended that the contractor should take the whole risk, I should specify that the contractor should put this tunnel through whatever material may be found, whether hard or soft.

54. And that was not contained in the specification?—No.

55. *Mr. Graham.*] You have stated definitely, and re-stated in answer to questions, that, in your opinion, this catastrophe could not have occurred had these sills not been removed by order of the overseer? —I have stated that I thoroughly believe that the continued removal—for it would be a continued weakening—of these sills, the only things that support the bars, was the cause of the disaster.

56. And the removal of these sills while the work was green was the cause of the catastrophe? —Yes.

57. You are pretty clear as to that?—In my opinion.

58. Supposing these sills had not been cut away in the way that they were, would the brickwork as originally specified have been sufficient?—No, that is a separate thing altogether.

59. So that as the brickwork was originally specified it was not sufficiently strong for the character of the tunnel they were putting through?—In my case I would have ordered an invert, and if that was not sufficient I would have ordered another ring of brick, and if need be another; but all this would have been extra. But no amount of brickwork could compensate for taking out the timbers supporting the roof.

60. *Mr. Carson.*] I would like to ask Mr. Stewart whether it is a general practice, in his experience, to go over the ground and thoroughly examine it before calling for tenders?—I went over the ground for the first part of Waikato Railway with Messrs. Carruthers, Engineer-in-Chief, and John Henderson, Engineer, and every cutting was examined to ascertain the nature of the the material, but not by means of borings. The experience of all three of us generally coincided as to when we would expect soft sandstone, clay, or other material. That was actually done by our walking over the line.

61. But, as a rule, is it not the contractor's business to find out for himself?—As a rule, it is left to the contractor.

62. *Mr. Blow.*] Mr. McLean asked you if the ground was such as described in the specification. Have you read the specification?—Yes, I have read it.

63. Are you aware whether there is any description of the ground in the specification at all?—There is no such description.

64. As regards the removal of the sills, to which you attach great importance, do you know the position in which the sills were put in by the contractors?—Yes, the lower sills, as usual, down on the level ground; it should be put no lower. The upper sill near the top. Two sills are quite sufficient where it is a single-track railway; with a double line of rails three sills are required.

65. Do you know the level at which the contractor put his lower sill?—Yes; but I would have ordered him, if I had been engineer, to have left that sill and to have completed his invert with the exception of a portion, then I would have made up those portions of the brickwork occupied by the sill.

66. But could he not have put his brickwork at a lower level, and so have imbedded it?—Well, you see, these sills are a considerable expense, and it would be very absurd for a contractor to incur more expense than was needful.

67. Of course, a contractor likes to carry out his contract in a cheap way, but it would be a cheaper thing to the contractor to have buried his sills than to have done as he did?—No; I would rather have kept the sill on the level of the excavation for the invert, and then when the invert was put in it would occupy the position of a certain portion of the brickwork, which, of course, would be put in when the sill was taken out.

68. What, in your opinion, is a fair price for excavating a tunnel in sandstone rock?—5s. or 6s. would do the work very well for a single-line tunnel.

69. Can you mention any tunnel that was excavated at that figure?—Well, I am not now quite sure of the price. I really cannot charge my memory with what was paid for the Waitakerei Tunnel, but I think that was about the most favourable tunnel I ever heard of.

70. Do you know the Caversham Tunnel, near Dunedin?—No, I do not. I have been told it was driven through a solid piece of sandstone.

71. Through soft sandstone that cost 9s. a yard to excavate.—That was, perhaps, the contractor's price. You can hardly say what it cost him. It might have cost him half-a-crown.

Mr. R. McKenzie: But that was a good many years ago.

Mr. Morrison: Twenty-five years ago.

Mr. Graham: 9s. would be cheap then as compared with 6s. now.

72. *Mr. Blow* (to witness).] Two or three members of the Committee have asked you whether you regarded the thickness of the lining specified as sufficient. Are you aware that power is given the engineer to increase the lining if required?—Certainly.

73. Are you aware that in this case the department was doubtful whether an increase of the lining was necessary?—It is very likely the department was doubtful about the matter.

74. Will you read the portion of the specification I have marked, and give your opinion on it? *Mr. Stewart* (reading): "Should it be found that the rock is sufficiently solid to enable the tunnel-lining to be dispensed with, the Resident Engineer may withdraw the whole or any portion of it from the contract, and the contractor shall only be paid for the work actually done. The excavation shall, however, be taken out the full size of the outside of the lining, and so that half of the section can be got clear on each side of the centre-line; beyond this nothing is to be excavated except what is absolutely necessary for the security of the work." There is no doubt there that the department seemed to be quite in a fog as to what the tunnel would go through.

75. Exactly; the department had no knowledge whatever. As regards the slips, did you see them?—I saw the slips, but I cannot say that I examined them sufficiently to answer any questions on them. My work was simply the tunnel at that time, and it was only in passing that the question of the slips came up. I can only answer in general terms, therefore, about the slips.

76. Then, the evidence you have given the Committee must be taken as theoretical?—Yes, and general—that if a piece of ground will not stand at ½ to 1, or at 1 to 1, the engineer should order a flatter slope, and pay for it.

77. *Mr. Blow* (reading).] "And should any slips occur, either in cuttings or embankments, from want of proper drainage, or from neglect to keep the drains clear during heavy rains, the contractor shall remedy them and restore the slopes to the specified, or a flatter, rate of inclination, such inclination being that at which the material will naturally and permanently stand." If these conditions exist the contractors would be compelled to remove the slips without extra pay?—Well, I could hardly say whether I could bring myself to ask a contractor to do those things. I would rather take my orders from the department in the matter.

78. No; but, of course, two men can make any bargain they please. The contractor bargained with the Government in those express terms. As they are there, do they not mean that the contractor was compelled to act under such circumstances without extra payment?—There is no doubt the clause means that.

79. When did you leave the Government service?—On the 31st March, 1881—seventeen years ago next March.

80. So you have had nothing to do with the Auckland railways in an official capacity for seventeen years?—Not with the department; but, of course, I had to do with the Rotorua Railway. I was specially engaged by the Government in 1885 to put through the Rotorua Railway—that is, after they acquired the District Railway.

81. That came about through the Government taking over the railway from a company for which you were an engineer, and so they retained your services?—Yes; otherwise without that explanation the Committee would probably think it very strange that the Government should go outside their own department.

82. A question was asked by Mr. Lawry as to contractor's risk. You state that it is your custom to put down borings, but you do not guarantee anything?—Yes.

83. Therefore, if the ground turns out different from what the borings show, that would be a contractor's risk?—Yes; but in my own case I give them all the information I can.

84. But even if the information turned out incorrect it would still be a contractor's risk?—Yes; you cannot eliminate a certain amount of risk in all kinds of works.

85. *Mr. R. McKenzie.*] The Engineer-in-Chief is responsible for the accuracy of all plans and specifications issuing from his department?—Yes.

86. To the Minister, and to everybody?—Yes, I should say so.

87. And he is also the only sort of remedy there is for appeal?—I believe that used to be the case.

88. Will you look at clause 13 of the General Specification? In answer to Mr. Blow you say there was power given to either dispense with the lining or increase it?—Yes.

89. Will you point out in that clause where there is power given?—That would not be stated in this clause, but in the General Conditions. The General Conditions give power to alter or vary the work in any way.

90. But if as engineer you found it necessary to increase that lining, would you consider the design faulty?—Hardly.

91. But you are at present dealing with the specification. The inference in this clause is that, as the tunnel was going through sandstone, it might be possible to do without lining, and also that there was power to increase the lining?—Yes.

92. I would like to know where power is given?—It is given in the General Conditions.

93. Would you consider the engineer was justified in compelling the contractor to do that work at the ordinary price, you knowing the nature of the ground?—The brickwork, I should say, should be the schedule price, but for the excavation-work—to put a ring in the invert, I mean—I would not ask him to do it at the same price.

94. Do you think the engineer was right in asking the contractor to do that work at the schedule price?—I myself would ask for additional authority to do that work; and if the lining was weak at 14 in., and it wanted double that, then for the amount of excavation needed to put in that work I should have recommended and paid for a large increase. It would have been necessary because the ground was bad and wanted extra heavy timbers.

95. *Mr. R. McKenzie.*] Will you look at paragraph 7 in clause 13: "The tunnel shall be constructed to the line and levels shown, and the contractor shall be bound to set them out himself, and to find all appliances for that purpose. Should the Resident Engineer choose to set out the work, it will only be at the request and on the responsibility of the contractor." There is nothing in that paragraph to indicate that there should be an increase of 14 in. for brickwork. Then, in paragraph 6—which reads, "Should it be found that the rock is sufficiently solid to enable the

tunnelling to be dispensed with, the Resident Engineer may withdraw the whole or any portion of it from the contract, and the contractor shall only be paid for the work actually done. The excavation shall, however, be taken out the full size of the outside of lining, and so that half of the section can be got clear on each side of the centre-line; beyond this nothing is to be excavated except what is absolutely necessary for the security of the work"—there is nothing at all there to show that the lining should be increased. It simply shows that the lining should be taken away altogether, which indicates the nature of the ground the tunnel should go through.

Mr. Holland: This is scarcely to the point, Mr. Chairman, because in all contracts an architect or engineer is allowed to make increases or decreases as much as he likes.

Mr. Blow: This clause—clause 7 of the General Conditions—is in the contract: "The contractor is to make and execute, in the like manner as aforesaid, and with the like materials as aforesaid, any additions, deviations, or alterations to, from, or in the works which the Resident Engineer may from time to time previously to the commencement or during the progress of the works, by an order in writing, require. The cost of such additions, deviations, or alterations shall be valued by the Resident Engineer at the several prices or rates set forth in the schedule of prices annexed to the tender; and, if any additions, deviations, or alterations shall comprise any description of work not named in such schedule, the same shall be valued at rates to be fixed by the Engineer-in-Chief."

Mr. R. McKenzie: We do not deny for a moment what Mr. Blow says nor what Mr. Holland says. We know that these conditions are there. What we dispute is the right to say at what price the work shall be done.

Mr. Blow: That is also provided for.

Mr. R. McKenzie: What I want is for Mr. Stewart to show the Committee the justice of the claim which the petitioners make. We do not for a moment dispute the right to alter it.

Mr. Stewart: I think I understand Mr. McKenzie's question to mean, what do I consider the specification in the specified clauses relating to contract provided in the way of anticipation of soft ground. There can be no doubt at all that they had not the slightest expectation of soft ground there.

96. *Mr. R. McKenzie.*] Having found soft ground, which necessitated putting in an invert and also extra lining, do you think that the department ought to pay for the extra labour and trouble involved?—Yes, I think so. I am not quite sure as to the whole of the tunnel, but, where this extra brickwork occurred in the lining or the invert, in justice to the contractors I think they ought to be paid something extra for the excavation. It was shown it was soft ground and required more and heavier bars. Some soft ground can be done with few bars, say, nine, this required nearly twenty.

97. Supposing you were the engineer for that contract, and had a bore put down, and you found soft sandstone at the ends and in the centre, would that be anything to leave you to imagine the nature of the ground?—My experience of New Zealand is that I would not be satisfied with only three bores.

98. *Mr. Blow.*] In this case there was only one.—Well, I would not consider the tunnel was bored at all.

99. *Mr. R. McKenzie.*] Would there not be reasonable ground for supposing that there was soft ground there?—Well, that is difficult to determine.

100. You know the contractors, of course. You have already stated that they are capable men?—Yes.

101. But do you know of anything in their method of working that caused that breakdown of the tunnel?—Their method of working seems to me to have been the proper method, except for the taking-out of the sills. It nearly took my breath away when I heard they took the miner's sills out.

102. Are you satisfied that if the miner's sills had been left in this breakdown would not have occurred?—Yes, I might answer that in the affirmative.

103. Do you know Mr. Witheridge?—Yes.

104. Has he ever had any experience of railway tunnelling?—Not that I know of. I know him to be an exceedingly-steady first-class mason.

105. Have you ever known any disputes between him and the contractors while he was inspector over them?—No; but he caused me some trouble nevertheless by the way in which he gave the contractors orders.

106. Is he an agreeable man to work with?—Well, I really do not know. He was always agreeable enough on the work when I was there.

107. From your previous knowledge of him, can you say if he was in the habit of unduly interfering with the contractors?—He once gave me considerable trouble in an order for the level of a sewer in Auckland at the reclamation; it was a very foolish thing.

108. Do you think he was justified in his interference in the present case?—If he had ordered those sills out when I was there I would have bundled him out of the tunnel, or else I would not have taken those sills out. I am astonished Messrs. McLean have taken them out.

109. Had he power to order them out?—Yes, an overseer has the power.

110. In fact, they could not be removed without his consent?—I think they could be removed without his consent.

Mr. R. McKenzie: On looking at the General Conditions the Committee will see that these sills could not possibly be removed without the overseer's authority, nor could any other scaffolding. Of course, that is entirely proved by the report.

111. *Mr. Crowther.*] Do I understand you to say that they were running the risk of their lives when they took those sills out?—They were.

112. *Mr. McLean.*] And who would have been responsible if there had been an accident?—That I could not say.

113. Would the responsibility have fallen on the contractor or on the Government?—That is a point of law I am sure I could not answer. I feel very thankful the question does not arise.

114. *Mr. R. McKenzie.*] Clause 11, subsection (2), of the General Conditions says, "Due notice shall be given by the contractor to the Assistant Engineer or overseer before any piles are driven at any structure, and centres or staging must not be struck without the written authority of the Assistant Engineer or overseer"?—Yes, those powers are always given; but, as a rule, the contractor is the judge when to take down supports and all that.

115. About those slips. Had you been a district engineer on that contract, would you command payment for those slips?—As I have said, I can only speak theoretically about that—that if a piece of ground would not stand at the angle at which it is specified I would order a flatter slope, and pay for it.

116. The practice is for a contractor to provide slopes at a batter of 1 to 1?—One to 1 is the steepest angle at which anything but rock is usually cut in New Zealand railways.

117. And if flatter than 1 to 1 it is generally the custom of the department to pay for it?—Yes, with this exception: there might come a "belly" out of a slope. That I consider would be a fair risk for the contractor. But for a piece of ground, such as that at Parnell and many other places that I have seen, I think that the department should pay for the extra work. For instance, in the case of the slips on the Forty-mile Bush Railway, the contractor was paid for drains; and that was a cheaper means of keeping up the ground than taking it out to the level. Then there is the Waiteti contract in the King-country. I believe all the slips there have been paid for by the department.

118. *Mr. Wright.*] Will you look at the specification in clause 8, subsection (2)? You stated in reference to that section that that would indicate a certain liability of the contractor to remove certain slips. Then, in relation thereto, I want you to consider subsection (6), and to tell the Committee whether the one does not override the other. In your opinion, does that provision contemplate slips which should not be charged to the contractor?—Provided that other slopes are necessary. If in going through rocks they will not stand at ¼ to 1, then the contractor should be paid for the extra work, and the same with sand at 1½ to 1, and with all other material at 1 to 1. The slips that in my experience are most difficult to deal with are clay slopes. Sometimes they will take a natural slope of 3 to 1; sometimes you can stop them with drains, and at other times drains are of no use at all.

119. Tell the Committee briefly whether, in your opinion, this clause contemplates slips which might not be a charge on the contractor: "Any alteration in the slopes of cuttings will be ordered in writing. No slips will be paid for under this clause, except those that are, in the opinion of the Resident Engineer, due to steepness of slope, and for which an order has been given beforehand."—I think I have mentioned in my replies to previous questions that the Resident Engineer could not in fairness withhold an order for ground that would not stand at the specified slope, and therefore any sand which would not stand at 1½ to 1, and soft clay at 3 to 1, he ought to give an order for.

120. *Mr. R. McKenzie.*] Of course, you have been out of the department for some years. Do you know whether it is customary for them ever to give these written orders?—Speaking of my own practice, I very rarely gave a written order.

121. I have been a contractor for some twenty years to the department, and I never got one yet.—I have had to give written orders; they were generally in important changes. But, as a rule, if I ordered a slope to be increased because it would not stand, the contractor knew as well as I did that it was just as good as if I had given a written order. Properly speaking, I should have given written orders.

Mr. R. McKenzie: In the case of the invert and the increase of the lining, which the department admits as extra, they never gave any written orders, so that the point about the written orders does not hold good.

Mr. Blow: No evidence to that effect has been tendered, at any rate.

Mr. Stewart: I was only nine years in the department, and I have been seventeen years out of it; therefore I do not know exactly what the practice has been since. I can only speak of my own experience.

122. *Mr. Blow.*] You speak of learning with surprise of these sills being taken out. If the overseer formed the opinion that they were in the wrong place, was not he justified in saying that they should not remain in that place?—No; any movement of those sills was at the risk of the whole top coming down.

123. Is there any power for the inspector to interfere if he finds the work being defective?—Yes, there is no doubt about that. That accounts for the whole mischief.

124. He saw this sill being put in a position which he thought improper: had he not a right to order that sill to be put into a different position? He had ordered it to be taken out: was not that his only remedy?—No; the remedy is to require that at any expense the brickwork should be made good.

125. But if he sees the work being done in a manner which he thinks faulty, is it not his duty to require that it should be altered? Was not he justified in interfering?—That, of course, is a debatable point.

126. You say the accident was due to the removal of the sills?—I believe so.

127. Are you aware that these particular sills were not removed, and that they are there now?—No.

128. That they were built in?—The upper sill crossed at the level of the springing of the arch.

129. We are talking of the lower sill?—Possibly it may have been built over. It was at the upper sill, however, where the danger took place.

130. But the inspector only insisted on the removal of the lower sill, because that was actually in the brickwork?—I do not know about that.

131. What is the extent of your knowledge of Mr. Witheridge? How long was he under your supervision?—I could not answer the question as to how long.

132. Would it extend to two or three years?—I cannot say.

133. During the time he was under your charge you were principally confined to your office, and you had Resident Engineers under you to supervise the work?—Yes.

134. I think they would actually know more about Mr. Witheridge's capacity than yourself?—No, I do not think they did.

135. Still, it is a fact that the greater part of your time was spent in the office?—A great deal of it had to be spent in the office, but I was constantly outside, and any questions that arose, such as the ones that I have spoken of, came before me directly.

136. The bulk of your time was spent in the office?—Well, probably, yes.

137. You speak of the reasonableness of the contractors receiving an extra price for excavating the invert; but it was carried out simultaneously with the remainder of the excavating?—Yes; but it requires more draining. The brickwork is done below it or at each end of it. The tunnel was on an incline. They put in 14 in. of brickwork, and you excavate for the ring on ahead. There is most difficulty in getting rid of the water; you have to bale it out. The necessity which caused this brickwork to be put in implied soft ground.

138. Is there not an alternative design shown on the plans for soft ground?—I can only speak of what has been shown me.

[Mr. Blow then showed the witness some plans, by permission of the Chairman. These contained two alternative sections of lining marked A and B. Under Section B, which had an invert provided in it and heavier brickwork, were the words "In soft ground to be used only where directed."]

139. *Mr. Holland.*] In reference to the sills, great stress has been laid on the bottom sill not being in the proper place. Should not the inspector have insisted on its being put in the proper place in the first instance?

The Chairman: We are not deliberating now. That is a question to me, and one which requires an expert to answer.

Mr. Blow: I submit that he cannot. The contractor says to his workmen, "You are not to alter it." What power has the inspector over it?

Mr. Holland: He has the power to stop the work.

140. *Mr. Graham* (to witness).] Mr. Blow asked you whether the inspector had not the right to order the removal of the sill if he found it being put in the wrong place. Was that the case here?—I cannot say.

141. Do you know whether it was being put in in the same way as the preceding portions of the tunnel?—That I cannot say. Of course, the sills were held up by the timber-work when I saw them, but I cannot say as to the particular sills at all.

142. And you do not know whether the order was given to remove those sills when they were being put in or afterwards?—No.

143. *Mr. Morrison.*] Have you any idea of the price per yard that Messrs. McLean tendered for putting this tunnel through?—I have no knowledge except what I heard on this Committee—6s. 6d., I believe—and I think there was some question about 6s. additional.

Mr. Graham: 6s. 6d.

144. *Mr. Morrison.*] If a contractor contracts to put through a tunnel at what you consider to be a fair price he would take the chance of the ground perhaps turning out of a softish character, and he tenders at a reasonable price. Suppose after starting it he finds that it runs through what may be termed a sandstone rock, which you thought could be tunneled for the matter of 2s. or 3s. per yard, he would then, I suppose, think he had a bit of "fat" in connection with the tunnel?—Very likely he would.

145. Do you not think, then, that in this case it is one of the ordinary contractors' risks?—That is hard to answer.

146. It should cut both ways?—It should cut both ways; but every information should be given so that the contractor should have the opportunity of judging of the sort of stuff that he was to drive through, though I would be averse to guaranteeing the correctness of such information. A piece of "fat" such as you speak of may very seldom fall to a contractor's lot, but might be expected as one of the pieces of luck that might occur to any one. The principle that I would like to go on is this: that if it is impossible to put a tunnel through a piece of soft ground that turns out to be exceedingly soft, it should not be done at the expense of the contractor, the whole community getting the benefit of it.

147. You state that as a general principle?—Yes, a general principle.

148. But are you not aware that all the information the department had at its disposal was placed at the disposal of the contractors tendering?—That I do not know.

149. It has been given in evidence.—But I know nothing of it.

Mr. JOHN BATE CLEMOW, of Stratford, Taranaki, Farmer, examined.

150. *Mr. McLean.*] You were engaged by me as a workman on this Makarau Tunnel some time in 1890, I think?—Yes.

151. Prior to that, what knowledge had you of tunnelling?—I had four years and a half with Mr. Brittain, at Porotorau, in the King-country.

152. I employed you as an overseer with a gang of men?—Yes.

153. In doing so, were you responsible for the work during your shift, and the manner of carrying out the work during the time you were in charge of the men?—Yes.

154. I did not interfere with you in any way in carrying out the work any more than to specially instruct you that the work was to be made secure?—Yes.

155. That was, above all things, my instruction to you?—Yes.
156. In your work in connection with the Porotorau Tunnel there was an overseer for the contract?—Yes.
157. In carrying out the work in connection with that contract, did the overseer interfere with the contractor over the method of working, or of placing the timbers in the tunnel?—No; never. He never attempted to interfere.
158. The contractor placed the timbers as he liked, and in putting in the lining were the ends of the middle sill left in the brickwork?—Yes.
159. Nearly every one of them, and bricked up afterwards?—Yes.
160. In that tunnel the nature of the ground was of what description?—It was some of it soft, and some of it papa rock. Each end was soft.
161. The foundation was sound, although the roof was soft?—Yes.
162. In your opinion, did Mr. Witheridge unduly interfere with both the men and the method of conducting the work on the Makarau Tunnel, considering your knowledge of inspectors in the work you have been connected?—Yes; when we came into soft ground.
163. In your recollection, did you hear Witheridge at any time instruct us to take out those sills?—Yes.
164. That is, the main sill?—The main sill.
165. And the sill underneath the main one?—Yes.
166. Stating at the same time that the brickwork was of sufficient strength to carry the timber and the weight on top of it?—Yes.
167. At that time, of course, there was an invert under it?—Yes, at that time.
168. When I employed you as foreman, what other foremen did I employ?—Patrick Smith and John Hunter.
169. To your knowledge, had those men ever had any experience in tunnelling?—Yes.
170. They were undoubtedly good men at tunnelling?—Yes.
171. In carrying out the work, when you got into the soft ground—the clay—out of the sandstone, the ground was of very heavy nature?—Yes.
172. And required close timbering?—Yes.
173. Heavier than anything else you undertook?—No; not quite so heavy.
174. During the construction of this work, and during the time that you were employed, do you remember on any occasion hearing me tell the inspector or the engineer, before they had put in the invert, that I considered the structure was not sufficient to carry the work?—I heard you tell the inspector, but not the engineer.
175. And it was only after we had driven some 5 chains that it was found out the brick lining was coming in?—Yes; at the footing.
176. Were you in the tunnel the night Mr. Witheridge took the levels?—No, I was not.
177. The Government, in connection with this, have laid great stress on the fact that we at one time stopped the work for Christmas. Did Mr. Witheridge at any time stop the work during our absence?—Yes.
178. What part of the week was that?—I could scarcely say; from Saturday to Monday, I believe.
179. The specification says we are to work every day when necessary, except Sundays. In work of this kind it would be absolutely impossible for us to go on with it without putting in a portion of the work on Sundays?—Yes.
180. In what state was the work when we stopped it?—It was in a very bad state.
181. I mean, what progress had you made in getting out the length?—We had the length finished, and it was only when you started to put in the bricks that he stopped you?—Yes.
182. In your recollection, was Witheridge in the drive at any time whilst it was under excavation a sufficient length of time to judge as to the weight on the timbers?—I do not think so; not to my knowledge.
183. Have you heard of him being in?—No.
184. Did you personally hear Witheridge remark to any of the men at any time that there was no weight on the timbers, and that we were unduly concerned about the weight?—Oh, yes; he used to laugh at the idea.
185. *Mr. Graham.*] At the idea of such a thing being suggested?—Yes.
186. *Mr. McLean.*] During the Christmas holidays do you consider it a difficult matter to keep men on the works?—I do.
187. *Mr. Graham.*] Putting in the timbers in this tunnel would include the sills that we have been speaking about?—Yes.
188. The inspector ordered certain sills at this part of the work to be taken out, did he not?—Yes.
189. Was that at the time they were being put in wrongly, in his opinion?—No.
190. Were the sills at this part being put in in the same way and in the same position as others that had preceded them?—Yes.
191. In the customary way?—Yes.
192. And the rule was that they were to remain there until the tunnel was sufficiently dry for them to be taken out?—Yes.
193. And the reason he had them taken out was because he considered the work sufficiently dry for them to be taken out?—Yes.
194. So that it would be wrong if any one were to say that he gave orders for those sills to be taken out because they were not put in in the way he wished?—Yes; there is only one way to put them in, I think.
195. *Mr. Holland.*] I think, during the examination, we heard that these sills were to be taken out before the arch was keyed in. Was that not so?—Yes.

Mr. Graham: That does not interfere with my question at all.

Mr. Holland: There is no brickwork there.

Mr. McLean (the petitioner): The brickwork was there to carry the ends of the bars.

Mr. Graham: My question was put because Mr. Blow inferred that these were being put too high because of the brickwork, and they should have been put lower. The man here says it was quite wrong.

196. *Mr. Lawry* (to witness).] I suppose it was necessary for the timbers to remain longer because of the nature of the ground?—Yes.

197. *Mr. Crowther.*] What is meant by the brickwork not being keyed in—I mean what place was left without being finished? Was it two or three bricks, or what was it?—He would not allow the arch to be done at all. The sill was to be taken out before it was keyed and before the arch was put in.

198. By the plan the arch would be a considerable one?—Yes.

199. And the arch, I suppose, we may fairly assume would be a considerable stay to the perpendicular wall?—Yes.

200. The sills had to be taken out, thus leaving the perpendicular wall more work to do?—It is the brickwork at the back.

201. Is the arch then what you call the "key"?—No; the key is the finishing of the last of the arch.

202. *Mr. Morrison.*] You state in your evidence that you have had four years and a half previous tunnelling, is that so?—Yes.

203. What particular experience is embraced in that period?—I had from driving the first head to completing the tunnel.

204. Had you any experience in tunnelling in soft material before you took charge of this Makarau contract?—Yes; each end of the tunnel in the King-country was comprised of soft ground.

205. What size was that tunnel in the King-country?—I think it was about 57 chains long.

206. And how far did the soft material at each end run into it?—On the south side, about 5 chains; and on, the other side, I think, about 5 or 6 chains.

207. So that your only experience in tunnelling in soft material was that of piercing a tunnel in the King-country, where you had about 5 chains of soft material at the two ends?—Yes.

208. You state, also, that Mr. Witheridge never attempted to interfere with the method of working in this Makarau Tunnel in any shape or form until you got into the soft ground?—Yes.

209. How did he interfere then?—He had everything taken out. All the timbers were taken out before the brickwork was put in.

210. And he objected to that?—Oh, no.

211. Please describe your method of carrying on operations after passing the soft ground?—We drive a bore-head in at first; then, we put in the ground-bar. We have something like a little box on the top at first, and then we work it down with slabs; take out a small piece, and put a slab in. It had to be kept close-timbered right to the foot.

212. Did Mr. Witheridge object to that method of working?—No.

213. In what respect then did Mr. Witheridge unduly interfere with the contract?—In taking the sills out.

214. As regards your method of keeping the cutting boarded up, he did not object to that?—No.

215. What was his objection to the class of bricks you were going to build with that he stopped them? Were they soft?—I do not know; he let them go into the tunnel afterwards.

216. He let them go afterwards, and he stopped the work on account of those bricks?—Yes.

217. For how long was the work stopped on account of those bricks?—From Saturday morning till Monday, 10 o'clock, I think.

218. Then the difficulty over the bricks was removed. During the stoppage of the work then, were there any other fresh slips took place or any falls that were the cause of the stoppage?—No; not at that time.

219. Then, as a result of the stoppage, there was no damage done to the tunnel?—No; not on that occasion.

220. *Mr. McLean.*] Broadly speaking, if the contractors had been left alone, do you think they would have carried out the work satisfactorily without the interference of Mr. Witheridge?—Yes.

221. You think so?—Yes.

222. You think it was his interference that led to the disaster?—Yes; the brickwork at the back was not sufficient to carry the ends of the bars.

223. *The Chairman.*] In excavating this tunnel, did you work from both ends, or from one end?—One end.

224. Was the tunnel on a level, or had it a slope?—A slope upwards.

225. How far did you go before you reached the soft ground?—About 8 chains.

226. And was all the rest this soft material you have described?—Yes.

227. *Mr. Morrison.*] There was a bit of rock at the other end.

Mr. McLean: There was no rock at the other end.

228. *The Chairman* (to witness).] With regard to the holidays taken at Christmas time, when you left the work did you leave it properly built up and firm?—Yes.

229. When you got back, was there any alteration?—No.

230. How long after you started work again was it that the crash came?

Mr. McLean: Mr. Clemow was not with us then.

231. *The Chairman* (to witness).] In the tunnel in the King-country were the sills taken out there?—No.

232. *Mr. Duncan.*] What was the effect of taking the sills out?—To let down the brickwork.

233. And they came together below?—Yes.
234. And did that cause any fall of earth?—Yes.
235. Did the bricks slip when the sills were taken out at the bottom?—Yes; they slipped all over, top and bottom as well.
236. *Mr. Flatman.*] You say the sills were not taken out at the King-country tunnel?—No.
237. Was the same Inspector with you at each tunnel?—No.
238. A different Inspector in the King-country?—Yes.
239. *Mr. R. McKenzie.*] Is it the centre sill that they insisted on taking out, not the bottom one?—There was only one.
240. The centre sill?—It was the sole-plate underneath that had to come out, because it was of no use.
241. *Mr. Blow.*] The witness stated that the sills were not removed in the tunnel in the King-country. (To witness.) Was there an invert to that tunnel?—No.
242. You say that Mr. Witheridge unduly interfered with the contractors. Can you indicate in what manner he interfered?—In taking up those sills.
243. Is this paragraph in the report a fair statement: "The contractors must be aware that the Inspector has never interfered in their way of timbering, only when it came to a question of building these sills into the brickwork. Neither the Inspector nor I myself considered it advisable, and, as I stated, it could easily have been avoided." Is that paragraph a correct statement of the case?—No; I do not think it is.
244. Will you say how it is incorrect?—I do not see how he could possibly take out the sills and keep the brickwork up.
245. You stated that the other men employed in charge of shifts—Smith and Hunter—were experienced men. What knowledge have you of their experience?—I think Smith has been an old miner in the South Island. We all worked in the tunnel in the King-country.
246. Then you all came from Brittain's contract?—Yes.
247. *Mr. McLean.*] I would just ask Mr. Clemow whether there was any heavy ground besides the 5 chains you speak of at both ends of the tunnel?—We came upon patches.
248. Quite sufficient to cause you to be particularly careful and attend to the timbering in a proper manner?—Yes.
[On the motion of Mr. Flatman, the Committee at this stage adjourned.]

MONDAY, 13TH DECEMBER, 1897.

ORLANDO WELLS, shipwright, Onehunga, gave the following evidence on behalf of the petitioners in reply to questions put to him by Mr. M. McLean:—
1. *Mr. McLean.*] For how long a period have you been engaged in working on engineering contracts?—I have been following contracting off and on for the last fifteen years.
2. You were employed by me on the Makarau Tunnel, were you not?—Yes.
3. In various positions?—Yes.
4. And were working in the tunnel for a considerable time?—Yes.
5. For how long?—From eight to ten months.
6. You were in charge of a shift of men when the slip took place?—Yes.
7. How long were you in charge of this shift?—In charge of that one for three months; but I was in charge of another for the balance of the time.
8. In connection with the work, I myself did the full general supervision, and was in and out at different times during the day and night, and standing attending to the work?—That is correct.
9. Who were the other shift-bosses at the time?—Jack Russell and James McKay.
10. Were both these experienced men?—Yes.
11. For how long had they been working on the tunnel?—McKay, from the start; Russell, I could not say.
12. Was the length taken out in a proper manner, and were the bars well put in and propped and supported in the usual manner?—Undoubtedly.
13. In fact, it was secured in every possible way; the bars were well strutted, and the poling-boards were all put in in a proper manner?—Yes.
14. What, in your opinion, was the cause of this breakdown that took place?—In my opinion, the cause was that we had no support to carry the back end of the bars, only the crown brickwork; the sill had been taken out previously. Consequently the whole weight was on the brickwork.
15. You talk about throwing the weight on the crown brickwork; but under that brickwork were not the laggings, the sills, and everything supporting the brickwork in at the time?—They were never taken out until the side walls were bricked up.
16. So that the brickwork was supported at the time, but the sill was taken out?—Yes.
17. Was it a general order from Witheridge that these sills should be taken out?—Yes.
18. Witheridge was the inspector of the work?—Yes.
19. Had they been taken out before bricking up to this point?—To my knowledge, not one of the sills was built in the tunnel during the time I was there.
20. So that the sills had all been taken out, as far as you know, up to this point?—Yes; as far as I know.
21. Did Witheridge, in your opinion, unduly interfere with the carrying-out of the work?—Well, if you refer to insisting on the sills being taken out, I should say he did.
22. Did you, during the bricking-up, or at any other times when you knew that there was great weight on the supports, hear Witheridge say that there was no weight on them, and ridicule us for thinking so?—Yes; many times.

23. Were these continuous remarks of his to the men and others during the progress of the work?—Yes, they were; but I could not tell whether he was chaffing or not.

24. Still, remarks were made by him that it was ridiculous to speak about the enormous weight on the timbers?—Yes.

25. Do you remember any special occasion on which Witheridge ordered the sill to come out, even after deciding to leave it in until the brickwork reached the spring of the arch?—Yes; one particular occasion I remember well. I was in charge of the brickwork at the time. I was sent out for to the minor shift, and when I arrived the sill and the main legs all were standing, and were to be left in there. Mr. Witheridge said, "There is nothing in these, you had better take them down." I remonstrated; but he said, "It does not matter, they will have to come out." I took the sill, the main legs, and the bottom sill out.

26. Do you remember my instructing you not to take a particular sill out, notwithstanding any instructions from Witheridge to the contrary?—Yes; on one particular occasion Mr. McLean was going to town on the Saturday evening, and he said to me, "No matter what Mr. Witheridge says about this sill, you are not to take it out." I replied, "Very good." I may tell you, on this particular occasion the sole-plates were left in, and when they got to the springing of the arch I met Mr. Witheridge going out. He said, "Before you go on with the bricking of the arch you must take that sill out, or if not the ends must be cut off." But I would order neither the sill to come out nor the ends to be cut off, as I thought it was my duty to my employers not to.

27. How long and how often was Mr. Witheridge in the tunnel during the excavating?—That I could not say; he was not very often in during the excavation, because he had to look after the brick-shift, and probably he was tired.

28. Not long enough, at any rate, to judge as to the weight of the ground that was on the timber, where the weight came on the timber, and how the pressure was bearing on the timber?—No, I do not think so. I do not think he was long enough in the excavation to be able to judge as to that.

29. And when he came back did he not sometimes delay the work for hours testing the centres, which might easily have been done when I was putting them in, thereby keeping the whole shift waiting?—Yes; I have known him do that.

30. *Mr. Morrison.*] You stated that you were working in this tunnel for a period of from eight to ten months. How long did it take to go through with this tunnel from start to finish?—Close on six years.

31. So that your experience in connection with the piercing of this tunnel only extended over a very small portion of the time?—Yes; and in this particular place where the tunnel collapsed.

32. The whole period you were employed in charge of a gang on this tunnel was during the time you were piercing what was known as the soft ground?—No; I was not employed on this particular job after the collapse.

33. What was the extent of the collapse that took place?—The whole crown came down.

34. Over what length?—11 ft. We were taking out 11 ft. lengths, and the whole length came in.

35. But this collapse took place at the same time Mr. Witheridge told you to take out the sill, or cut the ends off?—No, sir, there was no collapse at that time.

36. No collapse took place as the result of his order for you to either take out the sill or cut the ends off?—Not on that particular occasion.

37. When the collapse took place, had the sills been taken out by Witheridge's direction?—I could not tell you that; it was a general order to take the sills out.

38. But on this special occasion that you remember, when Mr. McLean gave you those special instructions, and when Mr. Witheridge interfered saying that you were either to take them out or cut the ends off: as the result of that, did anything happen?—No, sir.

39. *Hon. W. J. M. Larnach* (to Mr. McLean).] Was Mr. Witheridge representing the Government?—He was.

40. The whole of the six years referred to?—Yes; up to the collapse.

41. Then, the collapse happened about six years after the contract was commenced?—Three years.

42. Then, during the whole course of the brickwork part, did Mr. Witheridge interfere in the same way in reference to the sills?—During the whole time.

43. Did you ever make complaint to anybody about it?—To the Resident Engineer I did many times.

44. Have you got evidence to that effect?—Yes; my brother, and others.

45. Did you ever complain in writing?—No; I made no complaint in that respect in writing.

46. Merely verbal?—Yes.

47. Did you not think that, as this was a very important matter about these sills, it was necessary to put this complaint in writing?—Well, that is a mistake I made; I certainly should have done so. But Mr. Vickerman was up every month, and I complained every time to him.

48. *Mr. Flatman* (to witness).] You say Witheridge insisted on the sills being taken out. How long had they been in before he had insisted on their being taken out?—They had only been in two days.

Mr. McKenzie: It was a temporary structure.

49. *Mr. Duncan* (to witness).] You stated you were not in charge of the work when this collapse happened?—I said I was in charge of the work when this particular collapse happened.

50. Were the sills taken out on that special time?—The sill was out on that particular occasion prior to my coming into the tunnel on the shift.

51. How much of the brickwork was up at that time?—The brickwork and arch were all completed.

52. Yes; but at the special 11 ft. length that collapsed?—There was no brickwork in the tunnel at that particular length; we had not quite finished excavating ahead of it.

53. But the brickwork that collapsed?—We had to rest our bars on the bricks, and had no support to carry them——

Mr. McKenzie (interrupting): As I see the Committee does not quite understand, I was going to examine Mr. Wells on that point. [The point in question was, however, explained by means of a plan which Mr. McKenzie put in.]

54. *The Chairman* (to witness).] Mr. Wells, you were working on the tunnel in December, 1892?—Yes.

55. You were with the men when they knocked off work for the Christmas holidays?—Yes, sir.

56. How many days before Christmas?—I could not say exactly—a little over a fortnight perhaps.

57. You were away about a fortnight?—Yes.

58. Resuming work some time after the new year?—Yes.

59. How long was it from that time to the time when the collapse took place?—I could not tell you that.

60. But before you left had you taken the precaution to fix up everything in a substantial way, so that no damage was likely to take place?—Yes.

61. Mr. Witheridge was frequently in the tunnel?—Yes.

62. Did you ever know Mr. Witheridge to go right forward at any time to the heading?—Yes; many times.

63. That is, in advance of the brickwork?—Yes. He would be in the heading of the work, too, when they were bricking the arch.

64. *Mr. Hales* (representing the department).] Have you in your contracting work ever had any other experience in tunnel-building?—None before this.

65. When you were in charge of that work you say a sill was taken out. Do you know who took it out?—I took one out that I was ordered to take out myself.

66. When was that?—It was a few months back.

67. Not at the time of the collapse?—No.

68. Which sill did you take out?—The minor sill.

69. Did Mr. Witheridge order you to take out these props [pointing to the plan]?—Yes; he ordered me to take those timbers out.

70. How did you get past that sill with your brickwork?—This sill was taken out. On this particular occasion we were going to take it out; there was a great deal of weight there.

71. But I want you to explain how you got your brickwork past the sill and props?—[This the witness explained with the aid of the plan. Several other questions put to the witness by Mr. Hales as to the mode of procedure in building the tunnel were also answered with the assistance of the plan, to which close reference was continually made.]

72. Continuing, Mr. Hales asked: Did Mr. Witheridge or anybody else order the ground sill to be put in the position marked on the plan?—The contractor had the sill put in that position; I took no instructions from Mr. Witheridge.

73. Was there any difficulty in putting that sill down below the invert altogether?—Yes, it was altogether too difficult; the ground was very hard, and you could not bale the water out to get down in it. It would be of no use whatever.

74. Is it usual in such cases to put the sole-plate, or bottom sill, as you call it, in?—In my opinion, it is absolutely necessary, and we could not do without it.

75. With regard to the time when the slip took place in the tunnel, how much brickwork had you built when you left off work for the Christmas holidays?—I do not remember well.

76. After you came back you commenced and excavated a certain length?—Yes; in the usual way.

77. Then what did you do?—The main sill was taken out again.

78. Then, after you had taken out the sill, the whole of those back bars were hanging down?—Yes.

79. When you came on this heavy ground, and required all this support, did Mr. Witheridge order that particular sill to be taken out?—I cannot say, because I did not take it out.

80. *Mr. Flatman* (to the Chairman).] Is that a departmental tracing?

The Chairman: Oh, no.

81. *Mr. Flatman:* Then, will the department recognise this as correct?

The Chairman: The petitioner has brought this to illustrate his own case, and he is perfectly at liberty to do so. This is only intended as a rough illustration, and a correct picture or drawing of the breakdown.

Mr. McLean (the petitioner): This is a perfectly correct illustration of the method of timbering, and of the cross-section of the tunnel.

82. *Mr. Hales* (to witness).] You say Mr. Witheridge was not in the tunnel when the excavation was going on, as a rule?—No.

83. He was only the Inspector on the contract, I believe?—He was the Inspector that we looked to, but he also had an assistant.

84. But in the meanwhile there were other works going on at the same time, were there not?—Yes.

85. So that he could not always be in the tunnel when you were excavating?—No.

86. Mr. Witheridge, in fact, did not direct your mode of timbering at all?—He did not direct our mode of timbering.

87. But he did see that the tunnel was of the proper size and lined, and that the lining was properly put in?—Yes.

88. Now, it has been stated in evidence before the Committee that the contractor's method was in accordance with "Sims's Practical Tunnelling." This is "Sims's Practical Tunnelling" [producing a copy of the work in question]. Does that [showing a plan in connection with the book] represent anything like your method of work?—That is very much like it.

Mr. Morrison: This witness does not profess to be an expert on tunnelling; he was simply a ganger. I hold Mr. McLean was the particular witness who should have been examined on that particular point of evidence.

Mr. McKenzie: I have a decided objection to Mr. Hales's examination of the witness.

The Chairman (to Mr. Hales): You have a right to refer to Sims's book on tunnelling, which has been quoted in the petition, but I think it is hardly fair to examine a workman on a work he has perhaps never seen in his life before.

Mr. Hales: But he was in charge of the building of the tunnel.

Mr. McLean (petitioner): Mr. Wells was ganger. I was there at the time this breakdown took place, and I can answer any of those questions Mr. Hales asked.

Mr. Morrison: I maintain that the questions that have now been asked from Mr. Wells should be asked from Mr. McLean, seeing he was directing the work.

Mr. Hales: I wish to explain that I merely want to refer to this plan and to ask the witness whether this method shown here was the method adopted.

Witness (after a further study of the plan): That is exactly the same, only on a smaller scale.

The Chairman: Is that a section of a double-line tunnel, Mr. Hales?

Mr. Hales: This is a section of a tunnel on an English railway, either double-line or single. In those days there was a 7 ft. gauge; of course, ours is only 3 ft. 6 in. gauge—half that width. This tunnel is, I think, 15 ft., and ours was 12 ft.

89. *The Chairman.*] Have you any section of a single-line tunnel in that book?—Yes; but not showing the work of it.

90. *Mr. Crowther.*] And the only difference we are able to note so far is that that book indicates that there is no bottom sill put in. Is that so?—Yes.

91. *Mr. Hales* (to witness).] You say there was no direct order to take out this particular sill?—I had no order to take that sill out, and I did not take it out.

92. *Mr. McKenzie.*] Will you point out to the Committee on that sketch which do you call the minor sill?—[The witness indicated a spot in the centre of the section, showing some timbering crossing the tunnel not far below the tops of the side walls.]

93. *Mr. McKenzie* (referring again to the plan which he had previously put in).] And, of course, those are the posts coming out from the ground?—Yes.

94. There was a general order to take these minor sills out. These posts are supported with bars, and before taking this sill away you naturally have to cut them out?—Yes; in any case.

95. And when you take them away there is no weight left?—No.

96. Mr. Hales's contention that all the weight was on those sills means nothing?—Yes.

97. And there was a general order to have them removed?—Yes.

98. Being a shipwright by trade, you understand all about timber?—Yes.

99. Was this sole-plate [indicating it on the plan] below the invert?—Not below the bottom of the invert, but in all cases below the top.

100. You have a centre left in after the sole-plate comes out?—Yes.

101. (Having got the witness to point out two or three more spots on the plan to illustrate the method of timbering, Mr. McKenzie asked). When you have the ground excavated, and so ready for bricking, you simply take the centres for legging?—Yes.

102. You say there was a general order for these minor sills to be taken out?—Yes.

103. Of course you had a bar resting on the end of the sill; and if that sill was taken away there was nothing to carry the ends of the bars?—No; nothing to carry the ends of the bars whatever.

104. Were you in the tunnel before the breakdown occurred?—I was.

105. Of course this sill had to be removed before the breakdown?—Yes.

106. And the weight on those bars rested entirely on this particular centre?—Yes.

107. So that when those came away this centre had to bear the whole of the weight?—Yes.

108. *Mr. McLean* (petitioner).] I think Mr. Hales tried to elicit the fact that the whole time the excavation was going on this [referring to the plan] was taken out immediately these bars were put in. That was not so?—No; not in any case.

109. This sill lay in until the excavation was down to the invert?—Yes.

110. And it was recognised as a fact that the sills had to come out; and they were taken out then because there was a better opportunity to do it then than at any other time?—Yes; that was so.

111. So that this length that broke down was carried on in the usual way—that is, this sill supported it for the greater part of the excavation?—Yes.

112. Of course this ground varied considerably—sometimes it was very heavy and sometimes not quite so heavy—and, consequently, in your opinion the leaving in or taking out of sills should have been left to your judgment?—Undoubtedly; you could then take them out with safety and with no risk whatever.

113. Great stress has been laid by Mr. Hales on the fact of these sole-plates being necessary. He alludes to the tunnel in Sims's as a case where a work is carried out without the necessity of a sole-piece——

Mr. Hales: Pardon me, I did not say so. There was a sill above the invert, but no sole-piece.

Mr. McLean: That is what I understand.

Mr. Hales: This arch was supported on props at the bottom of the excavation put down deep enough to clear the invert.

114. *Mr. McLean* (to witness).] But this ground was of such a nature that in your opinion it was absolutely necessary to have a sole-plate?—Undoubtedly.

115. That if the sole-plates were away these props would be really all that was holding up the enormous weight on the length; so that it was absolutely necessary to put a sole-plate in here for supporting purposes; it would not have done to have depended on those rakers?—You could not have depended on those because it would have capsized the sills.

116. *Mr. McKenzie.*] Suppose that sill had been left in, could you have made provision for carrying the brickwork past it?—The simplest thing in the world.

117. You would have to leave a hole of 18 in. square?—Yes.

117A. Suppose you went two or three lengths past and you bricked that up, you would have no difficulty at all, if these sills had been left in, in taking out the posts and bricking up the holes afterwards?—Yes.

118. *Mr. Hales.*] I think we are getting away from the point altogether. This sill is supposed to support that [indicating on the plan] until you get to the next length?—Just so; but that sill was not taken out in any case.

119. You say this was taken out altogether, and you left that supported on your laggings and punchings?—Yes.

120. Before you put in your brickwork you took that set out altogether, and then you let your crown bar come down on top of your brickwork?—Yes.

121. Then you took this out [indicating on the plan] and the whole weight of your material was resting on the brickwork?—Yes.

122. And you took this sill out because you were ordered to take it out?—Yes. I had instructions to that effect.

123. But we have got different kinds of stuff here. Was this sill in connection with this heavy land?—Yes, in connection with the heavy ground. Sometimes the ground was better and there was no need of the sills; sometimes it was heavy. The weight varied on account of so much water.

124. *Mr. McKenzie.*] You say you had a letter from Mr. Witheridge instructing you to take out that particular sill?—To take out or cut the ends of that particular sill.

125. Which part of the tunnel was that in?—Previous to coming to the break.

126. *Mr. Duncan* (referring to the plan).] Would this be solid brickwork?—Yes.

127. At the time you took the supports out how far was your brickwork advanced?—A whole length previous.

128. It stood in that way, then, until you were ready to brick this?—Yes.

THOMAS DONOHUE, of Auckland, Miner, was then called on behalf of Messrs. McLean.

129. *The Chairman.*] Have you been engaged by Messrs. McLean in this Makarau Tunnel?—Yes.

130. *Mr. M. McLean.*] You were employed by us as a miner in the Makarau Tunnel?—Yes.

131. What state was the tunnel in when we employed you?—It had collapsed.

132. Describe the position that you found it in when we employed you. What were we trying to do?—To put a drive in—trying to pick up the length that had come down.

133. There was a shaft in ahead, and the stuff was extremely bad?—Yes.

134. In tunnelling you have had considerable experience?—Yes.

135. Will you state to the Committee the extent of your experience in tunnelling?—I should think I have been engaged about ten years in railway tunnelling.

136. Continuously working in tunnels?—Yes.

137. Where have you been working on tunnels?—In New South Wales, Queensland, and Victoria.

138. And in what capacity were you employed?—As foreman.

139. It has been stated here that we as contractors had very little knowledge of tunnelling—in fact, we were practically inexperienced in tunnelling. What was your opinion of my knowledge of tunnelling when you became employed by us?—Well, I considered you knew equally as much about it as I did.

140. And that I was thoroughly practical in my knowledge of tunnelling?—Yes.

141. The ground when you were employed first was practically impassable: was that so?—It was.

142. Under the system that we were doing the work it was impossible to proceed with it, in your opinion?—It was.

143. And how did we overcome the difficulty?—By cutting the water off.

144. And who suggested cutting the water off?—You were the first that I heard suggest it.

145. And the drive that I proceeded to put in was not a success?—No.

146. But afterwards between us we took other methods?—Yes.

147. Which eventually proved successful?—Yes.

148. Of course, in your connection with tunnelling you have had a great deal to do with brick lining—at any rate, you have seen brick lining put in in soft ground and timbering put in in soft ground. Now, is it customary to leave the main sills in the brickwork until the next length is bricked up?—If it is not considered safe you leave them in; it is no detriment whatever to the brickwork.

149. You leave the sills in the brickwork?—Yes.

150. Suppose, for instance, you were to cut the ends of the sills off, what would be the use of those sills?—It would be worse than taking them out; it would be a trap.

151. You consider that if the ends of the sills were cut off and the framework of the sill were left there it would be worse than taking it out altogether?—Yes.

Mr. R. McKenzie : More dangerous, anyhow.

152. *Mr. McLean* (to witness).] You completed the balance of the tunnel, and through our joint management we overcame the difficulty of the water. Were there any sills taken out after that?—No.

153. And there was never any question of leaving the sills in?—No.

154. That is the main sill?—Yes.

155. From the time we picked up the ground and completed the tunnel the main sill was left in the brickwork, and the ground sill was left in until the length was picked up?—Yes.

156. It was then taken out, and the hole filled with concrete?—No, it was left in altogether.

157. It was left in altogether and then the hole filled with concrete?—Yes.

158. Is that [pointing to the plan on the wall] a fair representation of the method that we carried out the work by?—Yes, that is.

159. Would you consider it safe in carrying out this work in bad ground to leave the legs out altogether and depend on these posts to support that length?—No, I would not.

160. It would be a trap?—Yes.

161. So that it is absolutely necessary to have the sole-plate in that ground?—Yes, you cannot do without it.

162. You consider that in that ground you could not possibly do without that sole-piece to support those legs and the timbers?—Yes.

163. Take the sole-plate out, and leave the legs to rest on the ground to support this weight, and they would give way?—They would sink into the ground.

164. And the result?—Everything would fall down; you might as well take them out.

165. So that sole-piece is absolutely necessary?—Yes, absolutely.

166. *Mr. Crowther* (to the Chairman).] May I ask the witness his reason for stating that they would sink into the ground?—The ground being wet and soft.

167. But the ground, in starting excavation, was of a particularly hard nature?—Yes, we had to shoot it sometimes.

168. But what was the result when water came on it?—It would go over one's boot-tops, very nearly.

169. *Mr. McLean* (petitioner).] And consequently, if we had to depend on these legs without any sole-piece, of course they would sink into the ground?—They would not carry their own weight without sinking.

170. And so this tunnel was carried out in a manner similar to works that you had been employed on before?—Yes.

171. In a thoroughly up-to-date manner?—Yes.

172. You have your credentials on you from your former employers?—Yes.

173. *Mr. McLean* (petitioner) *:* I would like him to put them in to show his qualifications as an experienced man in tunnelling.

Mr. Hales : There is no dispute about Mr. Donohue's qualifications.

Mr. McLean : It does not matter, then, if the department are satisfied as to his knowledge of mining.

174. *Mr. Duncan.*] Had you any previous experience in mining in wet ground before you started tunnelling?—Yes.

175. In what part of the world?—Tasmania.

176. How long have you been at that work?—I have been mining ever since I was eighteen years of age.

177. *Mr. Morrison.*] You say you had experience in Tasmania in connection with soft ground. Was the method pursued in Tasmania the same as that pursued here?—It was similar; but that was mining work.

178. It was not a tunnel?—No.

179. Speaking as an experienced miner on all classes of ground, you think the method pursued by Messrs. McLean was a correct one?—I do.

180. *Mr. Hales.*] You, of course, were employed by them only after this slip occurred in the tunnel, and remained there some time?—Yes.

181. You know nothing about what preceded the breakdown?—Certainly not. I was not there.

Mr. McLean : Mr. Donohue was employed by us a very short time after the break.

Mr. Hales : I wish to know whether it was previous or subsequent?

Mr. McLean : Subsequent.

182. *Mr. R. McKenzie* (to witness).] You were employed by Messrs. McLean from the break until the completion of the tunnel?—Yes.

183. And you have had considerable experience in railway-tunnels?—Yes.

184. *Mr. Crowther.*] I would like to ask if the witness was there at Christmas-time?—I was there subsequently.

Mr. McLean : He was working in the tunnel a year afterwards when Christmas came round.

185. *Mr. Crowther* (to witness).] The slip had not been cured when you arrived there?—Yes.

186. *Mr. R. McKenzie.*] Was there any headway made from driving the tunnel from where the slip took place when you went there?—No.

187. *Mr. Morrison.*] Do I understand that the slip took place at a Christmas-time?—I was not working for Messrs. McLean when the slip took place.

188. *Mr. Hales.*] What time between the two Christmases were you there?—I cannot say exactly.

The Committee at this stage adjourned till Tuesday, the 14th December.

TUESDAY, 14TH DECEMBER, 1897.

ALLAN MAGUIRE, Contractor, Wellington, was next examined.

1. *The Chairman.*] You know the petitioner?—Yes.

2. Have you in any way been connected with the Makarau Contract?—In no way, sir.

3. *Mr. McLean* (petitioner).] You, Mr. Maguire, have done some tunnel-work in your time as a contractor?—Yes.

4. And you have done some work in soft ground as well?—Yes.

5. In tunnelling through soft ground, or what is termed heavy ground, is not it the usual thing to leave the ends of the sills in—that is, leave the sills in the brickwork, and build them round until that particular length is bricked up?—Yes; I have done so myself.

6. In the tunnel that you have built you have left the ends of the sills in the brickwork. That is the usual thing?—Yes; I was permitted to do so.

7. Mr. McLean then read the witness the whole of section 13 of the specification with the exception of the last three paragraphs, and asked, What kind of ground would you consider that to refer to, if you had no other indication as to the nature of the country?—I should consider it to be firm ground.

8. You would never anticipate that a tunnel such as the nature of this is required an invert?—No, I should not.

9. And in this particular tunnel the department do not admit of having given any borings. But, however, there was a boring in one place, and that, I think, was shown to be sand-rock; but it was not on the line of the tunnel, though they give a description of the tunnel in the specification. They also give a longitudinal section of the tunnel, such as this [pointing to the plan on the wall], showing 14 in. linings and footings, and a cross-sectional plan of it. This is the only description here. They have also a section on the drawings showing a much larger section of tunnel in soft ground than that—for instance, 22 in. brick linings, the radiuses much shorter, and the circle being very different from what this is on the plan. They show that section, and they say below it, "To be used when directed in soft ground." I want you to give the Committee an opinion as to what conclusion you would come to in connection with these plans and drawings. Would you base your estimate on it being a tunnel in soft ground, or a tunnel as described here?—I should certainly consider it to be in solid ground.

10. You would consider the fact of the department not having shown borings on the line of tunnel indicated that they were satisfied that the tunnel was through firm ground?—That is the inference, at all events.

11. You would really come to the conclusion that if the department for a moment thought it would be a tunnel such as it has actually turned out to be they would have turned the line, and given the contractors better information to tender on?—I do not know that they undertake to do that usually; in my own experience, they do not. In the last tunnel there were no borings at all, but at Reefton, where they had difficulties similar to that, they altered the levels.

12. It was mostly shingle at Reefton, was it not?—Yes; it showed splendid country on both sides; but, of course, there were no borings in that tunnel at all.

13. But if you were tendering for this contract, and the department showed no borings—we do not consider that there were any borings on the line of tunnel—and they called for tenders, just as in the case here, what conclusion would you come to, and how would you base your estimate?—I should certainly estimate that the ground was firm. That is the conclusion I should come to if I was tendering for it.

14. Now, here is a point that I would like to have your opinion about. [Reading paragraph 6 in clause 8 of the specification.] "All cuttings shall have a width of base at formation level, as shown on the drawings, according to the material through which they are made. Slopes shall be ¼ to 1 in solid rock, 1½ to 1 in sand, and 1 to 1 in all other material; but, should the Resident Engineer require any other slopes, the difference in cost, estimated at schedule rates, shall be added to or deducted from the contract sum. The Resident Engineer shall be the sole judge as to what class the material in the cuttings belongs. Any alteration in the slopes of cuttings will be ordered in writing. No slips will be paid for under this clause except those that are, in the opinion of the Resident Engineer, due to steepness of slope, and for which an order has been given beforehand." What is your opinion of that clause?—Well, I certainly should expect to be paid, but, as you know, the Engineers have great power over the conditions. I should expect to be paid, but I might have an uphill job to get the money.

15. The same as we have. You have done work for the Midland Railway: in your connection with that company, did they pay for slips?—I had only one slip, and the superintendent engineer did not take any power over it at all. After it was made good I was paid for it a price arranged.

16. And it was the same class as this?—Yes; the conditions were almost identical.

17. With regard to Mr. Witheridge, the inspector that we have had over us in this job: It has been stated in the report by the Engineer-in-Chief that he has given general satisfaction, and contractors have not complained of him. Perhaps that is so. You had to do with Mr. Witheridge as an inspector on some works you had: where was it?—Newmarket Junction—a most difficult undertaking.

18. Did you find Mr. Witheridge very troublesome there?—He was extremely strict; but we got on all right.

19. Did you find him interfering with the men during the carrying-on of the works?—That is a general practice of inspectors all round: they all interfere with the men. I do not think he is alone in that matter.

20. But, still, you found him interfering with the men?—Yes; but, of course, it is a long time ago, and Mr. Witheridge and I are on most friendly terms.

21. Exactly; but this is a matter that I want a straightforward answer on. Did you find Mr. Witheridge any more troublesome than other inspectors you have met with?—Yes.

22. That is, that he interfered greatly with the carrying-on of the work?—Well, of course he was a new hand then. I have known Mr. Witheridge for years—over thirty years—as a tradesman. I do not think he would be actuated by any hostile motives in interfering; it was more his anxiety than any intention to be officious, I should say.

23. *The Chairman.*] You would say that Mr. Witheridge was unnecessarily strict in superintending the work?—I would not go that far. Of course, I am speaking now of nearly twenty years ago. I know engineers and clerks of works in the colony whom I would not tender or work under.

24. But he was extremely strict?—Yes.

24A. Have you ever in carrying out tunnel-work been asked to remove the sills in the way the petitioner described that he was asked?—I have only put in one large tunnel, and that was on the Midland Railway. I built in ten sills there.

25. Is it generally the custom for the engineer to allow the contractor to build in the sills if it is found necessary, and afterwards withdraw them and fill up the gaps with brickwork or concrete?—Yes; it was in my case.

26. Without difficulty?—Without any difficulty at all. There was no obstruction at all. I built them in. Of course, the sills were wasted, but that did not matter.

27. *Mr. Crowther.*] I think I understood Mr. Maguire to say that he had one slip, and that the engineer he had over him authorised a diversion. (To witness:) Does that mean a diversion of the line altogether?—Yes.

28. That would mean, practically, an alteration in the specification?—Not altogether in the specification; but it would mean an alteration in the plan, necessitating a slight curve.

29. So that in that case you had no trouble about slips at all: it was treated by a diversion?—Yes.

30. *Mr. Morrison.*] You state, Mr. Maguire, that you have had some experience in tunnelling work in this colony?—Yes.

31. Have you had any experience in what is known as "soft" ground?—Yes, I have had most difficult ground; we had one fall-in once, and it cost me £250 to pick it up.

32. You see that tracing there of the Makarau Tunnel. Would you think it was your duty, as a contractor, if you were dealing with that class of ground, to put in a sole-plate, or bottom sill as you call it, there? Do you think it would be absolutely necessary?—Yes; there would be great weight on the roof, and, of course, the sill props it up.

33. It has been stated here this morning that, according to Sims, it is laid down that, in dealing with soft ground, simply posts are put into the ground, the cross-sill is put above that——

Mr. R. McKenzie: It was not stated in evidence, but by Mr. Hales.

34. *Mr. Morrison.*] Would you consider that a proper method, to do away with the ground sill, and simply put the two pillars on to the ground wherever you could get a bottom? And do you think that would be sufficient to carry the top sill and the weight that was upon it?—You mean dispensing with the bottom sill? I certainly should not run the risk.

35. You stated that you have had some experience of Mr. Witheridge as a contractor in this colony?—It was nearly twenty years ago.

36. Do you think he has improved by age?—Well, all I can say is, he was very strict.

37. But I suppose Mr. Witheridge interfered with the men so as to see that they were performing their work properly?—Well, to see things that the contractor may have overlooked. He was the proper man for that.

38. Was he in the habit of speaking to you about the men, and did he speak to the contractor or to you personally?—Well, it is so long ago, I can hardly say.

39. To sum it up in a sentence, your experience of Mr. Witheridge is that he was rather of an officious character?—Well, I consider him an extremely good tradesman, but he is a man who perhaps carries his own opinions too far.

40. What is his trade?—He is a stonemason. He is in about the same line as myself; he is a stonecutter, and I am a builder.

41. You have found him difficult to get along with?—A little bit, I should not like to have him over me as an inspector. There is no personal animus.

42. *Mr. Flatman.*] Do contractors always understand who are to be foremen over them?—Certainly not always, but a contractor greatly relies on an engineer that is over him.

43. Yes, but I understood you to say that you would not put a tender in under some inspectors. Would you have any knowledge that they were going to be inspectors?—We generally get at that knowledge somehow; it is not a very difficult matter that. I have had but one small contract with a tunnel in my life—only the Newmarket Junction.

44. I suppose inspectors are shifted about sometimes from one contract to another?—They generally finish the work they are on. I have not known them to be shifted during the operations of a contract.

45. You have never known them to be removed for being too stringent?—I have no personal knowledge of it, but I have known them to be removed for being extremely stringent.

46. You have known them to be removed?—Yes, but not personally.

47. *Mr. R. McLean.*] You have heard about Mr. Witheridge interfering with the men. Is not it customary for the inspector to do that in a contract?—The contractor should be the person communicated with.

48. But you say interfering with the men?—Yes; but I do not remember well.

49. If the Government engineer wants any alteration he instructs the contractor, but does not tell the men what to do?—If alterations are wanted, it is provided that the contractor should be instructed in writing. Those are the conditions.

50. But I understand from you that the Inspector went to the men themselves?—Yes; but the contention of mine is that I do not think the clerk-of-works should direct you how to do your work, as long as you do it.

51. *Mr. Hales.*] Your experience in tunnelling was on the Midland Railway?—For large tunnelling, Yes. I have seen others done in the Old Country.

52. With regard to the Belgrove Tunnel, were your specifications anything similar in regard to that tunnel?—Something similar.

53. Much the same description as you have got here (referring to the plans and specification)?—Yes; but they left it chiefly to me as to the size of blocks, and arch, and all that.

54. In the case of that tunnel was there any provision made for coming on soft ground?—There were different sections shown, but no provision in the specification.

55. But when you came to soft ground you used that different section?—We did not come on soft ground.

56. You were not required to use the other section, then?—Of course the ground was extremely bad. We took out the bars.

57. With regard to the cuttings, you had one slip?—Yes, but it was a bank.

58. With regard to the Newmarket Junction contract, what was that? What did it consist of?—New station and station-buildings, erecting a bridge, tunnel, lowering the existing track, and keeping the traffic open all the while.

59. And that was a long time ago?—From twenty to twenty-five years ago.

60. And Mr. Witheridge did not interfere with you in any way?—Only on one occasion, but he did not interfere with my method or anything of that sort.

61. Except that on one occasion perhaps he interfered with some of your men, who were doing something in your absence, no doubt?—I had a foreman.

62. But he went to the men; he did not go to the foreman?—Well, I do not know. Mr. Witheridge may remember the circumstance himself.

63. These men, we will presume, were not doing their work in the way Mr. Witheridge thought they should be doing it?—No, they were good men.

64. Mr. Witheridge was a good man; and except on this occasion you had no complaint about Mr. Witheridge?—No; but I had that feeling that he was very crochety at work.

65. *Mr. R. McKenzie.*] You were a contractor for the Midland Railway tunnel?—I was.

66. What is the length of that tunnel?—Sixty-seven chains.

66A. And you consider you had some very bad ground in connection with it?—Yes.

67. Would you point out to the Committee on that sketch what you call the minor sill?—[Witness indicated a spot in the centre of the cross-section.]

68. In bad ground would you consider it an improper thing to take that sill out?—Yes; and I would not take it out.

69. Suppose you got a written order?—Well, I would take it out.

70. Suppose you got a verbal order?—I would not do it in that case.

71. Suppose it had been a custom, and it had been insisted on to take those sills out before the brickwork was put in, and a written order was given to take out one which the contractor refused to take out, do you think the Inspector was justified in giving that order to a foreman of the contractor's employed on a shift? Do you think the foreman was justified in obeying such an order as that?—I do not think the foreman should have taken the order; I think the order should have been given from headquarters.

72. But this was a general order, you remember, from the General Engineer. If that sill was taken away, is this other sill of any use?—No; it is a most important thing.

73. Now, suppose the department or the District Engineer was in charge of the whole of that work, and suppose the Engineer insisted on that sill being taken out before the invert was put in?—I would not take it out.

74. But the one prop being taken away, it is a matter of indifference with regard to the other?—Yes, it is of no use at all.

75. If they insist on this sill being taken away, of course, this is practically useless?—Yes.

76. In putting in the brickwork in bad ground, would you consider that the leaving this hole open at the end of the sill there would be any danger to the brickwork of the tunnel?—No, not the slightest.

77. Do you consider that the proper course to adopt in bad ground was to leave that sill in and build around it?—Yes; to cut them out, and then build them in afterwards.

78. You have known McLean Brothers for some years: do you think they are competent contractors?—I do.

79. Suppose it was stated that they were incompetent contractors, what would be your opinion?—I should not say so. At all events, I should consider them thoroughly competent.

80. From your knowledge of them as contractors—having worked alongside them on more than one occasion—do you think the department could support such a statement as that they are inexperienced contractors?—No, I do not think they could.

81. You do not think the Public Works Department could maintain a statement of that kind?—I do not think so. Of course, I could understand why such a statement might be made.

82. Do you think McLean Brothers were capable of carrying through a railway-tunnel, provided they had never carried one through before?—Perfectly competent; and I know they had some of the best tunnel-men in the colony, because one of them came down to me in my work.

83. You know that they had some of the best and most experienced labour they could get?—Yes, they had some first-class men.

84. You also stated that you had known Mr. Witheridge. Did you find him somewhat meddlesome in the work?—Well, I have already explained that.

85. Now we come to those extras. Of course, you said you carried out only one contract under the Public Works Department. But we will take the value of these excavations. There was a considerable quantity of work in this tunnel, and a length of it fell in. Now, as a contractor, would you do that tunnel at schedule rates?—I do not think that would be a fair thing to ask.

86. But this schedule rate was made for hard grounds, as the specification indicated. Do you think the department are justified in asking the contractors to take out that soft, wet excavation at the same rate as they had in the schedule, 6s. 6d. a yard?—I certainly do not think so.

87. And so, knowing that this ground was wet and that a large quantity of water ran through it, what would you consider a reasonable price for the work?—Well, that is a very difficult thing to answer. I have known as much as £3 per yard for a small tunnel, and then it was not a payable price.

88. But you would have an approximate idea of it?—Knowing that the ground was wet, if I was tendering I would not do it at £1 10s. per yard.

89. But if the tunnel broke down, and there was a considerable quantity of water in it, would you put in an invert for the department at schedule rates?—No, and I do not think it is fair to ask me to do it, because you cannot do an invert at the price you do walls or arch.

90. You could not do it at the same price as the sides and arch?—No, it is new work altogether.

91. In wet ground which requires a considerable amount of bailing, what would you consider a fair price to take out the excavation for the invert, where, say, four or five men were needed to keep bailing?—I would not like to tender for less than 10s. a yard. Of course, I am giving my own idea now.

92. As a man of experience in these matters, do you think the department are treating the contractors justly and equitably in refusing to give them extra for putting in an extra lining, putting in the invert, and also taking out this wet excavation?—No, I do not think they are treating them justly and equitably.

93. *Mr. Morrison.*] Then, you say, as an experienced contractor, that you do not think the department is justified in refusing to pay for the building of this invert and for the 9-inch wall an extra price?—No, it is for extra work. It is the practice at Home for you to be paid for the circular work price and a half.

94. That is, where there is no special difficulty?—Yes, for circular work I was paid price and a half.

95. *Mr. R. D. D. McLean.*] What do you mean by circular work?—Arch work.

96. *Mr. R. McKenzie.*] Would you think 6s. 6d. too much to ask contractors to take it, without excavation?—No, I would not.

97. Mr. McKenzie next read paragraph 5 of section 13, on page 6 of the Specification, as follows: "The tunnel shall be lined throughout. The lining shall be of rubble masonry, concrete, or brickwork in the side-walls—that is to say, from foundation to level of springing of the arch; and of concrete blocks or brickwork in the arch. If rubble masonry is used in the side-walls it shall be 18 in. thick, and if concrete or brick 14 in. thick. If concrete is used in the side-walls it shall be accurately moulded, and the moulding-boards shall not be removed for at least three days after the concrete is placed in position. If concrete blocks are used in the arch, they shall be the whole thickness of the lining—*viz.*, 14 in.—9 in. wide in the soffit, 18 in. long, and carefully moulded to the radius of the arch. They shall be bonded as in ashlar masonry. All spaces between the lining and the excavation shall be filled up with stones firmly rammed in." (To witness:) You notice there that there is no provision made for increasing the lining, and no provision made for putting in an invert?—No, there is not.

98. Now, under that clause, speaking as a contractor, would you increase that lining at schedule rates?—No, if the whole nature of the work was changed I think a price should have been asked for.

99. *Mr. R. McKenzie* (to the Chairman): Bearing on this point some correspondence has been put in. (To the witness:) Under that clause, would you put in an invert at the same price as the schedule?—No; but of course the Engineer has power to make me do it.

100. And you consider that before you did that work for the department they would have to arrange a price for it?—I certainly should not do it, but they would be able to compel me to proceed.

101. They would compel you, but you reckon you would have your remedy afterwards?—Yes.

102. Of course you are familiar with the Government specifications—there has been little change in them for many years?—Yes.

103. You notice there that the flattest batter that is provided for in that clause (clause 8, paragraph 6) for cuttings is 1 to 1; and afterwards it states, in the very same clause, that if it is necessary to give flatter slopes they shall be paid for at schedule rates?—Yes.

104. Now, suppose these cuttings slipped, we will say, 3 in 1, would you consider you would be entitled for the removal of that extra stuff to extra payment?—Yes, certainly.

105. That is under this clause; in fact, this is a clause which a contractor would consider as a clause providing for the payment of slips?—Yes, just so; this is intended payment for slips.

106. Any slip under 1 to 1?—Yes.

107. I will ask your opinion also with reference to these slips. There have been about 11,000 yards of slips removed under this contract. Do you consider the department justified in refusing to pay for those slips?—No, I do not consider the department justified.

108. Of course, the contractor has no legal remedy, and the Engineer-in-Chief is the sole arbitrator?—It depends entirely on the fairness of the Engineer.

109. In equity and justice you consider, under this clause, that that 11,000 yards should be paid for?—Yes; I should expect it to be paid for.

110. *Mr. McLean* (petitioner).] In regard to those slips, as a contractor, do you consider that you can remove slips at the same rate that you can any other portion of the work?—No.

111. It costs a considerable amount more?—Yes, for the more reason that you have to shovel every bit of it.

112. And if the slip is of a wet nature it is more difficult?—Yes.

113. Now, it is stated in an earlier paragraph in clause 8 of the specification that "During the execution of the work, and during the period of maintenance, the formation and slopes shall be properly drained so as to prevent any lodgment of water; and should any slips occur, either in cuttings or embankments, from want of proper drainage, or from neglect to keep the drains clear during heavy rains, the contractor shall remedy them and restore the slopes to the specified or a flatter rate of inclination, such inclination being that at which the material will naturally and permanently stand." What do you understand by that?—If you had not these drains cut prior to the slip, I have no doubt, under that clause, responsibility would be put on you.

114. *Mr. Lawry.*] I suppose the Committee is to understand you that if the contractor has carried out the conditions relative to the preventive measures being taken, he will be indemnified against any loss that may be caused by slips?—Yes, I think so.

115. *Mr. Morrison.*] There is a further question arising out of that, and that is that not only the drains are to be kept properly cut, but that they are to be kept clear after being cut. But as long as the drains were made, and a slip took place through the drains being blocked up, the contractor is responsible?—Yes; I had experience of that on the Midland Railway.

116. I suppose you have examined the method of working Mr. McLean pursued in connection with this tunnel?—There is only one method of working under these circumstances. The great question is the question of timbering. I give him all the credit in the world in the matter of handling timber.

117. But, speaking as an experienced contractor and a man who understands this work, you are perfectly satisfied that the method pursued by Messrs. McLean in the Makarau Tunnel was the correct one?—Certainly. Of course, circumstances alter cases generally.

118. *Mr. Hales.*] Suppose that though there was no mention of increasing the section of brickwork there was another section of tunnel much heavier with an invert shown on the plan, and it said on the instructions in connection with it, "To be used only where directed in soft ground," would you consider that you would have to provide that under the contract, and do it at the schedule rate?—If I was called upon to give a separate schedule I would, of course, give it. I have seen a separate schedule asked for.

119. But suppose there was no separate schedule, was not the contracter bound to do that work at the schedule rate?—If previously provided for. But I would have taken very great care to allow amply for such a thing as that.

120. *Mr. Lawry.*] With regard to the cuttings, the specification says, "Any alteration in the slopes of cuttings will be ordered in writing. No slips will be paid for under this clause except those that are in the opinion of the Resident Engineer due to steepness of slope, and for which an order has been given beforehand." Suppose the cutting had been taken out to the slope required by the terms of the contract and a slip occurred, according to this specification do you think that the Engineer has power to pay for that with the public money?—I do really think he ought to do so, speaking as a contractor.

121. Now, what would you call a slip that was due to steepness of slope, taking in any country that you know?—Do you mean when completed or in progress?

122. When completed. Suppose you completed your slopes to 1 to 1 and the slip occurred, would you consider that slip due to steepness of slope?—It might be water, it might be a greasy bank, or anything else.

123. Not steepness of slope?—Of course, if it was 2 to 1 it might not have slipped.

124. You did the Newmarket Junction Station contract. You know the cutting at the Auckland end of it. That cutting would be taken out in the ordinary course?—Yes.

125. And one side of the valley slipped back from the cutting about 10 chains, and it filled the cutting and broke the contractor, and broke the Provincial Government, I think?—I was in Auckland when that occurred. You could not expect a man-of-war's-man to know much about tunnelling.

126. But what kind of a slope would you have? How far would you have to go back?—Well, we did not go back as it was, because it was timbered.

127. There is no amount of slope, in fact, that would have prevented that slip?—Well, you would have to make it nearly horizontal; it would have to go into Parnell.

Mr. Crowther: The ground there is all full of springs.

ROBERT MCGONAGLE, Manager of Works, Coromandel Recovery, examined.

1. *The Chairman.*] You know a petition has been lodged by the contractors of the Helensville Northwards Railway, and we are now inquiring how the contract has been carried out?—I am aware of that.

2. *Mr. M. McLean* (petitioner).] You have been for some years connected with tunnel-work?—Yes.

3. In what position?—First as manager of works, and afterwards Inspector of the Public Works Department.

4. What were the tunnels you were connected with?—One was the Kai Iwi Tunnel.

5. And what was the nature of the ground there?—Sandy and heavy.

6. What class of timbering did you require?—Some very heavy timber.

7. Did the tunnel in question have an invert?—I very much doubt whether there was an invert or not.

8. What other tunnels have you been connected with?—The tunnels all through the Gorge contract—five in number. Also three of the tunnels between Hunterville and Taranaki.

9. So you have had considerable experience in tunnels?—Ten tunnels altogether.

10. You were in charge of the Makarau Tunnel for the department after what is termed the breakdown?—Yes.

11. You were appointed then as Inspector, were you not?—I was.

12. Will you describe the order that we were carrying on the work by?—I took charge of the draining of it.

13. Well, of course, that was preparatory to the experimental work on our own part; and, as an inspector, you thought you had nothing to do with that, I suppose?—Well, what I saw at the time I approved of.

14. I mean that after the drainage was completed and we had diverted the water off the line of tunnel, then we proceeded with the work. In your opinion, was the method by which we proceeded with the work a proper one—the way that an expert would carry on the work?—With the heavy ground you had to contend with, the principle you adopted was, in my opinion, a correct one.

15. Did we as contractors understand the carrying-out of works of that kind?—When I was there you overcame all the difficulties you had to contend with.

16. In a systematic and workmanlike manner?—Yes.

17. Now, in these tunnels that you have constructed—we will say the Gorge tunnels, as they are the most recent—I suppose there was some heavy ground?—Particularly heavy in portions.

18. In those cases when you were lining up with brickwork were the sills or the ends of the sills removed from the brickwork?—In my case we took out the sills, but where the ground was particularly heavy they were left in.

19. And the sills themselves, what about them?—They were heavy sills, and were left in until the brick length was completed. The difference between the centres was 2 ft. less than usual—viz., 9 ft. The average in the Gorge would be 12 ft.; in bad ground, 9 ft.

20. In bad ground the sills were left in the brickwork?—Yes; but it was concrete-work, not brickwork.

21. In carrying out this contract of the Makarau Tunnel there were something like 6 chains to complete after you came?—Well, I think it was more.

22. About 6½?—I suppose that would be it; I am not sure.

23. In the whole of that distance was there a sill taken out of the work before the brickwork was put in?—No.

24. The sill was left in in every case?—Every case that I can remember.

25. Did you have any instructions from Mr. Vickerman to remove the sills or to leave them in?—In general conversation it was understood they were to be left in. Had Mr. Vickerman instructed me to take them out they would have been taken out.

26. In general conversation it was understood they were to be left in?—Yes.

27. And they were left in?—They were.

28. Immediately, of course, the length was put in and everything was secured?—Yes.

29. [Referring to cross- and longitudinal-sectional drawings pinned up on the wall] Is that a correct idea of the method of carrying on the work?—That fairly represents the whole scheme.

30. In your opinion, in that ground was it absolutely necessary to have a sole-plate or bottom sill in?—Where it was not on rock.

31. In this particular ground?—It was absolutely necessary there.

32. It would never have done to have had that sill out and depended on these legs simply standing on the ground?—Certainly not; they would have disappeared.

33. The whole thing would have crushed down?—Yes. I have seen them have to go back and take up the whole because they had gone down too far.

34. *The Chairman.*] Having superintended the building of about ten tunnels, you claim to be a good judge of the way in which tunnels should be constructed?—Yes; for, beside the work of some ten tunnels, I have had fully thirty years' experience as a miner off and on.

35. But you claim to be an adequate judge of whether the work is done in a workmanlike way by expert men?—Yes.

36. And, in your opinion, does that description apply to the way in which this tunnel was made?—To the latter portions of it.

37. That is, of course, with the portions with which you were connected?—Yes.

38. Can you tell us what object was to be gained by removing the sills in the tunnel in advance of the brickwork, or when the brickwork reached the sills?—What object would be gained?

39. Yes. What advantage?—It would tend to weaken the tunnel. The brickwork would not be strong enough to carry the poles and the bars on the top had the sills been taken away in the first case.

40. You have taken the question the other way about. What advantage would there be in removing the sills? Do you not build the sills in first till the brickwork has dried and afterwards remove them?—That is what was done when I was there.

41. Then, you are not in a position to say whether they were removed or not when the slip took place?—No; I was not there then.

42. *Mr. Morrison.*] There is one expression that you have used that I should like to have explained. What do you mean by the phrase "heavy ground"? You stated, in reply to a question, that, in connection with some of these tunnels you superintended, parts of some of them were through heavy ground?—Yes; portions of them. The entrance of one of the tunnels near the Palmerston end was particularly heavy ground. We went back and put in extra timber, extra concrete, and an extra ring of concrete blocks. Also at the far end—the Woodville end—of the tunnel portions of the ground were very heavy.

43. But what is the Committee to understand by "heavy ground"?—Heavy ground means ground that would be coming in and crushing in the timber.

44. Do I understand you to mean by this that it is ground that is on the creep?—Yes; ground that may be on the move. It may be coming in sideways, or coming in direct from the top or at an angle. It has all got to be counteracted by putting in struts, and so on.

45. I suppose at the time when you took charge of this Makarau Tunnel the contractors were in heavy ground?—Particularly heavy ground.

46. They were in the midst of the difficulties as regards this breakdown?—They were.

47. It has been stated in evidence that there was no necessity for a sole-plate or bottom sill, or to build an invert. In your opinion, was it necessary?—In that ground it was absolutely necessary.

48. [Referring to the plan on the wall] Would it be possible, after the work was solidified, for the two props to have rested on and carried this upper sill here?—That sill was in position before this brickwork was built in. The brickwork was built round it. Sometimes there were two rings, and sometimes two and a half. If the sole-plate could have been done without it would have been a great saving.

49. In your opinion, it was absolutely necessary for the contractors to put in a sole-plate?—Yes; in this case I consider it was necessary.

50. *Mr. Massey.*] You say they were still in the heavy ground whilst you were in charge?—Yes.

51. If the sills were taken out before the brickwork was put in, would there have been any danger of the tunnel coming down?—Well, I should have hesitated to do it. I should only have done it after instructions from the department, which I should have considered myself bound to carry out. I have not done anything in my own tunnels which was not approved of by the engineer.

52. Still, as an experienced man, you would not have considered it advisable?—No; I should have advised against it.

53. *Mr. Graham.*] You were not Inspector in this work during the whole period of the construction of the tunnel?—No.

54. How much had been done before you came on?—About three-quarters of it, I suppose.

55. In the other ten tunnels you worked at, did you experience any of the same kind of ground?—Not exactly the same kind of ground, but the same class of work.

56. You have carried out works of equal difficulty?—Equally difficult, if not more so.

57. Work that would put greater strain on your ability to cope with it?—Yes, greater.

58. What is the object of putting in that sill across the centre?—So that the legs can be removed and the timber taken out.

59. Yes; but what is the object for its being put in at first?—For support. This minor sill is put in for convenience' sake, so that it can be taken out and moved ahead.

60. But the purpose for which it is put in at first is to be able to support all that work that holds up the arch?—Yes; and that keeps up the sides.

61. And the object is to keep that up until you get the brickwork in and hardened and solidified, so that it will carry itself?—Yes.

62. If that were taken out before the brickwork set it would be wrong?—Distinctly wrong; it would be risking too much.

63. If that were done, no matter by whom, it would be a wrong thing to do?—It would be a wrong thing to insist on doing.

64. And the consequence would be what occurred there?—Yes.

65. And if it came in you would say it was in consequence of the sill being taken away while the work was green?—I would never have it taken away; I should consider it a very wrong thing to do.

66. And that the result might be disastrous?—Yes.

67. *Mr. Holland.*] If you took the under-sill away, what would the ends of these posts rest on?—That is the top pieces. They would be resting on the arch simply.

68. And you think that should have been left in very much longer for the timbers to rest on that sill until the work was thoroughly set?—Yes.

69. *Mr. Graham.*] Do you think if the arch had been thoroughly set it would have been able to carry the tunnel?—Well, probably.

70. But when it got thoroughly set you think it would have been all right?—Well, brickwork takes some considerable time to set sufficiently to carry all the work of a tunnel. If you were to wait for four or five weeks it probably would have been strong enough; but that would mean that there would have to be a delay in the work.

71. *Mr. R. D. McLean.*] How long do you say it would take as a rule?—I think about a month would be necessary.

72. *Mr. Flatman.*] Do you know whether it is customary with every contract for the Public Works Department to supply a plan of how a tunnel should be strutted?—No; I do not think it is customary. It is not generally customary. Very often in general conversation with the contractors a suggestion may be offered.

73. There is no plan given?—They do not supply a plan; but if they insist on it being done in their own particular method they will supply one.

74. Was there a plan supplied on this particular occasion?—No.

75. Then, a contractor is left to construct a tunnel according to the way he thinks most advisable?—As long as he is competent; but if he is incompetent I should say the department should direct him how to do it.

76. Practically, the timbering of a tunnel bears the same relation as scaffolding to a building; there is no plan supplied any more than for the scaffolding of a house?—That is so.

77. *Mr. Hales.*] One of the witnesses said here that the reason why that sole-plate below the bottom of the struts could not be put down below the brickwork of the invert was because the ground was so hard that it would be great labour to get it out?—Perhaps he stated so; I did not see.

78. Another witness said the ground there was so soft that he was sure it would not stand; and you also say that they could not do without that sole-plate?—Yes.

79. But was the ground so hard that it was difficult to excavate?—In one or two cases where they came on a boulder. There were boulders that required blasting; but that was not the general character of the country they were going through. I cannot say that there was any particular spot that required blasting out, although there was an occasional boulder that required it.

80. Still, the ground that required blasting out was quite hard?—Yes, it would be.

81. That was the only suggestion about those struts—that if the ground was so hard that they could not sink there was no necessity to put in the sill?—Certainly not.

82. For instance, in your tunnels at the Manawatu you did not put in sole-plates like that?—At the Palmerston end of the second tunnel we put down sole-plates.

83. It was in clay there?—No; in rotten material—a kind of rotten soil.

84. Was there an invert there?—No; we did not put in an invert there, we increased the footings.

85. With regard to what is called the minor sill, the minor sill as a rule is put in to support the longitudinal bars till they are properly propped?—Yes.

86. You place the lower bars so that they will form a bottom to the arch?—Yes.

87. Then you strut up the crown bar, and it gets tighter and tighter as it goes?—Yes.

88. Then, when all that is done, you form a timber arch?—Yes; according to the nature of the ground.

89. Then your poling-bars are worked in?—Yes.

90. Then, suppose you removed that sill—the minor sill—and the props, ought not that arch of bars to be competent to support the ground?—No, I do not think so, except in certain places.

91. Do you know that it is done?—Yes; I believe it is done sometimes. I know that it can be taken out. But in that particular ground the bars were having as much as ever they could carry—in fact, they were bending down with the weight—and it was not safe to carry anything more. I have seen ground borne down so much that the men were afraid of working under it.

92. Why is it insisted by the engineers that the timber should be taken out?—I think it would be better in all cases that the timber should be taken out.

93. But do you know why it should be taken out, especially as the timber is not of much value?—Well, I suppose the timber rots in time. I should certainly have the timber taken out if it could be done.

94. Is there not a reason for timbering being taken out beside what you have mentioned?—There is less excavation if you do not have to take out all the bars.

95. And less brickwork?—Yes.

96. Were these sole-plates below the brickwork in the work you supervised?—Not in all cases below the brickwork—about two rings from the top of the invert. In some cases they were down below, and in others not down below. It depends on the thickness of the levels probably.

97. I think you said that in some cases you took out these minor sills?—In this tunnel we took out all the sills and bars; but the ground was strong.

98. But you did not need very many bars if the ground would stand alone?—Yes; but by putting in false bars under your arch you can take them out when there is room. It has to be done time after time.

99. *Mr. McKenzie* (turning to the diagrams on the wall).] Will you have a look at this sketch for a minute. You have been in charge of Government railways. As a practical man, which of those sills on that plan do you call the minor sill?—[The witness indicated the upper one.]

100. And that extends to both sides of the excavation?—Yes.

101. It is invariably wedged up at each end to keep it in position?—Yes.

102. Suppose this sill had been cut off inside the lining, would you consider that timber to be safe?—No; not unless there was other provision there.

103. Now, of course this has all been explained before, but I want you to explain it to the Committee, as you were a practical man in charge of the work. First of all, there is provision made for removing the sill in two pieces. Is there any reason in heavy ground that the brickwork should not be built past and the sill left?—I do not see any reason, because in all cases where sills have been left in they have been bricked up, and the work has stood. I know of no case where it has broken down.

104. Would you consider it dangerous to remove that sill in all grounds?—I would consider that in very heavy ground it should be left in.

105. You do not consider it should be taken out?—No, I do not.

106. What do you call this [pointing to the lower part of the diagram]?—A lower sill, or a foot-block. In two pieces a foot-block; in one long piece I call it a sill.

107. Of course, if this sill were away there would be nothing on the legs?—No; it is better to leave it in and brick over it.

108. As a Government inspector of long experience, you consider it better to leave that in and build over it?—Yes.

109. You do not consider it detrimental to the work?—No; but if the Engineer had objected to it I should have had to take it out.

110. According to your own judgment, it is not at all detrimental to the work to leave half the block, or lower sill, in?—No.

111. The reason why I am asking is because Mr. Blow laid great stress on this block being left in. Do you attribute the breakdown of the Makarau Tunnel to the fact of the contractor being compelled to take out all these sills?—I do not know anything about it.

112. But what is your opinion as a practical man?—Well, the tunnel certainly showed flattening on top of the arch as if it had been crushed down.

113. Suppose you took that sill away in heavy ground, would you consider the tunnel unsafe?—I would.

114. Would you consider that the effect of its being taken away would be that all this brickwork would come down?—Well, if it came down I should attribute it to that.

115. You said you had verbal instructions from Mr. Vickerman, the District Engineer, to leave the sills in?—Well, all that he wished to be done was done. I consider that all I did was approved of by the department—that I had their full approval.

116. But did you have verbal instructions from Mr. Vickerman to leave those minor sills in?—They were left in by his tacit approval.

117. He gave you verbal instructions to leave the minor sills in?—He said until the holes were filled up he did not consider the brickwork finished.

118. Were there any weep-holes left in it or not?—I do not believe there were; I am not very certain about it. I had weep-holes in some tunnels I was in.

119. But is not it a general thing to leave weep-holes in?—It is a matter of opinion about it.

120. You where there when the contract was finished?—I was there when the tunnel was put through.

121. You have a general knowledge of Government specifications?—Yes, pretty fair.

122. Were you on that contract that Cleghorn, Forrest, and McGee carried out?—Yes.

123. There were some slips on that?—Yes.

124. Were you aware that there was a petition came before Parliament in connection with those slips—in 1894, I think?—I was aware that there was some petition, but I did not know the details of it.

125. You know the slips on the Makarau contract?—Yes.

126. Would you attribute the cause of the slips to steepness of slope in that particular ground?—Well, certainly in that class of country the angle of the slope was not flat enough to support itself.

127. Were there any catch-water drains there?—They were carried away in some places.

128. Had you not to examine these catch-water drains occasionally?—Well, I went up there occasionally. Where there was a slip taking place I would go up and have a look at it.

129. But where they were not carried away, did you always find these catch-water drains clean?—On the tops of the hills they were all right.

130. But, however, the slips went from behind the catch-water drains?—Yes.

131. Now, coming to the nature of the ground. First of all, there was no invert in that tunnel?—No invert provided for.

132. Would you consider that the contractor should receive more payment for excavating that invert?—As a contaactor, I should charge more for it myself. If I was managing for a contractor I should also charge more; I know it is worth more.

133. And also for the extra ring and lining?—Yes.

134. Do you think that is also worth more?—Yes.

135. Do you think the excavation was worth more than the excavation you had in sandstone rock?—Yes; owing to the extra strength and quantity of timber required.

136. It slipped up to the surface, did it not?—Yes; there was a great deal of pressure on the top.

137. A greater quantity of stuff would have to be taken out of the tunnel on that account?—Well, there are parts of the tunnel where there would have to be a considerable quantity extra taken out.

138. There is one tunnel where the wing-wall was not sufficient to resist the strain on it?—Well, the fact is the bricks were placed at an angle, and they were shorn through as if they had been taken off by a cross-cut level. The base of one wall was laid at an angle, which in itself was wrong, and the wing-wall was shorn off, turned inwards, and slightly uprighted; but it cut the bricks every one of them almost like a wedge. They were not removed from their beds.

139. Were the bricks put in according to the plan and specification?—I paid particular attention to this.

140. Do you attribute the slip to the fact of the wing-wall not being strong enough originally? Do you think that was the cause of that slip coming down?—No; it was the cause of the wing-wall coming away—the slip coming away.

141. Had the wall been strong enough, would it have stopped it?—Well, that wing-wall was strong enough in almost any ground, but in that particular place it was too heavy for it. A few feet away from this the ground is very heavy, going back up the hill. I considered this wing-wall particularly strong, and anything that carried it away was very heavy.

142. Was that batter taken down from 1 to 1?—I think it had been, but it was taken away to save timbers. The slip was coming down almost in a series of steps. It was all quietly on the move.

143. Did you, as a Government Inspector, consider that that ground required a flatter slope than 1 to 1?—At that particular place, Yes.

144. It would not stand at 1 to 1 there?—No; certainly it would not stand at that. It was very heavy country.

145. It was not the fault of deficient drainage?—No; it carried away the drains.

146. *Mr. Flatman.*] It has been stated that in this ground you could not get the sole-plate down?—I had no knowledge of it.

147. Is it necessary that these uprights [pointing them out on the plan] should stand in the position in which they are placed on this plan?—Yes, with that system of work.

148. In your experience, have you ever found that where there would be soft ground underneath them they would be required to be placed in, and in hard ground not always?—In the case of a boulder that might happen. There might be a case.

149. And yet you would have to put that plate in because it was soft where you wanted to put the upright?—If I found it soft, but hard near the middle, I would put in a longitudinal one under it at each end, so that it would not break over the hard piece in the middle.

This completed the case for the petitioners, and the Committee adjourned till the following day.

WEDNESDAY, 15TH DECEMBER, 1897.

Mr. BLOW, Under-Secretary for Public Works, made a statement on behalf of that department, and was examined:—

Mr. Blow: This claim arose out of a contract by the petitioners, dated the 13th March, 1890, the contract date for completion being the 1st March, 1892, under a penalty of £20 per week. The contract sum was £26,616, and, amongst other things, the contract provided for the construction of a tunnel 627 yards long. The contract was not actually completed until the 13th May, 1897—five years and two months after the date specified. Extra works were performed to the amount of £3,995 18s. 7d., but there were reductions in the contract sum, consisting largely of the agreed charge for the hire of an engine and trucks that the contractors got from the department, totalling to £432 19s. 4d. So that the net amount extra after deducting the reductions was £3,562 19s. 3d., and that amount was paid to the contractors. I will put in the Engineer's final certificate, with his report on the work, and a full schedule showing how the whole of these additions and reductions were arrived at. [Documents handed in.] This certificate was signed by Mr. Vickerman, the Resident Engineer. It is usual for such statements to be also signed by the contractors, but in this case the contractors declined to sign, because the other items were not included there. So that the final certificate bore the signature of the Resident Engineer alone. As evidence that this amount was duly paid to the contractors, I put in a copy of the final voucher. [Document put in.] The contractors now claim £5,371 16s. 3d. There are really only two items in this claim. The first is for slips, and the second is for the additional cost of the work in the tunnel over and above what they expected it would be. I have therefore simply to address myself to these two points.

1. *Mr. Crowther.*] What is the amount claimed on account of slips?—£725 6s. 3d., and the balance of £4,646 10s. is claimed for the tunnel.

Mr. Blow (continuing): As regards the question of slips I will ask the Committee to glance at two paragraphs of Clause 8 of the specification. They have been referred to before, but the question is of such importance that I would like to have them read again. [Mr. Blow then read paragraphs 2 and 6 of Clause 8 of the specification, and drew particular attention to the last part of the latter paragraph, where it stated, "No slips will be paid for under this clause except those that are in the opinion of the Resident Engineer due to steepness of slope, and for which an order has been given beforehand."] The author of this specification seems to have been more particular than usual to make this point perfectly clear. It is perhaps usual only to say what the contractors will be paid for and to leave it to be inferred that they will not be paid for anything else; but in this case, to make it perfectly clear, it is stated precisely what will be paid for and precisely what will not be paid for. The department contends, and their Engineers will be prepared to support that contention, that the slips in this case distinctly come under the former paragraph—namely, slips owing to insufficient drainage, for which no payment shall be made. We contend they distinctly do not come under the latter head—due to steepness of slope. To protect the Department in this matter the author of the specification also provided that the Engineer of the works should be the sole judge as to whether the slips were due to steepness of slope or not, and they were not to receive payment unless in the opinion of the Engineer they were due to steepness of slope and he ordered their removal. The opinion of the Engineer was that they were not due to steepness of slope, and he did not order their removal.

Now, as to the date when these slips happened. This contract should have been completed on the 1st March, 1892. The first serious slips occurred in March, 1893—a year after the work should have been finished. Slips to the extent of 5,000 or 6,000 yards came down in March, 1893. The first serious slips happened in March, 1893, but another very serious slip at the back of and alongside the tunnel wing-wall did not happen until January, 1896, when the contract should have been completed four years. As I say, the department contend that the claim for slips is clearly barred by the terms of the specification. But, even if that were not so, the contractors having kept their works running on for such a length of time—having exceeded the contract term nearly three-fold—it would indeed be unreasonable to ask the Government to be responsible for slips that occurred through their extending their works, to suit themselves, for such a tremendous length of time. Some correspondence took place with reference to these slips, and I should like to have it before the Committee.

Mr. Blow then proceeded to read a number of letters and telegrams, being communications between the department's officers on the spot, and the heads of the department in Wellington, with regard to the progress of the works and the difficulties met with. They comprised: Report of the Resident Engineer to the department, 1st March, 1893; ditto, 9th January, 1896; ditto, 13th January 1896; reply of the department to the latter dated 20th January, 1896; telegram to the department from the Resident Engineer, 13th February, 1896; reply to same, 15th February, 1896; letter by contractor *re* slips dated 12th February, 1896 (on page 1 of printed exhibits). As the accuracy of this copy was disputed by Mr. McKenzie, it was compared with the original and found to be quite correct. Memorandum by Mr. Vickerman, Resident Engineer, dated 22nd February, 1896 (page 2, number 6, printed exhibits). This also was compared with the

original and verified. Besides the copies of those letters quoted that were not included in the exhibits, Mr. Blow handed in the following papers: Schedule of works, Makarau contract, Helensville Northwards Railway; voucher for payment of contract, with certificate attached, exhibits 11 to 19 inclusive.

Mr. Blow: That is all the written evidence I propose to put in on the question of slips, but I just want to emphasize this: that the department contends that the slips are distinctly not due to steepness of slope; and we point to the admission of the contractors in their letter of 12th February, 1896, agreeing with that view. And further we contend that they distinctly were due to want of proper precautions being taken in the matter of drainage. And, as I said before, the author of the specifications was more than usually precise in this matter, because he defined the particular slips that would be paid for and the particular slips that would not be paid for, and we say emphatically that these slips come under the latter head.

Now I will deal with the question of the tunnel. As regards the tunnel there is nothing whatever in the specification guaranteeing the nature of the strata that the tunnel would pass through. We have heard a good deal about a boring that was put down, but no boring is mentioned anywhere in the specification from start to finish, and no boring is shown on the contract-plans anywhere from cover to cover. The reason for this was obvious. The department was quite well aware that the boring was put down on a wrong line, but members of the Committee will know that in making surveys for such important works as railways the survey is gone over two or three times. The first survey we make is called a trial survey, and on that line we do not put in any accurate curves, we simply put in tangents—run straight lines from point to point—and when we have discovered what is really the best line for the railway we make a much more precise and detailed survey showing the level of the whole of the ground along the contract. This boring was put in on the trial line, and in case it might mislead the contractors no mention of it was made in the specifications or anywhere else. The contractors were left to their own resources. They could examine the ground, and come to their own conclusions as to what the nature of the material would probably turn out to be. The department itself was doubtful about the matter. This is shown both by the drawings and the specifications. [Referring to a set of the drawings.] In drawing No. 4, attached to the contract documents, two alternative forms of lining are shown. The first form is the ordinary lining with an ordinary foundation. This form of lining is only adapted to firm ground, where the soil will stand the pressure that comes upon it. When the excavation of this tunnel was commenced the ground was found to be thoroughly hard—so hard that it could not even be broken with a pick; it had to be blasted out. And that form of lining was adopted, the foundation being considered to be amply strong enough to stand the strain. As they got further into the tunnel, and the nature of the strata changed, it was found that the work still required blasting out, but the material was of such a nature that it slacked on exposure to the air and moisture. And shortly after the lining of a portion of this part of the tunnel had been completed according to this first section (Section A) it was discovered that the footings were gathering inwards, and measures had to be adopted to prevent this. We then resorted practically to the other form of lining shown on the drawing (Section B), which provides an invert beneath the side-walls, making the lining a complete ring, so that gathering inwards was quite impossible unless the whole lining was crushed in like the shell of an egg. I mention this point now to show that the Government were doubtful what the nature of the strata would be. If we had been certain what it would be there would, of course, have been no necessity to put in that alternative. But we were doubtful whether it would be hard or soft, and therefore we showed two alternative linings that might be required, to be used in the discretion of the Engineer.

2. *Mr. R. McKenzie.*] Who signed those plans? That has never been altered for thirty years?—That was signed by John Blackett, Engineer-in-Chief. Mr. Blair was Engineer-in-Chief at the time, and that drawing is signed by his immediate predecessor.

Mr. Graham: Mr. John Blackett has been dead these six years. His son has been dead some time.

Mr. Blow (continuing): As further evidence that the department was doubtful as to the nature of the strata, I refer to a portion of clause 13 of the specification. [He then read paragraph 7.] These words show that the department as a matter of fact was not aware whether the tunnel would require to be lined or not—that is to say, whether the tunnel would turn out to be in hard ground or soft. I would like to say a word in reference to some remarks that have been made to the Committee on the subject of boring. The Committee will perhaps recollect that one of the contractor's witnesses—Mr. James Stewart, of Auckland—stated it was his practice to put down borings, but when he put them down he took no responsibility whatever; and if the nature of the strata turned out different from what the borings indicated, he said he took no responsibility, and the contractor was not entitled to any extra payment. Here we do not mislead the contractors by giving them any information at all, and surely, therefore, our case is better than that of Mr. Stewart. We say that we leave you to discover the nature of the ground, and all the contingencies that arise during the progress of the work are yours. If any other view than that were taken we should have to put in a clause in the specification saying that if the ground turned out more favourable than was expected an allowance would have to be made by the contractors in favour of the Government. It has often turned out to be the case that the ground has proved more favourable than expected, and contractors have made thousands of pounds by it; and if a contractor should once in a while suffer a loss on a contract through the ground turning out less favourable than was anticipated it is not right that he should come to this Committee and ask them to refund that loss. Contracting in this way is reduced to a farce.

Mr. Wright: It appears to me, Mr. Chairman, Mr. Blow is making a general defence. Is he going to call any witnesses?—because in that case, I contend, he should call his witnesses first and make his general defence afterwards.

Mr. Morrison: I think he is quite right and going on in the proper order.

3. *The Chairman* (to Mr. Blow): I take it you are making a general statement now which will be supported by evidence afterwards?—On this point I think the Committee should take what I am saying as evidence, because I, in my official capacity, can support the Resident Engineer as to whether borings are usually given or not; and I say they are not given. I will state, as Under-Secretary of the Public Works Department, that borings are not usual in New Zealand—that it is a very decidedly exceptional thing for borings to be shown on any contract plans, and when they are shown we take exactly the same course that Mr. Stewart says he takes—that is, we guarantee nothing; and if the strata turns out to be totally different from what the bore shows is likely to be met with, the contractor has still no claim for extra payment. The view the department takes of this is, that we are perfectly at liberty, according to these specifications and drawings, to order any extra thickness of tunnel-lining that may be required; but of course we pay for that extra thickness as an extra to the contract. I will read the clause in the general conditions that gives this power. [Mr. Blow then read subsections 2, 3, and 4 of clause 7 of the general conditions attached to the contract.] That settles the question of the price to be paid. The price to be paid is according to the rate set down by the contractor in the schedule sent in with his tender. I do not think there can be any obscurity as to the meaning of those words. Subsection (2) provides how the price shall be arrived at, and subsection (3) that when arrived at it shall be added to or deducted from the contract sum. So that it is futile for the contractors to come here and urge that the work they had to do in this tunnel—putting in this invert or an extra ring of brickwork—were works not contemplated as extra works by the conditions of contract. The conditions of contract say that all works, however extensive they may be, are to be done according to order; but of course they are to be duly and fairly paid for. [Copy of schedule attached to the contract, showing the rates at which the contractor is to be paid for extra work, put in.] In regard to extra work—say, so many yards of brickwork, so many feet of timber, and so on—each is duly appraised and worked up to a total, and that total is added to the contract sum. If we want a little more work done of this class we say, Do it and we will pay you for it at the rates put down in the schedule. I think nothing could be simpler, and nothing could be fairer. The contractor fixes the price himself. If he likes to put his price at a higher rate, well and good, but of course then his price being higher he might not be the lowest tenderer. In this contract the amount put down is 6s. 6d. per cubic yard for excavating the tunnel. That rate was paid for all the excavating work. The amount for the lining of the face and wings is £1 16s. per cubic yard, and for the lining of the arch £1 16s. per cubic yard, and the department of course paid £1 16s. per cubic yard for the invert. It was just as difficult, and no more difficult, to build an invert than to build an arch—in fact, of the two it is easier because it does not want timbering. It is simply an arch upside down; and therefore the department did their duty in paying at the same rate for the invert as for the arch. The extra work in the side-walls was paid for at the rate of £1 14s. per cubic yard, which was the contract schedule rate for such work. [Contractor's schedule handed in.]

The contention of the department in reference to the tunnel, as in the case of slips, is that the contingencies that arose were clearly provided for in the contract signed by the contractors. That contract says that if any extra works are required, however extensive or of whatever nature, the contractors are to carry them out, the price to be paid for such work being the price shown in the schedule; but if any work arose of a different nature from that described in the schedule, then the Engineer-in-Chief was to fix the price for it. The prices to be paid were in that schedule; and the department contends that the nature of the work that arose was precisely of the same description as that provided for in the plans and specification. If the contractors had not made the allegations they have with regard to Inspector Witheridge, I need say no more, because their claim for slips is clearly barred by the provisions of the specification, and their claim on account of the tunnel has been met by the work done being paid for as an ordinary extra, which is clearly provided for by the general conditions. The contractors, however, have urged that Inspector Witheridge interfered with them unduly. In fact, after all the allegations that have been made with regard to Inspector Witheridge, I think the members of the Committee will be rather disappointed to find what an exceedingly mild-mannered man Inspector Witheridge really is. But in the first place Mr. Witheridge had no power to interfere if the contractors followed out the correct method for carrying out the work. I believe the contractors have stated the opposite, but I challenge the contractors to put their fingers on the clause in the general conditions or specification that gives the overseer power.

Mr. Blow proceeded to quote clause 4 of the general conditions in support of his contention. Having had his attention drawn to clause 11, subsection (2), he read this also, and said in reference thereto: I am glad Mr. McKenzie has drawn my attention to this clause. There is clearly negative power given to the overseer there, but he is not to direct the contractor in his work. He is responsible to see that the contractor puts in piles of the proper length, and drives them to the specified depth, and no centres for arches or staging are to be removed until he is satisfied that the brick- or concrete-work is sufficiently set. The overseer measures the pile before it goes in, and stands by perhaps when it is driven in, but there is no hint of a power in that subsection that gives the overseer the right to direct the contractor how he is to carry out his work.

Having also read subsection (3), bearing on the same point, Mr. Blow continued: The Resident Engineer therefore has some power in this direction, but the overseer has no power, and for the contractors to say that they were compelled by an order of the overseer to either erect their framing or to remove their framing in any manner that was contrary to their own judgment and experience is the sheerest nonsense. The overseer had no power to do that whatever, and even if he had a contractor that works under the Government is in the grandest position that it is possible to be as regards the number of appeals that he has. If he is dissatisfied with the overseer he appeals to the Resident Engineer, who can be brought to the works at a few hours' notice; if not satisfied with him he can appeal to the Engineer-in-Chief; failing him the Minister for Public Works, then the Premier, and finally he can petition Parliament, and his appeal comes before this

Committee. So that for a contractor to urge that he is absolutely bound to carry out the orders of one individual man—and that man in a subordinate capacity—is nonsense, because he can appeal over that man's head in half a dozen directions. The Inspector will be called directly, and he will give evidence that he did not order the removal of these timbers.

Though a good deal has been said about this timbering, I do not think the Committee yet realise exactly how the matter stood. Something was said as to the timbering being ordered to be removed before the key of the arch was put in; and some members expressed surprise at this, because they thought the arch would possibly fall. But members did not realise that there are two sets of timbers. The timber referred to was not the set that supported the arch. There was first a set of heavy timbering which supported the material in which the tunnel is excavated. Then there is another set of timbering altogether, which supports the brickwork. [Producing a photograph of the timbering in the tunnel]: Here is a photograph. This shows the poling-bars—the longitudinal bars which support the roof of the tunnel. After the struts on which these bars rested originally had been taken away this underneath frame was put in, and that is the frame on which the arch was built, and that frame is referred to in the specification as the one that the contractor was not empowered to remove until some days after the brickwork had been put in, and not removed at all except on the sanction of the overseer. [Referring to another drawing]: This drawing illustrates the method of timbering adopted when the contractors first put in a ground-sill or sole-piece. This piece of timber was persistently put in just in the line of the invert. The department urged and urged at the time that it should have been below the invert, so that this brickwork could have been constructed continuously through there without coming into contact with that sill. [Pointing to the plan]: The sill should have been down here. This perpendicular leg should have been through the invert. That was all the more annoying because this great piece was left out of the invert, which materially weakened the structure. On that sill they founded two upright legs. Then there was a main sill that ran across the excavation. These are the poling-bars—very heavy bars that run lengthwise along the roof of the tunnel and support the ground that has been excavated. In this case as the ground ran they put in slabs above the poling-bars like weatherboards, and thus roofed it completely in. Between each poling-bar there was a round chock put in, so that we had a complete arch that rested on solid excavation here and solid excavation there, and that arch was complete in itself without the assistance of these legs. They were put in as additional support. There was a tom put in to support every one of these poling-bars. The poling-bars used by the contractor in this contract were for the most part very long, running up to 30 ft. in length, and generally being about that length. The contractors in trying to get in the poling-bar for the next section beyond, when they had completed one section, persistently and regularly every time—themselves, without any assistance or suggestion whatever—took out that principal tom. Not only did they do this without suggestion from the department, but they did it in defiance of the instructions of the department. That was the mainstay of the crown bar, and they persistently took that tom out to get in the crown bars for the next length. They were round bars long enough for two lengths. When that was taken out and the brickwork built they put the crown bar on top of the brickwork, generally only a few inches on it, and that brickwork, quite green, had to stand the strain of several feet of this crown bar. The lengths were 11 ft. One end would be supported at a distance of 11 ft., and the other end supported on this brickwork, and the whole weight came half on the new brickwork and half on the legs. The strain was so great that it positively flattened the arch. The contractors removed the packing at the sides, and we found it bulged out quite sufficiently to make the side toms perfectly loose—you could take them out with your hands. As to whether they were ordered out or not is a matter of no consequence, because they were perfectly loose. And this is the origin of the statement given by the contractors that Witheridge ridiculed the idea of stress being on these timbers. There was no stress on these timbers. The arch completely bellied at the top and thrust out the shoulders, so that these timbers had no weight to carry. This main sill was put in in two pieces to facilitate it being drawn out. The department contended that when the brickwork was carried out up to the level of this sill, which rests on the brickwork, that the brickwork should not have been completed round the arch while that sill remained in. It was a very large piece of timber, 12 in. square, and as the brickwork above the top had to be gathered it left an opening of some 20 in. by 12 in. in the side of this wall—an opening which unquestionably weakened the wall, and which the department thought it highly inadvisable to leave; hence the opposition of the Inspector to that sill remaining in. However, that sill, of course, could easily have been cut off on the line of the brickwork here, and that would have obviated building it in. It, perhaps, would have rendered it useless for the next length, but that would have meant but little extra expense, because the timber in this case was of no particular value, as the railway ran through a forest; and, to show that the contractors thought so, they left these poling-bars in repeatedly. [Pointing to the plan]: Here is the inner frame on which the brickwork was constructed. This is a sill running across a punching-piece from the lower sill, the punching-pieces resting alongside the brickwork to just about the springing of the arch, and this was flanked with pieces that we call "lagging" up to about this point near the crown of the arch, but just leaving room for the key. This piece was left open for the contractors to work in in getting in the key. After completing the arch and the brickwork entirely and efficiently this piece was put in, and that frame was not removed until the brickwork was properly set.

4. *Mr. Wright.*] You have not informed the Committee at what intervals these sills were placed?—I have another drawing to illustrate that. [Producing it.] On this drawing is represented the work as it was left just before the fall took place. The contractors had been bricking up to a certain point. A short distance beyond this point there was a set of legs duly set, and crown-bars running along here. The excavation then was only just beyond this length, and there was a false sill carring a short strut which supported the overlap of the poling-bars from the previous section. The contractors, in the course of their excavation, took that sill away, against the

advice of the department, and, of course, they had to remove this other one. A new crown-bar had been put in, which extended over 11 ft., and went back 12 in. on the new brickwork. With the exception of that one through bar the other bars had an overhang of 8 ft., which was entirely unsupported. The contractors were remonstrated with for leaving the work in this way, and were told——

Mr. McKenzie here objected to Mr. Vickerman, one of the department's witnesses, remaining in the room listening to what was said.

Mr. Graham also strongly objected; and

Mr. Blow replied that he would have requested Mr. Vickerman to withdraw long before if he had known there was any objection to his being present.

The Chairman ordered Mr. Vickerman to leave the room at once, remarking that he was not aware that it was Mr. Vickerman who was present.

Mr. Blow: In any case I should like to say that I consider there was no impropriety in his being here. I cannot give evidence personally on this particular matter, and I was merely illustrating the nature of the evidence that was to be called. I think there has been great misapprehension in the minds of the Committee as to the way in which the timbering was done.

The Chairman: You were stating that certain timbers had an overhang of 8 ft., and were unsupported, and that undoubtedly referred to this particular case. You did not refer to general principles.

Mr. Graham: Mr. Blow is simply taking up time in giving us evidence that the overseers and Engineers on the spot could give better.

After some further discussion, Mr. Blow was allowed to proceed.

Mr. Blow: My only object was to enable the Committee in examining the Engineers and overseers to know a little more about the matter than they did. I am convinced that the impression in the minds of the members of the Committee before was that the timbering that was removed was the timbering that supported the arch, because some of the members expressed a wonder as to how the arch could stand. I wanted to explain to the Committee, and give them a general knowledge as to how the timbering stood. I had no desire further than that. [Continuing]: I think I have now practically done. As I said before, if it had not been for the allegations made with regard to Inspector Witheridge I think the contractor's claim must fail, on the ground that both their claims —the slips and the extra work in the tunnel—are included in their contract. But the allegation made with regard to Inspector Witheridge is important in case it might be held that the department is liable, and, further, as regards the man's reputation as well, some consequence is attached to it.

5. *Mr. Wright.*] What were the amounts of the other tenders sent in?—The complete list of tenders of the work is as follows: J. McLean and Sons, £26,616; J. Cheyne and Co., £29,783; Jones and Peters, £30,284; M. Danaher, £31,870; J. Saunders, Wellington, £32,520; J. and A. Anderson, Christchurch, £33,227; Coates and Metcalf, £33,244.

6. *Mr. McKenzie.*] What is the Government estimate?—I am not sure that there was a Government estimate; there was no estimate made in the head office. Mr. Hales was District Engineer in Auckland at the time; he will be under examination directly, and he can say if there was any local estimate.

7. *Mr. R. D. McLean.*] How do you find out the nature of the soil?—The nature of the soil is generally apparent without much difficulty. Sometimes, of course, we are deceived, but, if so, the contractor has to run the same risk that the department runs. If we run the risk of having to pay too much he runs the risk of coming down too low.

8. Does the department give information as a rule?—None but that shown on the drawings.

9. It was nonsense to say the contractor was bound by the Resident Engineer?—I say he is bound by the Engineer, but not by the overseer.

10. Then, the Engineer can make him alter the work in any way?—Yes; but if the contractor is not satisfied with the directions he gets from the Engineer he can appeal to the Engineer-in-Chief.

11. *Mr. Wright.*] At what date did the fall take place?

The Chairman: On the 20th January, 1893—eleven days after the resumption of work—on the 9th January, after the Christmas holidays.

12. *Mr. Thomson.*] Did I understand you to say that the nature of the excavation was generally apparent from the appearance of the surface?—Generally, and from one's general knowledge of the country. If you were in limestone country, for instance, you would naturally expect before you got many feet down to come into limestone, if a sandstone, country sandstone, and so on.

13. As a matter of fact, you put down a bore and found sandstone, but the material was very different indeed in the tunnel?—Exactly; but the same thing might have occurred even if we had bored exactly on the line of the tunnel.

14. But is not it rather stretching a point to say that the nature of the excavation under the surface was generally indicated by the character of the surface?—I do not think so.

15. *Mr. Flatman* [pointing to a plan that had been produced by Mr. Blow]: Is that a departmental plan?—That plan was prepared by the man who is going to swear to it—Mr. Vickerman.

16. Are these struts in position?—I have no knowledge. Mr. Vickerman, who prepared the plan, will say.

17. *Mr. McKenzie.*] Can you give us the Government estimate of this contract?—I have already looked, and find there was no Head Office estimate.

18. Do you mean to say that the Minister for Works asks for contracts without an estimate from his Engineer?—I can give you a telegram—or, rather, Mr. Hales can when he is examined —with regard to a rough estimate.

19. When you were referring to these plans you endeavoured to get the Committee to believe that the Government were aware that the ground would be of a soft nature?—No, quite the con-

trary; I said the Government was not aware what the nature of this ground would be, and therefore we provided alternative sections, one for hard ground and one for soft.

20. You think you can tell the inside from the appearance of the surface?—Well, we are sometimes deceived.

21. But you told the Committee that the Government contemplated soft ground when they provided the plans?—Two alternative plans—one for hard ground and one for soft.

Mr. McKenzie: These plans have been provided for ten years past, so that reference to these plans means nothing. There was another point Mr. Blow made. First of all he endeavours to show that the Engineer can compel the contractor to do any extra work he likes at whatever price he likes.

Mr. Blow: I think Mr. McKenzie is not interpreting my answers fairly. I must protest, because an effort has been made to put words into my mouth that I did not use.

Mr. McKenzie: As long as he admits that the Engineer conferred with the contractor that is all I want.

Mr. Morrison: He said at the rates set down in the schedule.

22. *Mr. McKenzie.*] I wish to ask, then, can the Government Engineer compel contractors to continue a tunnel through dry ground or otherwise, or do any other difficult work, at whatever price he chooses?—The line of railway is shown on the plan. I do not go so far as to contend that the Engineer can compel the contractor to construct a line of railway on a different route altogether.

23. Suppose you had a tunnel under a river and you afterwards wanted to alter it to a bridge, do you think that your Engineer could compel the contractor to do it at any rate he chose?—Really the question is so extraordinary—a tunnel converted into a bridge—that I think I need scarcely answer it. My reply is: Certainly not at any price the Engineer likes to offer.

24. Providing the work is similar to that provided in the schedule he can make a contractor do any work as provided at a similar rate?—Yes; and if the work is of a different nature from that shown on the contract plans he can compel the contractor to do it at the price fixed by the Engineer-in-Chief.

25. You said that if the contractor is dissatisfied with the overseer he can appeal to the Engineer, then to the Engineer-in-Chief, from him to the Minister for Public Works, from him to the Premier, and finally to this Parliament. Have you ever known any case in the Public Works Department in which a contractor has made all those appeals, and ultimately come to this House and got compensation?—I have known of cases where contractors have appealed from the local Engineer to the Engineer-in-Chief, and again to the Minister.

26. And afterwards to Parliament?—Yes, and afterwards to Parliament.

27. And then got compensation?—Not as a rule got very much, but I have known cases where the contractor has got something.

28. Do you remember a case I had in 1889 with the Public Works Department?—I do not.

29. Do you remember the case of Forrest and McGee?—Yes.

30. Did they not appeal to the Engineer-in-Chief and then to the Minister and the Premier?—I do not know about the Premier, because I believe at that time the two offices were held by one Minister.

31. And they appealed in a petition to this Parliament, and ultimately got compensation?—They got something, but nothing like what they claimed.

WILLIAM HENRY HALES, Engineer-in-Chief of Public Works, examined.

32. *Mr. Blow.*] You are aware the Makarau contract was let to Messrs. McLean in March, 1890?—Yes.

33. And the date fixed for the completion of the contract was 1st March, 1892?—Yes.

34. Do you know when the works were actually completed?—On the 13th March, 1897.

35. You are aware of the provision in the specification with regard to slips: I allude particularly to paragraphs 2 and 6 in clause 8 of the specification?—Yes.

36. Did you see any of the slips that took place on the contract?—Only one. I might point out that I left Auckland a short time after this work had been commenced, and came to Wellington, but I visited the works twice afterwards.

37. Were you District Engineer of the Auckland District at the time this contract was let?—I was.

38. About how long did you remain in charge of the district afterwards?—Only about a month.

39. You left then to come to Wellington?—Yes.

40. To do what?—To act as *locum* to Mr. Blair, who was ill.

41. And shortly after Mr. Blair's decease you were appointed Engineer-in-Chief?—I was appointed Acting Engineer-in-Chief before his decease.

42. And in due time the appointment was confirmed?—Yes.

43. When you left Auckland who succeeded you in charge of the Makarau contract?—Mr. Vickerman, who was then Assistant Engineer.

44. Was he afterwards raised to the position of Resident Engineer?—Yes.

45. And he still holds that position?—Yes.

46. Who was the officer in charge of the work at the commencement?—Mr. John Witheridge.

47. Do you know how long he remained as officer?—Till the works stopped at the tunnel when the slip occurred; and for some time afterwards nominally in charge, though, of course, the works were not going on.

48. He was afterwards moved to Otago?—To the Otago Central Railway.

49. Do you know why he was sent down there?—Merely because we wanted a skilled inspector there for certain important works that were going on.

50. Is it correct that he was sent to the Otago Central Railway on account of his being a specially skilled inspector?—Yes.

51. Indeed, he was selected as about the best man in the department for the work?—Just so.

52. As regards the slips, from your inspection of the one you have seen, and from your perusal of the engineers' reports giving particulars of the slips and of the nature of the ground, are you of the opinion that they are due to steepness of slope?—I certainly consider steepness of slopes had nothing to do with the slips.

53. On the other hand, do you think they were due to deficient drainage?—Well, I cannot speak from personal knowledge. I have only seen this one, and that was simply an ordinary fall of a small quantity of earth.

54. A "pocket," so to speak?—Yes; a lot of stuff came down just off the point of the cutting.

55. You are familiar with the plans and specifications of the Makarau contract?—Yes.

56. Can you tell the Committee whether there is anything on the plans or in the specification with reference to borings?—Nothing at all on either plan.

57. Is there anything in the specification or on the drawing to indicate the particular nature of the soil the tunnel would pass through?—Nothing at all.

58. Is it usual in Government specifications to indicate this?—No; I have only known one case where borings were shown for a tunnel in my experience of thirty-six years. That case was the Catlin's River Tunnel.

59. Then, we may safely come to the conclusion that borings are not usual in New Zealand?—Just so.

60. In Australia are they usual, do you know?—Not for tunnels, only for convenience. We bore for convenience here—not for the information of contractors, but for the information of the Engineers—to find out the structure he has to build on, so as to enable his design to be carried out.

61. You mean to say it would not be safe to build a bridge unless it was founded on rock or sandstone?—Yes.

62. But for a tunnel it is not usual to bore?—No.

63. As some questions may arise in this matter as to the qualifications of Mr. Vickerman, will you tell the Committee what you know of his qualifications?—He is a trained Engineer, trained under the Public Works Department, and he has had, I think, about eighteen or nineteen years' experience. He was here almost from the first, and he has all the time been employed on important works. First, I think he was employed in Otago as a cadet, and, as an Assistant Engineer, he was in charge of works on the Lawrence Railway, and generally on the railway-works in the Otago district.

64. Do you know whether he had ever had any experience in tunnelling?—Yes; he had charge as Assistant Engineer—that is, he had executive charge—of the Round Hill Tunnel on the Lawrence Railway.

65. That was before he went to Auckland at all?—Yes, it was. He went to Auckland about the year 1878.

Mr. Graham here objected that the evidence now being given was of a secondary nature, as when Mr. Vickerman was called he would himself be best able to furnish answers to such questions.

Mr. Morrison, however, held the contrary opinion, saying that if the qualifications of Mr. Vickerman were called in question, they had now got the authority of the Engineer-in-Chief in the matter; the man himself would not be an accepted authority.

The Chairman ruled that the witness could proceed as before.

66. *Mr. Blow.*] Mr. Vickerman was an Assistant Engineer under you when you were District Engineer in Auckland?—Yes.

67. Therefore you have had exceptional opportunities for observing his capabilities?—Yes.

68. You had no hesitation in recommending Mr. Vickerman to be made Resident Engineer in charge of the Auckland section?—None whatever. Mr. Vickerman is one of the most qualified practical engineers in New Zealand. He thoroughly understands his profession, and his experience has been so large that he is thoroughly competent to take charge of any work, no matter whether it be railways, roads, buildings, or public works of any description.

69. Then, if any imputation of inexperience on Mr. Vickerman's part has been made before the Committee it is unjustifiable?—It is.

70. Do you know anything of Inspector Witheridge?—He was Inspector under me all the time I was in Auckland—about eleven years.

71. Had you any opportunities of observing his qualifications?—Oh, yes. When I first went to Auckland he was Inspector on a contract which was right below the office, and I saw him almost every day. I am quite prepared to say that Mr. Witheridge is a competent man.

72. Is he acting as Inspector under the department now?—Yes.

73. And you have not the slightest hesitation regarding him in that position?—Not the slightest.

74. And if a contract required an Inspector would you employ him?—I would employ him without the slightest hesitation.

75. *Mr. Crowther.*] We heard just now that there was a claim of £750 for slopes—extra work done—and Mr. Blow has got Mr. Hales to say that he is only conscious of one slip called a "pocket" slip. We know sufficient now as to what the specifications are: that the greatest slope—if I am right—is 1 in 1½——

Mr. McKenzie: That is in sand.

76. *Mr. Crowther.*] The greatest slope, then, is 1 in 1 and 1 in 1½, or 1 in 2 generally, Mr. Hales. Supposing this "pocket" slip had been at a slope of 1 in 3, would it have slipped?—I would not guarantee that it would not, and I would not like to say that it would.

77. Is it probable it would have slipped if it had been 1 in 3?—Yes, it is probable. I have seen a slip of 1 in 10, and even of 1 in 50.

87. But you saw this slip?—Yes.

89. And after seeing this slip you would be conversant with the nature of the ground, and would be able to judge from your own personal observation?—Yes.

80. And is it a speciality in connection with this claim of £750 and these slopes in the contract that if a slip is due to steepness of slope, then you admit the contractor can claim in the terms of the specification?—Yes; that is, if the Resident Engineer thinks so, and he orders this material to be removed.

81. But, having seen this slip, in your opinion, if it had been 1 in 3 would it still have come down?—I would not like to say that it would not or that it would. Besides, I do not think any Engineer would be justified, because a lump of earth fell out of the face of a cutting, to lift probably thousands of yards of earth, and probably go into an immense expense to slope this cutting at a greater angle, merely for the sake of a small slip falling out of part of it.

82. Hence that justifies my question. I may infer from your answer that by making this slope 1 in 1½, that even if he had paid for this small slip, you would have saved the removal of thousands of yards of earth you have mentioned you would have had to pay for being cut out in order to have this slope?—Not at all.

83. *Mr. Morrison.*] I understand that at the time this contract was let you were Resident Engineer in Auckland?—District Engineer.

84. Thoroughly conversant with all the circumstances surrounding this Makarau Tunnel?—So far as it had advanced during the time I was in Auckland.

85. Tenders had been accepted and the work commenced?—Yes.

86. When you were in Wellington as Engineer-in-Chief it would still be your duty to keep a careful eye for the Public Works as to how the tunnel was getting along?—Yes.

87. I suppose any communication forwarded to you by Mr. Vickerman, the Resident Engineer, you would have the opportunity of reading and dictating a reply to?—Yes.

88. A communication was forwarded to Mr. Vickerman from the department in 1893, saying that owing to exceptionally heavy rains and gales there had been slips, and the embankments had suffered very much, and stating that it was very hard on the contractor. That occurred in 1893?—Yes.

89. What was the reply sent to that?—I do not think there was a reply sent, because, if my recollection serves me right, I went to Auckland at that time.

90. And you did not think it advisable for the department to acknowledge that officially?—I do not say that. I have a distinct recollection of going to Auckland at that time, and anticipating the reply to the Resident Engineer.

91. Then, as far back as 1893 your attention was drawn to the matter of the slips?—Yes; my attention was distinctly called.

92. Then, there was the communication which the Resident Engineer forwarded to Wellington on the 13th January, 1893, stating that the contractors were not responsible for the very large slip that occurred at about that time, and that the department replied on the 15th January stating that the slip was caused by deficient drainage. How was the department to know that that slip was caused by insufficient drainage when the Resident Engineer on the spot forwarded you a communication telling you that the contractor was not responsible?—There is somewhere a letter in connection with this, in which the Resident Engineer said there was a collection of water above this slip, and the slip itself was full of water.

93. Yes; but the water may have gathered in some cavity above ——

Mr. Graham here rose to a point of order, objecting that these sort of questions were irrelevant.

Mr. Flatman also thought they ought to confine themselves more closely to the points at issue.

The Chairman ruled the question out of order.

94. *Mr. Wright.*] In your capacity as District Engineer in Auckland had you anything to do with putting down the one particular bore in this ground that was mentioned?—The Assistant Engineer put down the bore.

95. But, you being District Engineer, the Assistant Engineer was under your orders?—Yes; but I did not instruct him. He was instructed to make a survey, and in connection with this survey he put down the bore.

96. Had you anything to do with the specification?—No; the specification was drawn up in Wellington.

97. You know that the bore was put down?—I heard so; of course, the surveyors sent the information.

98. What was the nature of the ground shown by that bore?—Nothing shown; the note simply said that he had found sandstone at 10 ft.

99. He did not go beyond that, but he proved that the substratum was sandstone?—Yes, as close as he could tell from a small bore.

100. Do you think the department was at all guided in the preparation of the plans by the fact that the bore showed sandstone?—I am certain that they were not, because the information was never sent to Wellington at all; it was looked upon as quite local information.

101. Then, the system of the department is to take as little responsibility as possible, and throw the responsibility of the tunnel on the contractors?—Pardon me; no. They do not reckon to give information to the contractors. They may give him all the information there, but they do not guarantee the information. They give him his plans, and there is the country to look at; but they do not give him any other information.

102. You say that the specification was prepared in Wellington, and, although the result of the bore was known in Auckland, that that communication was not made?—It was not on the line of the railway, and therefore was no guide.

103. That is beside the question: it was within a chain of the line of railway, and that is a matter of opinion?—That was two years before this tunnel was started.

104. Two years would not change sandstone into clay?—No.

105. Where were the boring tools obtained from?—I could not say that; we always keep two or three sets of boring tools.

106. It is the practice of the District Engineer, I suppose, to get information and lock it up—not forward it to head-quarters?—This was not intended to be given as information.

107. Then, what was the object of the bore?—The surveyor wanted to satisfy himself as to what kind of country he was in.

108. As to whether the tunnel was going through sandstone rock, or some other rock, or clay?—Yes.

109. So much for the bore. In that letter of the 13th January, 1896, the District Engineer expressly states his opinion that the origin of that slip that took place was due to no fault of the contractor, but you as Engineer-in-Chief override that opinion altogether?—I do.

110. By your indorsement on his letter you say that it is a charge for the contractor?—I say it is not due to steepness of slope, that is all.

111. It was not due to steepness of slopes so long as the clay was free from water?—Whether free from water or not, it was not due to steepness of slope; it was charged with water, and the water remained.

112. Dry clay may stand like a wall?—That is so.

113. Clay charged with water will not stand?—No; the water floats it away.

114. And you think it a fair thing to charge this exceptional risk on the contractors?—I do not see how the Engineer can get out of it.

115. I know the specifications. They are so drawn that the contractor has no chance in equity i he has not equitable officers to deal with?—The Engineer is bound by the terms of the contract just as the contractor is. He cannot give away the public money when the specification says he shall not.

116. We have been told by Mr. Blow that there was no estimate prepared in Wellington as to the cost of this tunnel. Did you, as District Engineer, prepare an estimate?—There was a rough estimate. We did not prepare an estimate except for our own information, because it was customary to get the contracts out in Wellington previously.

117. That method was not observed in this case. A rough estimate, you say, was prepared by yourself?—Yes.

118. Can you tell the Committee what the amount of that estimate was?—I could not; I have not got it with me. It is in the Auckland office.

119. Will you furnish the amount?—Yes, I can furnish the amount.

120. *Mr. Graham.*] Mr. Witheridge was your Inspector in this contract at the time of the big slip in January, 1893?—Yes.

121. And he had been since the commencement of the contract, nearly three years before?—Yes.

122. How long did he remain there after that slip?—I cannot say from memory.

123. Six months?—I should think so.

124. He was Inspector there for six months afterwards, and then he was removed?—Yes.

125. What was the reason of Mr. McGonagle taking his place?—Mr. McGonagle was another Inspector at Maunganoho, at the North Island Railway, and he was considered a good man to take Mr. Witheridge's place.

126. More fit than Mr. Witheridge?—No. Mr. Witheridge was wanted to go to Otago for a special reason of the department, and Mr. McGonagle, being a fit man, was sent for to take his place.

127. With regard to this tunnelling work, did you know anything relative to the experiences of the two men?—I know very little as to Mr. McGonagle's experience.

128. You did not send him there because he had particular experience of this kind of work?—Not at all.

129. Then, you do not trouble to find out what has been the experience of Inspectors when you send them on these particular jobs?—We do not go into the man's history, particularly if the department has known him for a year or two.

130. So long as he is an Inspector you do not trouble to find out his capacity?—Oh, yes, we do.

131. Do you know anything of the relative capacity of these two men?—No; they are of different professions—one is a mason and the other is a carpenter.

132. But with reference to their experience as to the kind of work you had for them to inspect. Surely that would be an important thing to attend to—to send an experienced man to a particular kind of work?—That is why we sent Mr. Witheridge to Otago—because we knew he had experience in the kind of work he was required to supervise there; and that is why we sent Mr. McGonagle—because we knew he had experience in that class of work. The whole thing was arranged in shifting round the Inspectors, as we do occasionally, so that they should fill the hole they were properly fitted for.

133. But Mr. McGonagle has been spoken of as a man of special experience in this class of work?—He has had special experience of tunnels, but not much more than ordinary people.

134. Do you know how many tunnels he has inspected?—I know he has inspected three or four tunnels on the Gorge Railway, but I do not know whether he was the only Inspector employed there.

135. Do you know how many he has had to inspect in New Zealand?—I do not know.

136. If he had said he had had ten, would you say he was wrong?—No, I could not say. I may say this contract did not consist of a tunnel only.

137. We know that. What I wanted to get at was: Mr. Witheridge was not removed from this contract at the time the contractors got into an exceptional difficulty, and Mr. McGonagle was brought to look after the superintendence of that work to its completion at a difficult time. I know he has had a great deal of experience in this kind of work, and I wanted to ascertain how much

experience Mr. Witheridge had, if you are able to state it to the Committee?—I may explain that the work we wanted an Inspector for did not consist wholly of this. It consisted of general work in the Auckland District—buildings, railways, roads, and, in fact, any works that might be in progress there. Mr. Witheridge was not employed specially at this one thing.

138. But at this difficult period of the work Mr. Witheridge was sent away and another man came with large experience and carried the work successfully through to an end? I do not think Mr. McGonagle had anything to do with carrying the work through. As an Inspector he would simply be there and see the work done; he neither directed nor had anything to do with the actual work going on.

139. I quite understand that; but he undertook the work at a difficult time and inspected it until the end?—Yes.

140. And saw it properly carried out?—Yes.

141. And he was brought inin place of Mr. Witheridge, who was removed? And he was the Inspector from that difficult period until the end of the work?—But he was not brought there specially in connection with the tunnel: that was a secondary consideration altogether. It was only part of the work he had to attend to in the Auckland District; and the contract was not going on at the time the change was made.

142. *Mr. Flatman.*] Then, the position held by Mr. McGonagle and by Mr. Witheridge on this particular work was in both cases of the same class?—Yes.

143. Do you consider Mr. McGonagle was more experienced in tunnel-work than Mr. Witheridge?—I do not think Mr. Witheridge had had much experience in tunnel-work; Mr. McGonagle I know had.

144. You practically admit that Mr. McGonagle was the more experienced man in tunnel-work of the two?—I believe he had been more on tunnel-work than Mr. Witheridge.

145. Was not this in your mind when you changed these men?—Not at all—never thought of, because this work was standing still. The Inspector was not sent there at all to this work. When the work commenced again he, being there in the Auckland District, was put on as Inspector. This particular work had nothing to do with the change at all.

146. You have stated to the Committee that the borings are put down for the information of the Engineers in making calculations?—Yes.

147. What information was gathered from this particular boring that was put down?—The information gathered was that there was sandstone rock at 10 ft. from the surface.

148. But the boring was not on the line?—This boring was made two years before.

149. You took no notice whatever of this boring then?—No.

150. What was the reason then of putting down the boring?—To inform the Engineer what kind of ground he had under him. This survey was only a trial survey.

151. You admit it was the correct thing to put that boring down?—I do not admit that at all.

152. You say you got sandstone 10 ft. down in this boring?—That is what the note says.

153. What was the distance between the level of where this boring was started and the lower level of the tunnel?—I could not say that without the section was developed. The country is very uneven there; you could not tell at all.

154. I do not see what information you got at all if you did not know that?—We only went to find out what was under the surface.

155. Then, if you found out what was on the top you could judge what was at the bottom? —Oh, no, we could not. We were guided altogether, in forming this advance-plan, by the appearance of the surface.

156. I understood you to say that very few borings were put down in New Zealand?—Yes, for tunnels.

157. Have shafts been sunk instead of borings being put down?—Not down to the level of the tunnel.

158. They have been sunk, then, to gain information?—Only down to the rock, to see at what depth the rock was.

159. If you found no rock you would never have stopped sinking, then?—We would not have sunk very far in that case, any way.

160. How long had the cutting that slipped—at the north end of the tunnel, I think—how long had the work of that been finished before the slip at the time of the heavy rains?—About three years, I should think.

161. In your opinion that slip was entirely due to the weight of the water?—To the accumulation of water, I suppose, as much as anything.

162. And could that water have been prevented from settling at the back of it if proper drains had been cut?—I could not say that, because I did not examine the ground at the time.

163. *Mr. Lawry.*] It has been alleged that Mr. Witheridge unduly interfered with the contractors. Is that so?—I am not aware of it. I had no intimation from the contractors or anybody else about it.

164. Did he ever interfere except on minor questions on his own responsibility?—We never got any report as to the interference of Mr. Witheridge with the contractors.

165. Is it not almost an invariable rule that an Inspector derives his instructions from his superior officer?—That is so.

166. And was there any departure from that general principle in connection with the construction of the tunnel?—I should think not.

167. Then the heads of the department—we will say you or Mr. Blow—are responsible for everything Mr. Witheridge did?—Yes, that is so, in accordance with the terms of the contract.

168. *The Chairman.*] Do you know whether the petitioners were furnished with copies of the general conditions and specification before tendering?—These were exhibited at a place where the intending contractors could see them.

169. Where was the contract let, in Wellington or in Auckland?—It was accepted in Wellington, but the plans were deposited in Auckland and the other principal towns of the colony.

170. The plans were open for the inspection of the petitioners?—Yes, or any one else.

171. *Mr. M. McLean.*] In regard to the slip: In that letter that has been already quoted there is a suggestion, I think from Mr Vickerman, that a drive would be necessary?—That is so.

172. Supposing you had carried out his suggestion—it is understood that the Resident Engineer is in charge and is sole judge as to the merits and demerits of the work—suppose he had suggested it should be put in, would you consider we had to do that at our own expense?—No.

173. Was not that evidence enough that the ground would not stand—that there was something required to keep it up or to get the thing done in the proper way?—You had to get rid of the water out of the slip so that it would be workable.

174. But in reference to this suggestion. You did not take any notice of that suggestion at all, but threw the whole onus on the contractors?—I said anything with regard to the steepness of slope, &c., to be done by the contractor.

175. *Mr. McKenzie.*] You were District Engineer in Auckland, I believe, at the time this contract was let?—Yes.

176. Is it not the duty of the District Engineer to provide information?—No, it is not a practice.

177. I want to know, is it customary for the Minister for Public Works to have a departmental estimate?—No, it is not.

178. Have you got a file of papers in connection with this contract with you?—Yes.

179. Would you say there is no departmental estimate among that file of papers?—There is a telegram from the Acting Engineer in Chief, Mr. W. Blair, to the District Engineer in Auckland, "*Re* Makarau Tunnel—kindly wire your estimate." That was to me.

180. And the reply sent was?—£27,146.

181. And what was the contract price?—£26,716.

182. You are responsible for the way the contracts are done? If there is any fault found you are the principal person responsible?—I am not responsible for the making of them.

183. You are also responsible for the departmental report in connection with the petition?—I wrote it; it originated from me.

184. So that you still maintain that this is a correct report of the position of the contract before it came before this Committee?—Yes, I was reporting then not on the contract but on the petition.

185. I suppose you read the petition. There is a miner sill referred to in the petition. Can you point it out there?—In what clause in the petition is the miner sill mentioned?

186. About the fourth line in clause 10. That is the sill the petitioner complains that the Inspector compelled him to remove?—That is so.

187. If you look at your own report you will find that the very sill complained of is still existing in the tunnel?—That refers to another miner sill.

188. Of course you deny that "Sims's Practical Tunnelling" is a standard work on tunnelling at the present time?—I admit that it is a standard work. As a modern work it would be scarcely acceptable, but it is still a standard work.

189. And how do you define a "miner sill"?—Every sill that is put in by a miner is called a "miner sill," simply to distinguish it from the central sills.

190. There is only one sill described by Sims, and that is a miner sill. Are you aware of that?—Sims describes a "miner sill" as a sill put in by a miner.

191. In a tunnel where there is only one central sill, he describes that as the miner sill?—Yes; but if there are two or three he also calls them miner sills.

192. Oh, no! That central sill, any way, is what Sims describes as a miner sill?—Yes.

193. But, however, you do not maintain that portion of your report now—that that sill is still in the tunnel?—I was referring to a different sill altogether.

194. Do you still maintain that Mr. Witheridge was justified in compelling the contractors to remove that timber-work out of the tunnel in bad ground?—Where was this?

195. At any time when the ground was bad. It does not matter where?—If the bars and struts were properly put in that could be removed.

196. But I want you to tell the Committee whether you think Mr. Witheridge was justified in insisting on the contractors taking away that sill where the ground was bad?—If he saw any danger to it he was not.

197. Do you think he was justified in insisting on that timber being removed?—Yes; provided the other proper supports were there.

198. What I want to find out is if you still maintain that the Inspector was justified in insisting on the contractor removing these sills and timber-work in bad ground?—I do not know what sill you mean.

199. I mean that sill across the middle of the section—the miner sill?—If the thing was properly prepared and carried out in the proper manner, he was perfectly justified in ordering their removal.

200. Is it your opinion that it was a safe course to pursue?—I think so. I am quite certain of it.

201. I think you told Mr. Morrison an Inspector has no authority to interfere with a contractor in carrying out the work?—All he has to do is simply to warn him, in case he saw him acting wrongly.

202. And no right otherwise?—No.

203. Then, was he justified in ordering that sill to be taken out?—If allowing it to remain was injuring the work—certainly.

204. Would it have injured the work in any way if it was left there until the sill was passed by the brickwork?—Yes.

205. How would it injure the work to leave that sill there?—Because it would leave a big cavity in the brickwork.

206. Of what size?—About 20 in. by 18 in.

207. Is there any reason why that could not be just as well filled up afterwards?—It would not be so well filled up afterwards. Besides, it is the custom of the engineers to see their work carried out straight.

208. Was this engineer in charge of a tunnel before?—I do not know.

209. Is it good engineering to have these sills taken out in dangerous ground?—Yes, I think so, because the ground should be supported on the timber arch with poling boards and with struts and bars.

210. Were you in charge when the Manawatu Gorge tunnels were put through?—For a time I was.

211. Were the sills taken out or left in there?—I do not know now.

212. Coming back to the Makarau Tunnel: After the break down, were the sills taken out or left in then?—I do not know, I was not on the work then.

213. You did not issue any instructions to Mr. Vickerman?—He never referred to me at all.

214. Were you ever in the Makarau Tunnel after the breakdown?—Yes.

215. Was the tunnel going ahead when you were there?—No, there was no progress being made.

216. You would not see the sills, then?—I saw the wreck, that is all.

217. You have known Messrs. McLean Brothers, I suppose, for some years?—Yes.

218. Suppose there was to be a large brick building for the Government: if Messrs. McLean were the lowest tenderers, would you let it to them with perfect confidence that they would carry it out properly?—Yes, I would.

219. Suppose it was that large viaduct on the Main Trunk Railway, would you let it to them?—Yes.

220. And you would not ask them about their experience?—No.

221. And you would be perfectly satisfied?—Yes.

222. And you think, with your past experience of the contractors, you would, under the ordinary arrangement, consider them perfectly competent to put the work through?—Yes, under ordinary circumstances.

223. [Referring to Mr. Hales's own report, page 3, clause 18.] You say that the inexperience of the contractors was the main cause of this work giving way?—Yes.

224. And do you still hold to that view?—I think because they used improper methods was the main cause of it.

225. What were the proper methods? You say, "Owing to their inexperience"; you do not mention methods at all. If you still maintain this view, I shall have to call other expert engineers with whom the petitioners worked as contractors, to prove that they did use proper methods?—I still maintain that they did not follow proper methods. The method they used was adopted in consequence of their inexperience.

226. [Clause 12 read.] Does that apply to the contractors or not?—To the contractors.

227. Though you say the method was adopted owing to their inexperience, you never have the slightest doubt in letting them contracts?—It is not likely Messrs. McLean or any other single men could do all the classes of work required in contracts; but that does not prevent me letting them a contract to do this work. It does not greatly matter who the contractor is himself, because he employs experts in the various branches to do the contract for him. I have known all sorts of inexperienced men take contracts.

228. But you admit Messrs. McLean are practical contractors, and understand timber-work?—Yes.

229. And do you say that they did not timber that tunnel properly?—The methods adopted by them I consider were not what they should be—not the best.

230. Did not the Inspector or Engineer ever notify that any of them were wrong?—I am not certain about that. I do not think the Engineer was called upon to do it.

231. *Mr. R. McKenzie.*] With regard to the price of this contract, do you think the amount was fairly reasonable?—Yes; for the whole contract.

232. In fact, it was practically approximate to your estimate?—Yes; within £1,000 or so.

233. Now, are you not satisfied that they lost a considerable amount of money on the contract?—I suppose they did, but have no means of knowing it.

234. Does not your District Engineer give you an estimate?—He does not report upon any losses made by contractors—only as to amounts to be paid them.

235. Now, coming to the wing-wall that carried away at the tunnel?—Yes; it would be well to have the plans before us. [Plans produced.]

236. Was that wing-wall carried away by the slip?—Yes, it was broken up by the slip coming against it.

237. Are you satisfied that the wall was designed of sufficient strength to resist the pressure of moving earth?—Yes; for any ordinary pressure. But it was not intended to support a hill-side. You can scarcely construct a wall to support a moving hill.

238. Did you pay the contractors for rebuilding that wall?—Yes.

239. As an extra?—Yes.

240. Did you pay them for removing a portion of that slip?—I suppose so; the Resident Engineer will tell you that.

241. Would the Resident Engineer do it without your authority?—Well, of course, I would certify to his vouchers for rebuilding the wall and removing the stuff.

242. But would the Resident Engineer authorise payment of that as an extra on his own responsibility?—No; he would ask for authority.

243. As a matter of fact, the contractors have been paid?—Yes, we paid to get this wall rebuilt, and for the removal of the earth.

244. How do you reason the matter, then, when you say the slip was their own fault; would not they be responsible?—I do not say that they were responsible for the slip.

245. At the same time you paid them?—The contract provides that slips are not to be paid for except under certain circumstances.

246. Very well, was this slip due to steepness of slope, as provided in the contract?—No.

247. Why, then, did you pay the contractor for that wall?—The wall having carried away is not a slip.

248. But the slip carried the wall away?—That is so, but it was the rebuilding of the wall that they were paid for. It was certainly the moving earth behind that carried the wall away.

249. Now, coming to clause 13 of the specification. You have specifications quite different to this for some other contracts?—Yes.

250. Without this clause in it?—Yes, with a modification of that clause.

251. Without the portion relative to payment for slips in it?—Yes, that was the old form of specification.

252. Is it not a fact that both Government Engineers, and also all contractors, when they see this clause in a specification—what contractors and engineers know as a "Slip clause"—understand that all slips are to be paid for when they go beyond a certain batter?—No such thing, that I know of.

253. You are not aware that this is always understood amongst contractors and engineers?—I do not think it is.

254. How do you account for your District Engineer writing to you on the 13th January, that this slip, in his opinion, was a slip for which the contractors were not responsible?—Well, but he did not phrase it in that way, the expression he used was, that it was "no fault of the contractors."

255. Is it not implied in that letter that the Engineer was of opinion that the contractors should be paid for removing that slip?—No; slips as a rule, are no fault of the contractors, but it does not follow that they are not responsible. They are accidents which the department has no need to pay for.

256. Would any contractor, with this clause in the specification, make provision in his contract for slips?—I cannot say; but he certainly ought to make provision. Any experienced contractor would know that the further sloping of cuttings does not prevent them from slips, in most cases.

257. Do you tell the Committee that sloping will not save them?—There are some materials which stand best perpendicular.

258. In places where you have a batter of $\frac{1}{2}$ to 1 or $\frac{1}{4}$ to 1?—This slope would be $1\frac{1}{2}$ to 1, because it was in pumice-sand.

259. Supposing, then, it was $1\frac{1}{2}$ to 1?—In this case I say, that increasing the batter of the slope would only leave a greater surface to slip.

260. Supposing the slope were more than 1 to 1, would you not pay the contractors in case of slips occurring?—Yes, if I were satisfied that it was due to the steepness of the slope in the cutting.

261. You say in your report that it was due to faulty drainage. You make provision on your plans for drainage, do you not?—Yes.

262. You provide catchwater drains, and these are located on the plans by the specifications?—They are provided for by the specifications generally—never shown on the plans.

263. It is provided that they are to be a certain distance from the tops of the banks, &c.?—Yes.

264. Were these catchwater drains put in by the contractors?—I do not know. I was not on the works at all.

265. Now, as to this mild, modest Inspector, Mr. Witheridge. You are well acquainted with him?—Yes.

266. Did you hear Mr. Allen McGuire say that he had applied to the District Engineer to have him removed?—No. I did not hear him say that. I am quite certain he did not say that.

267. Did you hear him say that if he knew Mr. Witheridge to be over a contract that he would not tender for it?—Yes; but I think it was on very unreasonable grounds that he said so.

268. You know this man very well? Have you had any complaints made to you about him by contractors?—Never that I remember.

269. Are you aware that any complaints have been made to the Minister for Public Works about him, or to the Under-Secretary for Public Works?—Not before Mr. McLean's complaints.

270. Are you aware whether any complaints have been made since by other contractors?—No, I am not aware of any.

271. Will you tell the Committee why you shifted Mr. Witheridge from Auckland to Otago?—Because we wanted to replace another Inspector who had been shifted from there to another district, Mr. Fraser, who is our leading Inspector in the colony. We wanted to move him to the North Island Main Trunk Line, where we had very important works; and Mr. Witheridge, being the man who was most fitted to fill Mr. Fraser's place, was sent down to the Otago Central works. It was, in fact, promotion to him, not degradation.

272. He was sent there to look after co-operative contractors?—Yes.

273. Did these men make any complaints?—Well, I should not think much of it if they did.

274. Did they apply to the Government to have him removed, because they could not make a living under him?—I never heard so. I understood that he was getting on first-rate.

275. You are satisfied that they never applied to have him removed?—Not to my knowledge.

276. *Mr. Blow.*] I am anxious to clear up this point as to the transfer of Inspector Witheridge. The Inspector who was removed from the Otago Central was the senior Inspector of the department?—Yes.

277. His name was?—Jackson Fraser.
278. He is the man on whom the department places the greatest reliance?—Yes; he is next to an engineer.
279. The works on the Otago Central had somewhat decreased in importance shortly before he was removed?—Yes.
280. And those on the North Island Trunk line were largely increasing in importance?—Yes; and a great many in prospect.
281. In your opinion it was desirable that we should place the best Inspector of the department on that line?—Yes, that is so, and it was arranged that Mr. Fraser should be moved accordingly.
282. You were asked, then, to select the next best qualified man to take his place on the Otago Central?—Yes.
283. And, after consideration, whom did you select?— John Witheridge to go to Otago, and Robert McGonagle to take Mr. Witheridge's place in Auckland, he being a builder, and most of the works going on in Auckland being of that nature.
284. With his experience he was largely wasting his time where he was?—Yes.
285. It was considered important, in the interests of the Government service, that this man should be placed on a work of greater consequence?—Yes, that was all.
286. Was this regarded as promotion to Mr. Witheridge?—Yes.
287. Did he receive any increase of pay?—Yes, I think 10s. a week additional.
288. Had the works of Makarau Contract to be given out again, and these two men made application for the inspectorship, which of them would you appoint—Witheridge or McGonagle?—Witheridge, undoubtedly.
289. You have no hesitation in saying that he is the better man of the two? Are you aware that McGonagle has been dismissed from the Government service?—Yes, he has.
290. For gross neglect of duty and insubordination?—Yes, and insobriety.
291. Has he since applied for employment?—Yes, he has.
292. Both to the Public Works Department and to the Working Railways?—Yes.
293. And both departments refused to employ him?—Yes.
294. From your knowledge of Mr. Witheridge, do you think he is a likely man to interfere unduly with contractors?—I do not think he is. I never saw anything of that kind in him. I have seen him about among contractors a good deal; most contractors seem to be friendly with him.
295. And you never had any complaint?—No, until Mr. McLean brought it up.
296. Some mention has been made of complaints by co-operative workmen—have you heard anything of that?—No.
297. Are not complaints from co-operative workmen very frequent?—Yes; and those men who are doing best seem to make most complaints.
298. It is the rule rather than the exception for co-operative workmen to complain of prices?—Yes, that is so. Besides Mr. Witheridge was in a very different position in Otago—he was in charge of the works, carrying them out as foreman; and these men were immediately under his direction. I can quite understand friction occurring with working-men occasionally in such a position.
299. You would not regard it as an exceptional circumstance if complaint was made?—No. Complaints are frequently made. We are always having inquiries into these complaints.
300. These particular complaints—alleged to have been made through Messrs. Pinkerton and Millar—have never reached your ears?—I have never heard of them.
301. Then, if they were made to the Minister, he did not deem it of sufficient consequence to communicate them to you?—No.

THURSDAY, 16TH DECEMBER, 1897.

Mr. C. R. VICKERMAN examined.

1. *The Chairman.*] Will you tell the Committee your name, please?—Charles Rankin Vickerman.
2. And you are?—A civil engineer.
3. You have been connected with the Makerau Tunnel contract?—Yes. I have been engineer on the works all the time.
4. *Mr. Blow.*] You hold the position of Resident Engineer at Auckland for the Public Works Department?—I do; since the removal of Mr. Hales.
5. How long have you been in the Government service?—Since 1872; twenty-five years.
6. Have you been all that time in an engineering capacity?—Yes; strictly in an engineering capacity.
7. Did you serve a period of cadetship?—Yes. I joined the service as a cadet, and served in various parts of both Islands.
8. And in the usual course you also served many years as an Assistant Engineer?—Yes.
9. And lately you acted as Resident Engineer?—Yes.
10. During the time that Mr. Hales was District Engineer at Auckland you were one of his assistant engineers?—Yes.
11. And during the latter part of the period you were his principal assistant?—Yes; I had charge of all the works round Auckland, including this tunnel. I had work in connection with other lines besides, and defence-works, &c.
12. When Mr. Hales was removed to Wellington to take up the duties of Acting Engineer-in-Chief you took over his duties?—Yes; he left me in charge of the whole district.

13. You remained as Mr. Hales's *locum tenens* for a time, and in due course were appointed Resident Engineer for the Auckland District?—Yes.

14. Mr. Hales's title was District Engineer; your title is Resident Engineer, but this implies no difference in your duties?—No difference whatever. I had charge of the district, and was called Resident Engineer.

15. Just as full charge of all the works as he had?—Exactly similar in every respect.

16. And the Auckland District extends from the North Cape to the boundary of the Wellington Province?—Yes; that is so.

17. You had several assistant engineers and officers under you?—Yes.

18. As regards this distinction of title: have you seen the departmental estimates for the current year, and do you know whether you are provided for as District Engineer?—Yes; I believe I am put down as District Engineer, at an increase of salary.

19. So that you will now have the same title as Mr. Hales had as well as the same duties?—Exactly as he had.

20. During the time that the Makarau Contract was being carried on you were frequently on the works?—Whenever I was required. At the beginning I was up there regularly once a month and sometimes oftener.

20A. Who was the Inspector in charge of those works?—Mr. Witheridge.

21. What amount of personal acquaintance had you with Witheridge?—My first acquaintance with him was when I was moved to Auckland by Mr. Hales from Whangarei, where I had charge of the railway-works. He was then General Inspector in Auckland. He did any inspection required in Auckland City. I took over the work from the previous Engineer, and Witheridge naturally followed me then.

22. What date was that?—In 1883.

23. Have you had many years' acquaintance with him?—Yes; he has been working for me ever since, with the exception of about two years in Otago lately.

24. You have therefore had excellent opportunities of observing his qualifications?—I think I know more about Witheridge than any other man. I have had him in all classes of work, and in every way know that I can trust him.

25. Will you tell the Committee your opinion?—My opinion is that he is a first-class mechanic. We have very few men who can hold a candle to Witheridge in that respect, particularly in permanent work, such as masonry, brickwork, &c.; cement and lime is a speciality that he understands better than most of us engineers; and that is why I maintain that he was a fit Inspector to put in charge of this tunnel.

26. A suggestion has been made that Inspector Witheridge was transferred from Auckland owing to some dissatisfaction with him—do you know anything about that?—Well, I suddenly received a telegram stating that Witheridge was to be moved to the South. Some rumour to the effect you mention got about up there. I could not say how, but was sure it was not correct. I immediately telegraphed objecting, and that I considered Witheridge was fit for all I wanted, and applied to have him left to me.

27. But the department insisted on his removal?—Yes; although I particularly asked them not to.

28. Are you aware on what grounds they insisted?—The grounds were afterwards told me: through some official changes in Otago it was necessary to obtain a first-class Inspector for certain works on the Otago Central—tunnel work included. On these grounds the Engineer-in-Chief moved him down to Otago, and, before he moved him, he not only said that he was satisfied with his work, but gave him an increase of salary, proving that the man was getting promotion instead of degradation.

29. Some telegrams passed on that occasion; I have them on this file. Perhaps you will look at that—that telegram you received from the Head Office?—Yes, that was the first. [Telegram read; also reply, dated 21st February, 1894.]

30. Then the department replied: Will you read that to the Committee?—[Telegram of 22nd February, 1894, read.]

31. Then there was another telegram from Witheridge himself?—[Telegram dated 26th February, read.]

32. And the final decision of the department was contained in a telegram of the 29th February?—[Read]. I put in copies of these telegrams.

33. If, therefore, a statement has been made that Witheridge was transferred owing to his giving dissatisfaction, such a statement is incorrect?—It is incorrect.

34. He was removed on substantial promotion?—Yes, on promotion.

35. And because exceptional works in Otago required his attention?—Yes, there were urgent works in Otago.

36. From your knowledge of Witheridge do you think he was a man likely to unduly interfere with contractors?—I have never known him to do so. He is a good Inspector, attends to his work, and sees that it is done. He does not unduly press contractors, and in many cases he has assisted contractors; and I think in some cases in this particular work he has assisted the contractors in a very material way.

37. Have any complaints ever been made to you by contractors that he has unduly interfered with them?—None that were not settled at the time. There was nothing that I considered serious enough to report to the Engineer-in-Chief, which I would have done if there had been any serious complaint. Differences of opinion will, of course, occur between a contractor and any Inspector as to quality of work, &c.

38. But were any complaints made as to Witheridge interfering with the contractor's method of carrying out work?—No, nothing of the sort.

39. A suggestion has been made as to complaints having been made by co-operative workmen since Witheridge went to Otago. Do you know if complaints are frequently made by co-operative workmen?—Yes, complaints are constantly made.

40. But you manage to get on very well in the end?—Yes; but there is always a certain amount of discussion and time spent in settling matters that arise as work proceeds.

41. And the department would not think very well of an Inspector unless there were some complaints in reference to these co-operative contracts?—I should say not. I may say that I consider Witheridge the best Inspector that I have ever had. I have had many Inspectors working under me, and I never had one that I had the same confidence in as Witheridge. Without doubt I should prefer Witheridge if I wanted a job executed soundly and properly.

42. If we had the Makarau Contract to carry out again, and you had a choice as between Witheridge and McGonagle, you would prefer Witheridge?—Without a doubt. I would, as I have said, sooner have half Witheridge than the whole of McGonagle.

43. You are familiar with the nature of the slips that occurred in the Makarau Contract?—Yes, I know them all.

44. Take the contractor's plans—how many slips are mentioned there?—Five slips are put down here.

45. Look at the mileages, and tell the Committee if you can call each of them to mind distinctly?—Yes, I know each of them.

46. Are you familiar with the clause in the specification that deals with slips?—Yes, I am.

47. Are there two paragraphs in the clause referred to?—Yes, one general clause as to nature of ground, and the other with reference to slips due to drainage or the presence of water.

48. Does the specification say which is to be paid for?—The ones due to steepness of slope are to be paid for, those due to drainage are not to be paid for. In this case, after careful consideration we came to the conclusion that these slips were due to want of drainage, and to the presence of water in the strata, and therefore that they came under the last clause.

49. Are you clearly of opinion that they were not due to steepness of slope?—I am quite satisfied that in this case it was due to the presence of water.

50. Is this your memorandum, addressed to the Head Office, dated 13th January, 1896?—Yes, that is the original memorandum.

51. I want to direct your attention to the part where you say that the slip was not due to "any fault of the contractor"?—Yes.

52. By that expression "not due to any fault of the contractor" what did you mean?—If you turn to the section on the plans I think I can explain. You will notice that this slip took place in January, 1896. It is not one connected with the contract time, but some four years afterwards. There are two pockets here in the ground on the section, and in these two pockets the water gathered; and from the slip being left so long in the cutting it so dammed the water back that the whole became saturated with water, and the consequence was that the whole side of the hill began to move downwards.

53. Then had there been a previous slip?—There was a running there for some three years—the ground and water always on the move—continually going all the time.

54. Were the contractors removing it all the time?—No, it was in that condition for years.

54A. The contractors allowed it to lie?—They allowed it to lie, I should say, for over two years—probably three years. It did not assume such large proportions until the latter end of the time. The slip had come down about 2 chains further on from the mouth of the tunnel, and had formed a dam in the cutting, and this dam held the water back; and this had weakened the ground all round; so that when they opened out and took the tunnel down, it allowed this stuff to get away.

55. Then, the action of the contractors in allowing the cutting to remain damned up, caused the saturation of the ground at the back?—It did, most distinctly. I asked them to get it drained several times, but they seemed to have got down-hearted over their contract, and did not attend to the drainage—many places were injured from want of attention. I found there was nothing done to it. It was their risk, and I did not interfere more than I could help. I always look upon a contractor as a man who takes all the risks of his contract, and interfere with him as little as possible in carrying it out. And, having known Mr. McLean for years, I gave him as free a hand as possible, and did not interfere with or direct him, but simply told him what I thought; but, as I say, he got down-hearted with his job, and allowed things to go on, and did not act as he would if he was in an active state of mind.

56. How long was the slip neglected?—It was about three years in a state that it should not have been.

57. And during the whole time that saturation was going on?—Yes, during the whole time.

58. When they came to take the cutting out, what happened?—The soft bottom came away—the slip came away. After they got through the tunnel they built the wing-wall of the tunnel in the slip, and the failure of the wing-wall was due to the time it was built. It was being constructed while the slip was running round it. Several times it ran over it. They did their best to stop it by putting in timber. The clay came over it, and many a joint in the wing-wall never had mortar on it again.

59. Was the brickwork in the wing-wall defective?—Yes; I consider it was. It was defective in that it did not have its full amount of mortar. There was also another thing, the wing-wall was not tied on the face-wall as it might have been. There was a deficiency of tying-bricks—not sufficient headers or stretchers. The face-wall had gone up, and the other was shoved against it—a head-brick put in four or five courses apart, and only one head-brick tying the two together. It was not sound construction. There should have been a regular system of tying the joints together. But, as regards the wing-wall, I consider that the contractors have not been hardly dealt with over

it. It failed, and I ordered them to take it down, and paid for it being taken down, and paid for it being rebuilt, and also for stone to go behind it to drain it. They were paid—they were paid for that as an extra.

60. Do I understand you to say that the courses of bricks became somewhat overlaid with clay?—Yes, distinctly overlaid; so much so that when the wall was taken down we discovered places where the mortar was not binding together.

61. Would that make good work?—No; certainly not.

62. Would that in any way account for the failure of the wing-wall?—I do not think it did in this case. I think the pressure on it was too heavy; but it was faulty work.

63. Did it make the wing-wall weaker or stronger?—Weaker, decidedly. This wall was put up during the time that Witheridge was in Otago and McGonagle was Inspector.

64. Have you any personal feelings against the contractors in this matter?—Certainly not. I have always been on the best of terms with the contractors.

65. Had you that feeling in your mind in writing this memorandum, in submitting the matter to the department, and leaving them to make equitable allowances if the conditions of the contract would permit?—I am like the contractor in this respect. There are certain conditions and specifications, and we are both bound by them. If there is anything outside of these I always refer to the Engineer-in-Chief, which I always did.

66. Under the conditions of the contract do you consider you would have been authorised to certify to this as an extra?—Not without referring to the Engineer-in-Chief. I submitted the case to him impartially, described the whole thing to him, and after consideration he decided that the slip was due to want of drainage—it was the presence of water in the slope that caused the slip. Had there been no water there there would have been no slip.

67. Then your object in this memorandum was only to submit the matter to the Engineer-in-Chief?—Certainly; to put the matter as fairly as I could for every one.

68. Now, about the tunnel: are you aware of the provisions of the contract with regard to the tunnel?—Yes. I know the specification for the form of tunnel, and all connected with it. I know how the contract was let, and all about it. The whole of the information is given to the contractor on the contract plans, and, according to the conditions of contract, he makes himself acquainted with it, and has to be liable for any deficiencies in it, for anything that is not there. We did not undertake in this case to give the contractor any information as to the kind of ground he would meet with in the tunnel. He got information, I believe, from local people, and from men who had been on a previous party of surveyors up there.

69. Was any information shown on these plans or specifications in reference to borings?—None whatever. I have never seen any reference to borings either in the office or here. I have the plans drawn by the surveyors who laid out the line originally, and there is no reference to borings on them.

70. Do you know whether the contractors got any information about borings from the department?—I am not aware that they did. But there was one thing that perhaps gave them the idea that borings had been taken. In the Waitangi Valley, about a chain or so from the site of the present line, there is a tripod—the three legs used by a boring party. It was natural for them to inquire what that was. Every one who knew the place knew that it had reference to boring.

71. You think they probably saw this on the ground and made inquiries?—Yes. I should think they probably inquired from men about there who had been on the survey.

72. As Resident Engineer, did you ever give information to the contractors about borings?—I am not aware that I ever mentioned anything about it.

73. Do you think it is likely that any other responsible officer of the department would give information?—No. I do not see where they could get any information from.

74. As a Resident Engineer of many years' experience, can you tell the Committee whether it is usual to give information to contractors as to any strata likely to be met with in a tunnel?—I have been connected with tunnels in the South Island, and have also seen all the tunnels that have been going on in the North Island for some time; and it is not usual in the Auckland District to give such information; and I do not think it is desirable—it is more apt to mislead than assist. My reason for saying that is that putting down small borings is very poor information as to what the ground is likely to be below, unless you happen to meet with recognised strata; and in New Zealand the ground is so broken or faulty, that though you may get a recognised stratum at one place, there may be quite different ground at the same depth half a chain away, and this is particularly the case in the North Island. Therefore, I say that borings in tunnelling of this sort would be almost useless, and would be more apt to mislead than to assist a contractor in basing an estimate.

75. Do you know whether borings are given by the Australian Governments in letting tunnels?—I have seen specifications in which they are not given. I do not know the practice always adhered to, but I know of plans having been sent out on which borings were not shown, and these were for drainage tunnels, which were more important than this, because it makes very little difference in a railway tunnel what class of ground you get—I am speaking as to the utility of the tunnel.

76. Do the Australian specifications, so far as you have seen them, provide for information as to borings?—I have seen more without than with. Different engineers follow different practices in that respect—there is no rule; one engineer thinks it is fit to provide borings and another does not. My own opinion is that it is a mistake to provide borings—that it is far better for a contractor to take the risk upon himself, or to put shafts down. With a shaft you have an opportunity of seeing what the ground is, whereas borings are sometime very deceptive. I have done a considerable amount of boring, and do not approve of it.

77. *Mr. Duncan.*] Is that from a Government point of view or a contractor's point of view?—I mean from the point of view of obtaining a good knowledge of what is there. I think boring is

an imperfect way of obtaining what you want to know. That is, the class of boring done here, with small light rods.

78. *Mr. Blow.*] Have you known instances of borings turning out very unreliable?—Yes, I have seen more than one turn out unreliable, especially in the Auckland District, where the papa is. You may get on to a clay seam, and almost immediately after get rock.

79. Do you know the men employed by the contractors as foremen at the tunnel works?—Yes, I have known them all. The contractor started with his own people.

80. Who were the men employed first?—Mr. Neil McLean was one—he took charge for a time; and Mr. Wells; Mr. Clemow; and Mr. Russell.

81. Were all these men competent and experienced in tunnel work?—Well, I do not like to give any one a bad name; but, if I am required to answer that question, I think I can answer only in one way. In this case I consider that none of the men who were in charge knew anything about tunnelling. One man had perhaps worked in the Porootarao Tunnel for a short time. As to the other men, it was the first time they had anything to do with that kind of work. None of them were experienced, as the work they did showed.

82. Do you mean all the men that were engaged in the Makarau Tunnel?—Yes, I mean everybody that was there, from the contractor downwards.

83. How many men were there engaged at any time?—They were working in three shifts, and three men were working in charge of these shifts. I am speaking of the leading men now. Of course there might be an odd miner in the tunnel at different times who knew the work.

84. Your remarks apply particularly to the men who had the direction of the work?—Yes; to the men who were in charge of the work. I did not know the ordinary labouring-men in the tunnel. I knew the head men of the shifts, and the contractors, and leading men.

85. And your opinion, as regards the men who had the direction of the work, is that they were inexperienced?—Yes; my opinion is that they were inexperienced; and, to confirm that opinion, I may say that the best advice I ever gave the contractor was advice that he should have followed—that he should have a good foreman of works who is a miner. I said that, even if he gave him £5 a day, it would pay him to have a reliable man in charge of the works. Because it was very soon evident to me that the men in charge did not know what they were doing.

86. Then, the contractors were not ignorant of your opinion with regard to the men?—He (referring to Mr. N. McLean, who was generally on the work) was not ignorant of my opinion.

87. Did you mention this to him more than once?—I mentioned it to him many a time; and when, at the latter end of the job, he got hold of a miner and put him in charge of the work, what I said was proved to have been correct. That man knew what the work was, and was an experienced miner, and put the job through all right. I refer now to the man Donohue, who is an experienced miner, and who certainly seemed to know what he was about all through. He was the only man up there who really did know anything about it.

88. Was the work completed under Donohue?—He ran the last 6 chains out.

89. Was that the easiest part or the most difficult?—They got clear of water as soon as he picked up the slip, and did not have water again until the end of the tunnel. I consider the ground was lighter, because for one thing he reduced the size of the timbers. He went at the work steadily, and proved that he was well able to manage the work.

90. Was the rate of progress fairly regular and steady after he took charge?—Yes. It was so remarkably steady that I received a letter from Wellington one month asking if I had not made a mistake in sending the progress certificate down, the figures came out the same to a pound as the previous month, and they thought I had sent the wrong month's return.

91. Was the rate of progress similarly regular under the other foremen?—The rate of progress in the other part of the tunnel was most irregular, you never knew what was going to be done; one month they would do a good length, the next month there was nothing. I have the rates of progress of the different lengths here. The first 7 or 8 chains were in good sandstone rock, and there was no particular timbering needed. Then they got into bad ground—what they called bad ground—and the rate of progress began to be different. The monthly rate was: July, 1891, 70 links; August, 74; September, 89; October, 55; November, 99; December, 114; January, 1892, 33; February, 82; March, 116; April, 117; May, 93; June, 95; July, 147; August, 83; September, 9; October, 41; November, 70; December, 65—that is, December, 1892.

92. Was it then the change of management took place?—It was then that the big creep took place—January, 1893—and the last part of the tunnel was under the new managing-man: In January, 1895, 45 links; February, 58; March, 76; April, 76; May, 66; June, 78; July, 76; August, 76; September, 49. That took them to the outside of the face. The progress in the last part was so regular that you hardly need have gone to measure it up.

93. I see you have bracketed together the months December, 1894, and January, 1895; was that at the time they were overcoming the big creep?—Yes, you could not count that as progress, because he was picking up where the big fall of dirt was.

94. Do you know whether the contractors worked for any length of time at that under other foreman before they got Donohue?—Yes, they went on working for six months after the creep occurred.

95. What amount of progress did they made?—Virtually, none, except that they put down a shaft; they did not consult me about it, and had got it so far before I knew of it, that I thought it better to leave them to finish it; it was their risk, and I did not want to interfere unduly with the contractor.

96. Then, they worked for six months under the original foreman without making any progress?—Yes; they were really in a worse state than when they started.

97. Did progress immediately begin to be made when Donohue came?—No; it took him a long time to pick up things. After the contractors had finished the Tarukenga contract, they came back to the Makarau work; the works had been closed eight or nine months altogether,

and they did not immediately put the work under Donohue. Mr. Neil McLean it was who worked amongst the men as leader of the shift, but he soon gave it up; and after that Donohue was put in charge. He did things as he thought best, and it took him from somewhere about February, 1894, to November, 1894, before he got the ground out and a length ready for bricking.

97A. After that things went on smoothly?—There was no more difficulty after he went on; he went straight through with it.

98. Do you know whether the contractors' foremen that they had at first worked well and harmoniously together?—My experience of the three shifts was that they did not work well together; one shift would do one thing and another would do another. Each man seemed to work independently, and to be jealous of the other men.

99. Did you dictate to the contractors as to how the timbering was to be done?—No. As I have stated, I did not interfere with the contractors unduly. All I required the contractors to do was to produce permanent work in a satisfactory state. I hold that a contractor takes that risk, the same as a builder putting up a building—he puts up the scaffolding in his own way, but if he makes the scaffolding so that it will interfere with the permanent work, then the architect interferes. That was the ground I took. More than once I drew the contractor's attention to one or two matters; and particularly two nights before the heavy creep took place. [Two plans referred to.]

100. Will you describe how the tunnel was done in your own way?—The set of timbers used for excavating is composed of a ground sill or sole-piece with two legs and a cap-piece on top—on that cap-piece is bolted the miner's sill—in two pieces. On this miner's sill is put the toms or struts which radiate to the bars, and the bars go longtitudinally in the tunnel and support the timber lagging which holds up the unexcavated ground. Between the bars are put in short cross-braces of timber to prevent the bars coming together by the side weights. That is the set of timber which is used in advance of the brickwork to support the bars while the length is being bricked. This second section [referring to plan] is the inside lining of the tunnel after the brickwork gets up to the springing of the arch. Various timbering is introduced: a bottom strut piece, and side benching bars or props, which carry the side waling. On the top of this side waling the ribs stand on wedges, which wedges are used for slacking in the centre when the brickwork is set and removing the timber. The old ribs that were used at the time of the accident were constructed out of planking—with just a tie-piece across, and a king-post, and two struts. That form of rib was afterwards abandoned by Donohue as an unworkable rib. Then the lagging stands on the top of that rib, and on the lagging the brickwork is built; and this set of ribs and timbers are left in always on the back length until the forward length was bricked up. On the end of this brickwork is the place I am going to point out that the contractor supported the bars—not only the bars of the back-lengths, but also the back ends of the bars of the fore-lengths. I drew his attention to this as a dangerous practice. But he continued to do it, and said that it was all right—he used to quote a work on "Tunnelling," by Sims, as his authority. I invariably objected to his supporting the ends of these bars on the same centre as the back bars. Now, in taking out a piece of ground, we will suppose that a length of brickwork was in, and the heading came back up to the back-end of the set of timbers that supported the back-bars. The difficulty was that the contractor, and I believe with good intention, used double lengths of timbers in the headings. The crown and the two shoulder-bars he always tried to put in in double lengths. I did not object to that, although it made it very clumsy timber to handle—the difficulty was to get the bar through into the heading. In order to get this bar in, the centre tom was slacked out; and on the particular night that I was in the tunnel that tom was out. In order to get room to put in this awkward piece of timber he used to slack out the centre tom. That was before he excavated the bottom piece.

101. How long were these pieces of timber?—He wanted them to span 22 ft. centres; he may have had them up to 30 ft., but generally I should say they were 24 ft. long. As soon as he got the polling-bars in he put them up to the tunnel, and supported the two shoulder-bars and crown-bar on the false sill, or temporary sill on the floor of the heading; and the night that I was in there—two nights before the accident happened—I may state that I was truly surprised to find that the crown-bar was hanging from there to there [plan], and the two shoulder-bars one on each side of it, without a sign of support from there to there [plan], 18 ft. clear between prop and prop. I measured it with a tape, and said to the contractor, "You are going the right way to pull this tunnel in." And when I heard of the accident three days afterwards, I had no difficulty whatever in accounting for it on the ground of insufficient timbering. He then was excavating to get that sill in; he had the whole heading excavated, and was digging down to get the bottom sill in. When I saw it he had no temporary sill in; he had nothing to represent this figure [plan] at all. The whole thing was hanging just as I show, about 18 ft. The overseer went to him and drew his attention to the matter, and represented that it was not a legitimate thing to interfere with an arch after it had been loaded. What happened after I left the tunnel was this: The contractor took the whole set of timber out, every bit of it. He got this set in, and had both his back-bars and forward-bars depending upon this brickwork for their stability, which I had objected to time and again, although he had said that it was Sims's way of tunnelling. I always drew his attention to it, that he should have the back ends supported. I was quite prepared to allow the back length to support itself. They never were supported properly. I have been in heavy ground elsewhere, and we always supported the back ends of the bars. Well, there was nothing very serious that night. The contractor was accustomed to work in 11 ft. lengths. At this particular spot he stopped for the Christmas holidays on the 19th December, and he did not resume work until the 9th January following. Then, against the advice of the overseer, instead of putting in as usual 11 ft. lengths, he cut it short and put in a 5 ft. 6 in. length. He had put in his bars previously for an 11 ft. length, and the consequence was that the ends of these bars overhung some 8 ft.; and this became rather an important matter when the accident took place. The delay in going on with the tunnel was a serious thing. I was never more surprised than at the contractor knocking off for holidays at that

time. I may explain that the ground turned out to be clay, which, on exposure to the air and water, after about three weeks or a month, dissolved into a liquid mass; and by delaying his work in this way this whole month he allowed the pressure and stress to come right on top of him. As long as he kept moving on he was all right; but in stopping for a month he allowed an unusual strain to come on to him—a bigger weight than he could contend with. That was, in my opinion, the cause of the accident, and owing to the fact that he had removed this set of timbers. It might be said that my Inspector removed this set of timbers. I maintain that he had nothing to do with it. If he had, it would have been while the brickwork was going on, and no brickwork was started on that length. Therefore my Inspector had nothing whatever to do with the removal of that set of timbers. That sill should not have been removed until the brickwork was brought up to the underside of it. The whole sill was removed before excavating; the timbers were hanging on the end of the brickwork; they were not supported for some 11 ft. or 12 ft. The cause of the accident, I believe, was the back weight coming on to the end of the bar on the brickwork. There were no braces here, so that the least pressure from behind dislodged that bar. The crown-bar dropped into the tunnel first. When it dropped in, all the weight of the arch here, and this overlap that I mentioned, came on the brickwork, and being green brickwork it shook it all to pieces, and then the arch tumbled down. That was, as near as I can explain, the cause of the accident in the tunnel.

102. Did you order the removal of these sets of timber?—I did not order the removal of timber at all until it came to the question of building it into the brickwork or not. When it came to the question of building it into the brickwork, I said there was need for it.

103. Do you think the Inspector would order its removal?—He did not order anything until it became an interference with the brickwork.

104. Several memoranda passed with you at this time, and some little time afterwards?—[Originals read and copies put in: 29th September, 1891, signed "C.R.V."; 5th October, 1891, signed "C.R.V."; 4th February, 1892, signed "C.R.V."; 26th January, 1893, signed "C.R.V."; 1st February, 1893, signed "C.R.V."; covering letter of McLean and Sons, dated 27th January, 1893; 29th May, 1893, signed "Witheridge." This latter was certified to by witness as being in Witheridge's handwriting.]

105. The contractors, in their letter, make some reference to objection being made to moving the middle or miner's sill: did you object to the miner sills remaining, provided they cut off the ends so that the brickwork should not be interfered with?— We never objected to the miner sills remaining, provided their ends were cut off, with the sole object of getting the timber out of the brickwork, to keep the brickwork solid.

106. Was any part of the tunnel constructed with the miner's sills being allowed to remain in position, but with the ends cut off?—No, there was no case in which the ends were cut off that I remember.

107. Before or after the slip?—I am not aware of it being done at any time.

107A. *Mr. McLean.*] You say that you are not aware that the ends were cut off at any time?—Yes, that is what I said.

108. *Mr. Blow.*] Do you know how the timbering was done in the sounder part? When they first commenced was the miner sill removed before the brickwork?—We did not mind about that part. We let the miner sills stop in in that sandstone country, because there was no strain on the brickwork. But when we got into heavier ground where there was a strain, we considered that the brickwork should go in solid.

109. When you first got into wet country were the sills removed directly the brickwork of the side-wall reached the level of the sill?—Speaking from memory I could hardly say that the sills were left in until then. They may have been at the early part. Later I know the whole set was taken clean out.

110. May we infer, then, that at any rate he did not leave them in after the brickwork had reached the level of the sill?—No; because we would not have them in. Once or twice he asked permission to leave the sills in, and we objected. At the same time we said that if it were really necessary we were not going to bind them; but we never found that it was necessary. There was no difficulty in removing the sills at any time that I am aware of.

111. Was the arch ever completed, notwithstanding that the sill was removed?—Oh, certainly.

112. Was much of the tunnel done that way?—The whole of the tunnel up to creep was done that way, by removing the sills. In the clay country they were all removed.

113. What length was that?—About 12 chains.

114. Was that 12 chains of tunnelling successfully carried out?—Yes, it was successfully completed and bricked; it is nearly 15 chains.

115. If any civil engineer expressed his astonishment at miner sills being removed, is it your experience that it is usual to take them out?—I think if you went to the Old Country you would find there very few sills built in. It is a practice in vogue among contractors in New Zealand, but at Home I find that in nearly every case the sills are removed.

116. In any case, you can confidently tell the Committee that 12 to 15 chains of this tunnel were successfully carried out with the sills all removed?—Certainly. I always insisted on their being removed, and from the experience that I have got from the latter end of this tunnel I think it is a proper practice.

117. Were the sills left in in bricking the last part of the tunnel?—At the request of the contractors, and also of the overseer, who was sent to me as a competent man. I, knowing the difficulty they were in, naturally met them, and said that I would allow them to leave the sills in through the latter part of the tunnel, and they were left in.

118. What length of tunnel was that?—5¾ chains.

119. A much shorter piece than the other?—Very much shorter.

120. Have you seen the tunnel since the brickwork has been done?—Yes, and am exceedingly disappointed with it. This last 6 chains has as many cracks in it as the whole of the rest put together.

You can see the holes staring you in the face wherever you look at it, and the brickwork is nothing like as well executed as the previous part of the work.

121. Apart from the look of the job, there are many more cracks in it?—Yes.

122. Do you think, therefore, that the arch is so strong?—I cannot think so, or the cracks would not be there.

122. Great stress has been laid on the ground being very bad. What was the nature of the ground at the commencement?—The first 8 chains were in the sandstone that the contractors mentioned, it was simply splendid country, it was not too hard or too soft. Part of it stood open for six or eight months, the arch of it without any timber to speak of—I call that perfection of tunnelling country. After that we ran out of the sandstone country into the clay country. I believe that at one time it has been an old sea bluff; we ran off the bluff into a collection of mud deposited up against the bluff.

123. Did you find that material hard or soft to excavate?—At first it was nearly as hard as the sandstone, but after it had been exposed for a month it became dangerous—you had to mind what you were doing. We found this out immediately we got into it. At first we put in an ordinary section of tunnel, but, after going about 2 chains, Mr. Witheridge came down with this letter, and reported that the sides of the tunnel were coming together—that was right at the start of the clay ground. This was a serious matter, and required urgent measures to be taken with it; and knowing Witheridge to be a practical man, I told him to go back there and help McLean all he could with that invert—that it would have to come out at once, and get the brickwork in without any delay. He went back to the contractors and himself put the men to work to get the invert in.

124. Was this with the consent of the contractors?—It was at their request.

125. The men who were acting with Witheridge in doing this work were not men employed by the Government?—No; they were the contractors' men—the usual shift.

126. You mean, Witheridge placed his experience at the disposal of the contractors?—Yes, exactly.

127. As to the nature of the ground at the time they first drove their heading into the clay: was it hard or soft?—It was hard at that time—solid clay.

128. Was there any difficulty in getting it out?—We shot it out.

129. Did it fall from the roof dangerously?—After we had got on about 2 chains we had the first creep.

130. Was there any difficulty in getting the timber in at first when they drove the heading and enlarged it to the full size?—No difficulty whatever.

131. So that if the contractors had pushed on their work in a careful manner, and had timbered with sufficient strength immediately following on their excavation, there is no reason why the timber should not have stood?—There is no reason why they should not have gone straight on with the tunnel in the same way as did the man who came in afterwards—Donohue.

132. Would the Committee be right in inferring that the creep was due to the work being left exposed to the atmosphere and moisture getting to it?—That was the principal cause that led to the creep, and a cause that should have been carefully guarded against. No special precaution was taken to meet it.

133. Is it likely that the creep would not have occurred if there had been no cessation of work?—In my own mind I am satisfied that there would have been no creep if the work had gone straight on.

134. Did the ground change, or did it simply become moist from exposure?—The moisture was not there at the time the creep took place. It came from the creep; it allowed a stream of water in from other strata. The moisture came in after the creep, and must not be confused with the creep itself, which came in dry, except that it was slaked; there was no run of water.

135. But after you had passed the sandstone rock, the ground remained practically the same, and the difficulty experienced was due to moisture and air having got into it, rather than to different strata being met with at that place?—It was exactly similar to what we had all along from the time we entered the clay.

136. Then, if the ground was the same, the excavation would have been the same if the air and water had not been allowed to get to it?—Exactly.

Mr. Vickerman cross-examined.

At the commencement of the proceedings, Mr. Blow, by permission of the Chairman, put in several more letters, the dates running from the 19th May, 1893, to the 2nd March, 1894.

137. *Mr. Lawry.*] You have heard, I dare say, that there has been some reflection cast upon Mr. Witheridge?—The petition states so; if you will look at a copy of the petition you will see what has been stated.

138. Did he act on your instructions?—He did.

139. Did he act in any important matter without your instructions?—Not that I am aware of.

140. Are you aware that in the petition some reference was made to boring?—There may have been.

141. That boring took place?—I believe it did.

142. Was it under your supervision?—Previous to my coming on the ground it took place.

143. You said in your evidence that about eight chains of the tunnel was as good tunnelling ground as you ever experienced?—Yes.

144. And then you came into this soft material?—Yes.

145. Is it true that, practically speaking, a hanging wall of sandstone ran almost parallel with the tunnel the whole length?—The first 8 chains was of solid sandstone.

146. I mean after the 8 chains?—For some distance it was, and then it disappeared and came out again; it was not the whole length.

147. Suppose the tunnel had been driven a couple of chains from its present position, then it would have gone through sandstone rock all the way?—No, it would still have come out into the same class of country as now.

148. And for the same length?—It would be much longer in any other position than the one it is in now.

149. But would there be the same length of this rotten semi-liquid ground?—There would be no means of ascertaining that.

150. Had you any previous experience of tunnelling of a similar character to this?—I should say worse.

151. Where?—In Otago. I was in the Round Hill Tunnel when it was being put through on the Lawrence-Tokomairiro line.

152. Was the ground there of a semi-liquid nature?—It was practically running water all the time. We had it timbered very much more heavily than the Makarau Tunnel.

153. The timber in each case was put in according to specification, I suppose?—No, the specification never specifies as to the timber.

154. And you have no discretion?—We do not interfere with the contractor as long as he does not interfere with the solid work. All we want is his brickwork put in in a solid condition.

155. And you are not in any way responsible for the timber the contractor puts in?—No.

156. Are you responsible for the moving of the timber?—I do not interfere so long as the contractor does his work properly.

157. Can you tell me why Mr. Witheridge refused to let the contractors use timbers they thought fit?—All Mr. Witheridge did was to tell them they were not to build the timbering in the brickwork, which were my instructions to him.

158. And you say you have never known that done before?—I certainly did not say that.

159. Did not you say it was a most unusual thing to be done?—I said it was a general custom in New Zealand, but it was not done in other places; and it is not necessary that it should be done.

160. Then, you say that the end of the tunnel was constructed under the supervision of McGonagle, and that from the period where McGonagle supervised it it is very much worse than before?—I say it is very much worse than the other part of the contract.

161. And did you pass it?—Yes, I did, because it was quite good enough, though not so good as that done previously. I cannot be responsible for all McGonagle passed. You cannot see inside the brickwork when it is put up; the man who is on the ground must see what is done.

162. Watch every brick?—Yes.

163. *Mr. Duncan.*] When this timbering is supposed to be taken out, does all the structure come down with it, or how is the surface kept up?—The timbering is not taken out at the forward end. When that timbering was taken out it was the back end where the brickwork was, and when that was taken away the bars rested on the brickwork. It rested on this section [pointing to it on the diagram].

164. You have two sets of timbers, and you take out the one when the brickwork has been in a certain time?—Yes.

165. And this sill must be removed before the brickwork passes?—That is, the back one; the front one is ahead of the brickwork.

166. You stated that you did not consider that it would be sufficiently strong to allow these beams to stop in, and brick past them, and allow them to be taken out at a later time?—I did not consider it advisable that the back sill should be built in.

167. Then, betwixt this stringer and the back one would be 11 ft.?—Yes.

168. And that would allow of nearly 9½ ft. solid?—About that.

169. By allowing this to stop in, you contend that it weakened the bricks?—Weakened the work, Yes.

170. And that the amount of weakness only amounted to the width of the wood and the brickwork?—It leaves a hole of something like 20 in. by 12 in. when put in.

171. Then, the brickwork would only be 12 in. weak within 11 ft.?—Well, I had to get the brickwork in solid. That was the purpose of letting the contract.

172. I understood your answer to a question was that there is nothing else but complaints from co-operative workmen?—There are two ways of asking questions. I say it is impossible to get on with any men without rubbing one against another to some extent.. Some of the most successful work has been done by co-operative workmen, and the co-operative men in my districts have done as well as the others. There are good men amongst co-operative workmen—capital men.

173. *Mr. Flatman.*] You say there was a boring party. Was the boring party connected with your office?—Yes; it was under an engineer who was out making trial surveys for this line.

174. There are no records of that bore in Auckland?—There is a record; I know them myself.

175. But they were not used in this specification?—No. There was more than one made, but they were never referred to, and nobody knows anything about them. They were kept private.

176. You say there were constant delays in the work. How were they caused?—What particular ones do you mean?

177, I am speaking generally?—The work has been on hand for seven years.

178. Yes; but when there were delays between yourself and the contractor, were you parleying as to whether they had a right to do it for nothing or whether they were responsible?—The only reference was in that letter; and then the contractor states in his letter that he was going on with the work; what was he to be paid.

179. They were paid for taking down and building a new wall?—Not only paid for the labour of building, but for taking it down.

180. This plan [indicating it], and another similar plan with the struts put in at an angle, is the correct one?—This is the plan. I submit that the angle of the struts is according to the system that was used.

181. I believe it has been stated before the Committee in evidence that this crown of the arch had sunk, or come down a bit, and that there was consequently no weight on this sill, because the shoulder of the tunnel had bulged?—That is so.

182. Then, would not that show that it was all the more necessary to get this main strut in?—If you allow one strut to remain in you should allow all. If you remove one you are required to remove all, so that the pressure on the arch is the same all round. That is why we always objected to that central strut being removed, because it caused that disfigurement.

183. That is what caused the bulging, then?—Yes.

184. *Mr. Graham.*] You said this morning that none of the people connected with the carrying-out of this work were experienced, from the contractors downwards?—I did. I said, however, that one man had had some experience in tunnelling; but I said none were really experienced men.

185. Did you mean to convey by that the idea that they were undertaking a work that was beyond their capacity to carry out?—I did not intend such an answer, at any rate. I believe Messrs. McLean were fitted for the job, and they would have got on very well if they had had an experienced man with them. If they had got an experienced man they would have done better than they did.

186. The words, as near as I could take them down, were that "none were experienced, from the contractor downwards." You said you joined the service in 1872?—I did.

187. As a boy?—I was eighteen years of age at the time.

188. What qualifications had you then?—I had been very well trained in mathematics before that.

189. But with reference to contract work you had to gain your practical experience in 1872?—I had studied mathematics, which is a most important thing in connection with engineering. I knew trigonometry. I was on the Picton–Blenheim line laying out work within six months after I had started, a thing which no other cadet had done at such an early stage.

190. How long have you been acting as District Engineer?—Since about 1891.

191. For about six years acting as District Engineer?—Yes.

192. You have never had any experience outside of New Zealand?—No, I have not.

193. This morning, in speaking of the taking out of the sills, you said while you were in the sound work—that is, the sandstone work—where there was no risk of falling in you did not insist on the sills being taken out until the brickwork was finished?—I was not particular about it; it did not affect the stability of the work. There was nothing very serious about that.

194. Whilst there was no fear of the earth falling in you did not mind the sills remaining?—I did not mind.

195. But when there was a danger of collapsing you insisted on it?—I did, in the heavy ground.

196. Was not there any danger of it falling in by removing these sills in the part where the ground was heavy?—Not if it was done carefully, and removed in the usual way. They had the ribs up, and they should have temporarily strutted off the ribs to maintain the bars in position. The whole job, from the time of getting up to the sill to the bricking up of the arch is a matter of only six or eight hours.

197. Although you deprecate the idea of not removing these sills, yet you admit it is the usual thing in New Zealand?—It is done by most contractors, so I believe. I saw it done in the Round Hill Tunnel, and that is where I first formed the opinion that it was a mistake.

198. It is not the rule in the Old Country?—Sims takes out his miner's sills, and in other works they take out the miner's sills. I know cases where they have been left in, and there are cases where it has not been done.

199. It is generally done, I presume, in a majority of cases?—It is a matter for the Engineer; he proposes whether it is to be done or not.

200. What did you mean by "the usual custom"?—It has been done by most contractors, I believe.

201. That is to say, it is a general custom. So that in this country, where you have had all your experience, the general custom is against what you individually consider to be right?—That is not so. In more cases than one, I tell you, the sill has not been left in. I have not said all the tunnels in New Zealand have had the sills left in. I say that, though it has been done, it is not an advisable thing.

202. You said it is the usual thing in New Zealand, you believe, to leave the sills in?—It has been the usual thing in New Zealand; but lots of things have been done in the past which will not be done in the future.

203. *The Chairman.*] Do you stand by the word "usual"?—It has been done in the past, and it has been the usual thing, but I do not think it is advisable now.

Mr. Graham: Mr. Vickerman has admitted that he said it was the usual thing in New Zealand to leave the sills in, and that he disagrees with that practice. Therefore it is a usual custom against Mr. Vickerman's personal opinion.

Mr. Vickerman: I am not the only person who disagrees with this. Other engineers are of my opinion. The District Engineer in Dunedin is now leaving the sills out in the same way that I have done.

204. *Mr. Graham.*] In one of the letters that was read this morning—a letter to the head-office written just after this big slip had come down—appeared a statement that the contractors seemed incompetent to do anything at present. What do you wish to be understood by that?—When the slip came down it was very bad; it was very hard to know what to do; and what I meant by it was that nothing the contractors attempted to do turned out successfully. They wanted to pick up the "creep," and they tried it for five or six months. They eventually wrote me a

letter saying they wished to stop. The letter you read was written soon after the creep, and it was my expression to the Engineer-in-Chief of what I thought was the case. Circumstances proved me right, because they failed to pick up the creep altogether.

Mr. Blow: I think the word was "incapable."

Mr. Crowther: There is no difference.

Mr. Graham: They mean the same thing.

Mr. Vickerman: I was not referring to the character of the men at all.

205. *Mr. Graham* (to the witness).] You did not mean the contractors were incompetent to carry out this work?—I do not cast any aspersions on the contractors. The attempt they made to pick up the creep was not successful.

206. That statement as to the incompetency of the men is a very serious one to make. What do you mean by saying the contractors did not seem to be in an active state of mind?—Well, if you had suffered a serious loss, and saw further losses ahead, it would take a good deal of pluck for you to go on with the contract. The contractors got into such a state, and they deserve every credit for going on with the work.

207. Have you carried out much of this tunnelling work before this? What is your own experience in carrying out this work?—I am an engineer; contractors usually carry out this work.

208. In supervising it, then?—I had the charge of seeing tunnels through in Otago on the Tokomairiro–Lawrence line. There were two tunnels there. I have also seen tunnels carried through in the Auckland District.

209. How many altogether?—Two in Otago, and the Makarau.

210. Three altogether. Have you had any other tunnel that presented the same difficulties as this?—The Round Hill Tunnel was more difficult than this. It was what we called a rotten tunnel. It had to be close timbered. It was on a six-chain curve, it was sweeping away all the time, and it was so full of water that you never knew where you would have a run at any time. It was always coming down.

211. Mr. Witheridge, you said, was the best Inspector you ever had. Did you mean because of his large experience in carrying out this kind of work?—His general knowledge of work.

212. What experience had he of this kind of work?—He was put in the tunnel to see the brickwork through—to see the brickwork put in properly. All that he was wanted for in the tunnel was to see the brickwork put in sound and solid. He simply had to see that the brickwork was put in in a proper mechanical way.

213. You mean that he was a good tradesman, and knew when the work was being done properly, so far as the brickwork was concerned?—I mean that his duties extended that far.

214. Then, was he competent about the sills?—He knows about the weight of ground, probably more than most of us.

215. What is your ground for making that statement?—I had him constructing works. He constructed the Bastion Fort with day labour, and other works.

216. You had no previous experience of him before this tunnel, as to his capacity for this particular kind of work?—He did not require any capacity. His duty was just to see the brickwork put in in a proper way. He did not interfere with the timbering, except that he did not allow the timbering to go into the brickwork.

217. To your knowledge, Mr. Witheridge never gave any orders to take out a sill?—He may have told the contractor that a certain sill was dangerous, and he had better take it out. His instructions were that the contractor was to timber as he liked, provided he put the work in solid. He gave orders if the timbers were a bit dangerous that they were to be removed. He had nothing to do with the sill that they were talking about.

218. But are you aware that there was any protest made against his having these timbers out?—In one case, I think, the contractor wanted it left in, in excavating the invert. It was simply for the safety of the men that this was done. It was not done in any way to affect the contractor.

219. You have no personal knowledge of Mr. Witheridge's experience in this kind of work previous to this particular tunnel?—He has been in tunnels in the Old Country in mining counties—in Devonshire. He has worked with his father, and done all sorts of work.

220. But have you any knowledge of his experience in tunnelling work except in this case?—This is the only time I have had him employed in a tunnel.

221. You said this morning you would sooner have half a Witheridge as Inspector than one McGonagle?—I say it again.

222. Do you know about McGonagle's experience?—He may have had a lot of experience, but the way he acted in the North was such that I was glad to see the back of him.

223. You are rather prejudiced against Mr. McGonagle?—He did not do his duty, which ended in his being dismissed from the department.

224. If practical engineers twice your age were to tell the Committee that what Mr. Witheridge ordered the contractors to do was a very wrong thing, in taking out the sills at a certain time and place, what would you say?—Mr. Witheridge did what I told him. I should like to know the engineers you are speaking of.

Messrs. R. McKenzie and *Graham* having made a protest against the manner in which the witness was answering questions,

The *Chairman* told Mr. Vickerman that if, instead of answering a question straight he evaded it, he discounted his evidence; and he could not suppose the Committee when they came to deliberate would attach that weight to his answers that they otherwise would.

Mr. Vickerman: I am not used to this sort of examination at a private inquiry like this, and I would rather be examined on oath.

225. *Mr. Graham* (to witness).] If a civil engineer said he was wrong, you, Mr. Vickerman, still say he was right?—Yes.

Mr. Wright: It is just as well Mr. Vickerman should understand that, although he is not being examined on oath, the Committee has power to examine on oath, and that any question put to him has as much force as to the reply as if in Court.

226. *Mr. Graham.*] I think you said you visited this work about once a month?—Up to the time of the big creep I did so.

227. How long had Mr. Witheridge been Inspector under you before this work?—From about the year 1883.

228. And between your visits you depended, of course, entirely on what he did?—He was always in town once a week. Whenever the bricking was done he came down and reported to me.

229. Your means, then, of judging his capacity was chiefly by his reports?—I visited the tunnel about once a month.

230. You said there were three shifts of men on the contract, and they did not work harmoniously together?—I had heard the different shifts did not get on well.

231. You only visited the contract once a month, and yet you know from your own knowledge that men working continuously in three shifts were not working harmoniously: How did you know from your own knowledge, when you visited so infrequently?—You hear a good deal and see a good deal.

232. But that is hearsay. How do you know it from your own knowledge?—Supposing a man was putting in a set of timbers and he had got them in up to a certain point, and then another man in the next shift does not start where the other had them in, it would not go on harmoniously.

233. Had you been an Inspector all the time I could understand you would know from your own knowledge whether the work was going on harmoniously or not, because of your knowledge of the daily details, but it is difficult to comprehend without. That is why I asked. You said something about faulty work; and Mr. Blow suggested that clay had got amongst the water, and that is what made the faulty work during McGonagle's inspection. Were there any slips or falls after McGonagle came on as Inspector? Did it go on fairly well until the end after he took it up?—The work was about done at the time McGonagle was moved.

234. But if this slip occurred in McGonagle's time, that had nothing to do with what retarded the work?—The slip did not all come down at once; it came down by degrees. It was one of those running sores.

235. You do not wish for a moment to imply that these contractors are inexperienced contractors?—They are good men.

236. Thoroughly competent contractors?—Very good contractors.

237. Would you have the same hesitation in letting them a job now as you would then?—Seven years have passed since then. I would not have objections now; they would put a job through differently now.

238. But this particular job?—I imagine they would get a competent man, and thus get through all right.

239. But did not you consider them competent men?—They had had no experience in tunnelling.

240. *Mr. Holland.*] Mr. Witheridge had had experience in tunnelling in the Old Country, I think you said?—In mining in Devonshire, I said. He served his apprenticeship to his father.

Mr. Morrison: We shall have him to give evidence.

241. *Mr. Wright:* He will speak for himself. (To witness): You said this morning you considered the contractors were being hardly dealt with?—I do not quite remember using that expression.

242. The contractors being hardly dealt with surely implied they were being hardly dealt with by some one in authority?—Then it would be myself, I suppose.

243. You also stated that borings were a mistake, it was better for the contractors to take the risk?—Yes.

244. Does not that imply higher cost for the work? If the contractors have no data to go upon, and they have to take risks that are unknown, they must necessarily make a contingent allowance?—I explained that you could not trust borings made with small mud-augurs. Unless you happen to strike a recognised rock, what comes up is very misleading with these little shell-augurs, as I have found in several cases.

245. In reference to the big creep that you referred to, would that have been prevented simply by pushing on the work more rapidly, or by making provision for draining off the water?—The big creep occurred after the holidays. I consider that if they had gone on straight away at the time, they would have gone past there. This month's delay brought this pressure forward, and hence the slip. We always used to notice it took about a month for the pressure to come on the brickwork after it was built. That was, when we were going forward steadily.

246. As to the slips: You attribute the slips, I think, to want of sufficient attention to drainage on the part of the contractors?—The presence of water in the ground was what caused the slips.

247. Which the specification says they should provide for by drainage?—Yes.

248. Explain to the Committee the nature of the drainage-works the contractors ought to have undertaken?—It is very often difficult to drain a slip. It can be drained in various ways—by cutting a driftway and filling it with stones, or digging a trench and laying pungas. Anything that will cut the water off from the slope.

249. Were any instructions given to the contractors to cut the water off above?—It was their own risk, the same as the tunnel.

250. We are speaking now of the specification?—It provides for catch-water drains.

251. Were they put in?—No, they are generally done last in most cases. In this particular case they were not done where the big slip in the tunnel was.

252. You say they are generally done last; but should not the precautions to intercept the water have been taken first?—It would have been advisable to do so; but the contractors did not do the catch-water drainage till afterwards.

253. But were not these drains part of the work to be ordered and paid for?—Yes, that was part of the contract.

254. Did you call the contractors' attention to the fact that they were omitting this?—I asked them several times to put slip-drains in, but very little was done until after the work of the tunnel.

255. Did you instruct them to make these catch-water drains before the cutting had proceeded any distance?—They had their contract to work out; I did not interfere with them.

256. But is it not the duty of the Superintendent Engineer to see that due precautions are taken?—Not to harass the contractors.

257. *Mr. R. D. D. McLean.*] What do you mean by saying in one of your letters, "It was no fault of theirs"?—That was referring to one of the slips.

258. It was an act of Nature?—I should have said the slip should be drained. It is hard to explain that statement. I probably should not have used that term. I made a mistake. Probably I am wrong in using that term. It rested with them to provide that drainage according to the contract.

259. If this work had been done under the department as co-operative works you would have carried it out in a different way from what the contractors did the tunnel?—We should put the tunnel through just as before. We would timber it just the same as the contractors.

260. What would you have done under the circumstances, supposing you had been in the position of the contractors?—I do not think I should have been stuck up with it. I have never been stuck with any job yet.

261. Did you say they failed through lack of knowledge and experience?—Where they had that heavy creep, which was a matter that required experience in mining, and one that required special knowledge, I should have endeavoured to carry the thing on and avoided that creep.

262. *Mr. Morrison.*] You state you have had twenty-five years' experience in the Public Works departmental service?—I have.

263. You have had previous experience in tunnelling work?—Yes.

264. Was the Round Hill Tunnel of a similar nature to this?—Not exactly the same material, but a running material that gave a lot of trouble.

265. What do you mean by "running material"?—It was all loose ground, and, being full of water, it came away.

266. Was it clay or sand?—It was a mixture of all sorts of stuff.

267. Was it anything like the running sands in Otago?—Something like them.

268. Who was your superior?—Mr. Dartnall.

269. Have you any idea of the price the contractors received for the Round Hill Tunnel?—I have not now, and I do not think I have a copy of it.

270. Speaking from memory, could you give the Committee any idea?—No, I should not like to say.

271. In your opinion, was it a larger or a less sum than what the contractors had for the Makarau?—I should think they had a larger price than in the case of the Makarau, because the work was done at a different time, when there was more prosperity and everything else.

272. When was this Makarau contract taken by Messrs. McLean? When did they start the tunnel?—About February, 1891.

274. And you said in evidence this morning, I believe, that they had first-class tunnelling country to go through for 7 or 8 chains?—Yes, capital country.

275. And on the 29th September, 1891, you reported to the head of the department that a creep had set in, and it was necessary to give instructions for an invert to be built at once?—That was so.

276. On the 4th February, 1892, in a further report sent in to the department, you said the ground was still soft and got worse?—Yes.

277. And you say the cause of this last creep, in your opinion, was the stoppage for the Christmas holidays?—Yes; this stoppage of a month allowed this slacking process to catch up to the work, and the weight was thus thrown on to the work that was being carried on.

278. Then, if the work had been carried on continuously, you would have kept ahead of the pressure that was following you up?—Kept ahead of the back pressure, Yes.

279. Did you recognise that the contractors had had serious difficulties for some time?—They were in soft ground for seventeen or eighteen months.

280. That they were in difficulties for seventeen or eighteen months?—They had heavy ground; Yes.

281. And the ground was of a character that you called "slurry," or like porridge; it was very difficult ground?—That was, after the creep came down; but if they had kept on going ahead they would not have had this.

282. But, of course, it might have overtaken them for all that?—Oh, yes.

283. Do you remember a letter on the 13th January, 1896, drawing the department's attention to the fact of a large slip having taken place—about 3,000 yards—and stating the contractors were not responsible for it?—Yes.

284. And to that communication you received a reply from the department in Wellington on the 27th January stating this slip was caused by insufficient drainage?—Yes.

285. How could this be?—This letter of mine was a departmental letter, and meant that they had done nothing unusual to bring the slip down.

286. Why should the department, then, turn round and say it was owing to insufficient drainage?—They said that it was a large slip, and that the contractors were responsible for any insufficient drainage.

287. But the drainage must have been carried out to your satisfaction, as you have made no complaint?—This is a matter between me and my superior officer. He understood what I meant by it. As a matter of fact, the slip had not been drained. The contractor had done a little ditching, but he had not drained the water above the slip; and we eventually paid the contractor for building a stone wall along the edge of that slip.

288. That was after the tunnel wing-wall had been cut away?—Yes.

289. And you also stated in evidence, in connection with this same creep, that the work in connection with this particular place had been finished for about three years?—The cutting was put in earlier in the contract—that north cutting. As far as I remember, it was done about the end of 1891, and the slip in that cutting started in the following winter, in 1892, and it was there right on to the end of the job; and, of course, a heavy slip took place in 1896.

290. And you state that that particular work for that large slip, then, had been finished about three years?—Not the slip. You see the railway cutting had been put in three years before, and the slip came down three years after the cutting had been brought in so—the face-cutting at the north end of this tunnel. What I refer to was that the cutting was brought in three years before the final slip took place. This slip came away, and it went off at a shallower batter than at first.

291. In your opinion that slip was caused by insufficient drainage?—It was due to the accumulation of water at the back.

292. And how did that water accumulate?—There were two depressions across the line, and there was another hill beyond them; and we provided in the contract for a wooden shoot down the side of the cutting and a catchment basin at the bottom.

293. Had the contractors done that?—No, they had not.

293A. Before the slip took place at all had the contractors done all you asked them as regards drainage in this particular case?—They had not completed their drains. I did not press them to go any further with it until they had finished the tunnel. I should have expected them to do this other work after they had completed the tunnel.

294. Do you think the contractors are responsible for the slip themselves, or do you think it was one of those unforeseen things?—Honestly speaking, I believe it was a slip that was natural. As far as I can tell, it was due to being the bottom of a watercourse, and the water would affect it sooner or later.

295. Then you agree that it was no fault of the contractors as regards this particular slip?—I do not blame them particularly.

296. You know the price at which Messrs. McLean tendered for the various portions of this contract?—Yes.

297. Was this price a reasonable one for this tunnel, judging from the information they had at their disposal?—I think it was a bit low.

298. What did the department estimate the cost of that Makarau contract themselves at?—I think about £1,000 above Messrs. McLean's figures. The exact figures were £27,146.

Mr. Graham: The tender would be £530 below the estimate.

299. *Mr. Morrison.*] In your drawing-up of that estimate I suppose you would rather err on the generous side than cut it too fine?—I gave the department a price at which I was prepared to go and do it myself.

300. Seeing that Messrs. McLean were that much under your estimate, they had not done much cutting on a big contract like that?—No, it was a close tender.

301. Then your statement about their tendering at too low a price is hardly borne out by the facts?—That is so.

302. You said the creep in 1892 came down dry?—Yes.

303. How do you account for a dry slip?—It was a sort of a dry composition stuff. If you threw water on it it began to slack. It finally slacked into a batter, and what was formerly hard would turn into a sediment. This tunnel was at first hard, but as soon as it broke down it drew the water from the neighbouring strata. After the big creep had occurred, a heavy stream broke in and it got into slurry.

304. *Mr. Crowther.*] In the exhibits, I see that there are four items constituting the amount, and, since this inquiry began, a statement has been made that certain sums have been paid into the bank in Auckland to the credit of Messrs. McLean Brothers. We were told that in the early statement. There is one item of £715, another of £4,011, one of £318, and one of £317. Has there been any payment made, do you know, Mr. Vickerman, on account of any of these items?

Mr. Blow: No payments have been made on account of these items.

305. *Mr. Crowther.*] Then, this stands as the claim the contractors are making to-day?

Mr. Blow: That is so.

306. *Mr. Crowther* (to witness).] There is a statement made by you that one of the wings had not been properly bonded?—I made that statement.

307. Who was the Superintendent?—Mr. McGonagle.

308. And what became of that wing?—That was the one that was overthrown by the slip, and it was taken down and rebuilt.

309. And also drained with back-packing?—Yes.

310. Although you say that this wall was not properly bonded, you, by inference at any rate, are prepared to admit that the defective bonding was not the cause of it slipping?—I think the slip was too heavy.

311. It was such treacherous ground. And the way you saved it was by draining it at the back?—Yes, by putting stones in at the back.

312. That slip forms no part of the claim?—That slip forms no part of the claim; but the wing-wall does.

313. You said that although you did not pay much attention to the reliability of these bores, still, you said, the result of them was kept private in the office. If you put down bores I presume

you do so for the purpose of ascertaining the nature of the ground underneath?—For the information of the Engineer they were made.

314. You told us that you made out the estimate?—Yes.

315. Did you use any information that you acquired in consequence of these bores having been made when you made out that estimate?—I made a shot at the estimate the same as any one else—it was a guess. I had not seen the result of the bores at that time.

316. Then, you could not use them?—No, I did not use them.

317. You said you had had some experience in tunnels in the South Island, and one of these was stated to be worse than the Makarau Tunnel?—Yes.

318. How long was the contractor getting through that tunnel under your supervision?—I cannot answer without the papers. As far as I remember, about twelve months. I was in Otago for the best part of two years, and for half that time I was stationed between those two tunnels.

319. And were they begun and completed in these two years?—Yes; both of them just about the time I left.

320. And you witnessed the beginning?—I did not witness the beginning of one of the tunnels.

321. And was the same system used in the timbering and general mode of work in these tunnels as was adopted by Messrs. McLean Brothers in theirs?—Considerably more bars were used; the ground had to be supported very closely and the timber-work carried right down to the bottom.

322. *Mr. Morrison.*] The method of working would be the same?—On a similar plan.

323. *Mr. Crowther.*] And, in the construction of these tunnels, was the contractor allowed to leave in that sill that has been mentioned until the consolidation had taken place?—I said before the sill had been built in in the Round Hill Tunnel.

324. Were they allowed to be left in the tunnel?—Yes.

325. Then, does it not go by inference that the witnesses we have examined, such as Mr. Stuart, of Auckland, and Mr. Allan Maguire, are correct, who have told us positively that if they had been the Messrs. McLean Brothers and had been ordered to take those timbers out they would not have done it?—Well, Messrs. McLean Brothers had an appeal over me. They had an appeal to the Engineer-in-Chief, or to the Minister.

326. Quite true; but you see here is a discretionary power, upon which it seems to me there is some division of authority. We have first Mr. Witheridge, who gets his orders from you. You tell us you do not give your orders to Mr. Witheridge until you have your orders from the Head Engineer in Wellington. Your letters indicate that, wherever any matters of immediate emergency arose, before you took action you communicated with your chief?—In the case of anything extraordinary I was instructed to do so. That is provided for in the conditions of contract.

Mr. Crowther: I may say at once I am not in sympathy with such a very severe cross-examination, because the whole of this trouble arises on the slips question and the taking out of those sills. All the expert witnesses we have examined have told us that if they had been the contractors they would have refused to take out these sills.

Mr. Graham: That is for us to deliberate on.

327. *Mr. Wright.*] It is merely on the question of time. (Having read clause 17 of the General Conditions, he said:) According to that, the contract time allowed was two years. Once the contractors were seventeen months and no progress made, and also, as you told us, on one occasion for nine months practically nothing was done. Can you tell the Committee how it was that this provision of the general contract was not exercised—to take the work out of the contractors' hands?—It is optional to the Government whether they do it or not. In this case they did not exercise the power.

328. Can you state any reason why?—I was only instructed that they were to be allowed to go on. I think I read at one time or another a letter stating that it was advisable to go on.

Mr. Blow: I think I can put in that letter.

329. *Mr. Wright.*] But, looking to the extraordinary extension of the contract time from two years to seven, how was it during all that period the Government did not themselves interpose and take up the work under this section 17?—I know that the Premier was up himself and saw the work, and the Engineer-in-Chief was up and saw the work. I never received any instructions to take it out of the contractors' hands.

330. You made no suggestion yourself?—I made no suggestion—it was in good hands, and there was no special hurry.

331. Was there no special object in completing the railway?—Like all railways, the district people wanted them to go ahead; but that was a thing I had no control over.

332. Was there any traffic for the railway when it was finished?—Oh, yes; there has been a very heavy traffic from the Waitangi Creek on the further side of the tunnel.

333. Was any of this timber felled, or got into a position for loading?—It does not do to fell kauri timber until you are quite ready for loading, because it is very subject to fire. Until the Kauri Timber Company knew the line was available I think they kept the timber back.

334. *Mr. McLean* (the petitioner).] In reference to this slip, are you aware that before we started the cutting at all we put in a big catch-water drain to intercept the stream which crossed the line at that point at right angles?—I am aware that you dug some ditches.

335. But this one I am speaking of is a special drain that was dug on the east side of that cutting before we started the cutting at all, and we intercepted a stream of water that ran at right angles with the line across that particular depression you were speaking of for which you provided a shoot down the cutting?—I stated you had done some drainage; you cut a catch-water drain there.

336. In connection with these slips, it has been solely attributed to want of drainage or insufficient drainage. I want to point out to the Committee that I took the precaution to drain the ground

and to endeavour to intercept this water by this special drain. Explain to the Committee the dimensions or catch-water drains as described in the specifications?—[Reading from the specification:] "The ditches shall average 5 cubic feet per lineal yard, and shall be true and regular to the inclinations directed. No stumps or roots shall be left in them. They shall be made at the commencement of the work with proper outfalls, and shall be cleared out from time to time as may be necessary or ordered." [The witness also read paragraph 2 of the same clause (clause 9) of the specification.]

337. Did you pay us for this special ditch or drain?—You had payment for the whole of the drains included in the contract.

338. But was this one included?—In the same general way that it is specified here.

339. That is right. But in connection with the 20 chains of ditching that are placed by your instructions when the time comes for them to be executed?—There is nothing about my instructions at all.

340. Then I can put those drains where I like?—Those 20 chains of ditching have been paid for in the final certificate, which includes all such drains you have mentioned.

341. In reference to the slip, it has been stated in the report that none of these slips occurred during the proper currency of the contract—that is, during the two years that our contract would be under execution if completed in the contract time?—Yes.

342. When did this first slip take place in that cutting?—In the north face, as far as I can speak from memory, just about the time you ought to have completed the contract.

343. Are you quite sure of that?—Somewhere about the time of the winter of 1892. It filled up the end of the cutting in the winter of 1892.

344. When did we start?—You finished up the cutting in December, 1891, about Christmas time.

345. And the slip took place when?—When the rains came on in the winter.

346. I am referring to the first and largest slip that took place—the slip that filled up the end of the tunnel?—That was in the winter of 1892.

347. After our contract time had expired?—Your contract time expired in March, 1892.

348. And you are not quite sure whether it took place in March, or later?—Between March and July, I believe.

349. In cutting out that ground, was there any water in it?—Yes, when you got to the top end you began to strike water. You carried some across the cutting, you remember, in a trench.

350. How much of it?—Not all of it. There was some in that ditch you mentioned.

351. Would there be enough to carry the ground away?—Very little would be required to carry the ground away.

352. Would any amount of surface or catch-water drainage have avoided that slip?—I have already said before that the water was there, and it would have been very difficult for any one to help it.

353. In reading clause 13, would you describe that to be a tunnel in firm ground?—It says here: [paragraphs 5, 6, and 7, of clause 13, read].

354. [Referring to the two alternative sections of the tunnel that had been produced by the department:] Does that brick lining allude to the one section of the tunnel or the other?—The contract does not make it perfectly clear.

355. But, if you take your plans together, which section of the tunnel shown on this drawing does it allude to?—It does not allude to either.

356. You are to take the two together?—Yes.

357. One says the brickwork is to be 14 in. in lining, and the other 22 in. How would you take it?—If it was hard ground it would be 14 in., if in heavy ground, 22 in., and if it was in such solid rock as not to require lining, it says leave it out. The indications are here that the tunnel was in soft ground; or why did we put these buttresses in.

358. These are put on every tunnel?—Not at that time.

359. You told the Committee in your evidence that there was not a man, from the contractors downwards, with one exception, who knew anything about tunnelling?—I said of the leading men; I did not say of the labourers.

360. Did you know Paddy Smith?—Yes; but he was not there as a leading man. I do not remember him as ganger.

361. You do not know Hunter?—Yes.

362. Was he there?—Yes.

363. Had he been at tunnel work before?—At the Poro-o-Tarao Tunnel.

364. And how long was he there?—I do not know.

365. So that you have really made a statement here that seems very incredible, that these men knew nothing about tunnelling, notwithstanding it is possible, so far as you know, that they may have spent all their lives in tunnelling?—I did not mention Hunter's name, or Smith's name.

Mr. Graham: You mentioned them all in general.

366. *Mr. McLean* (the petitioner).] As a matter of fact, you did not know Paddy Smith was engaged on the work or not, and you do not remember my engaging him as ganger?—I remember it, now you speak of it.

367. At the same time, you make that statement to the Committee that there was not a man from the contractor downwards who knew anything about tunnelling?—Yes.

368. How long was this tunnel that you were engaged on down South?—The Glenore Tunnel 60 chains, and the other about 10 chains.

369. And these two tunnels were built inside of a year?—I did not say that. I said I was in them a year. The Round Hill Tunnel was done while I was there.

370. That was the difficult one?—Yes.

371. What kind of brick lining did you put in?—The ordinary brick lining—some of both the sections described. When we came to the very bad places we had an invert put in.

372. What was the nature of the foundation?—In the soft it was sandy, in the solid it was rubbly ground.

373. You have already stated that the sills were left in?—They were left in as far as I can remember.

374. At the time we started that tunnel did you know of any more experienced men that we had engaged. Not in the Auckland Province. I think I gave you the name of one man down South, but I do not know whether you sent for him.

375. Do you know whether I wrote to him?—I could not say. I think I gave the reason why you got on was that you got better men, did I not?

376. Was that before or after the big creep?—At the beginning of the work, after you got out into the clay country.

377. Now, you stated it was simply the only reason we overcame the difficulty was by engaging Donohue to carry out the work?—I stated you overcame it by getting an experienced miner.

378. You said you attributed the whole success in carrying out the work to Donohue, and Donohue only?—I attributed it to Donohue.

379. Do you know how long he worked there and could make no progress?—He was there nine months, I think, before he went ahead much.

380. And were you aware of the fact that Donohue informed me, and wrote a letter to me, that he would have to leave it, and could not proceed any further?—I was not aware of it. I do not believe it.

381. Then, you made a very strong objection to the putting down of the shaft?—I did.

382. Can you inform the Committee how the difficulty could have been overcome without that being in?—My objection to it was that it let the air and the water into more fresh ground. I should have endeavoured to work the tunnel from below.

383. How was the difficulty overcome?—You drove back headings in, till you got a top heading of all, and then you put your crown-bars in and worked it out.

384. You said it was through the water that the great trouble occurred. Do you not think that it was because we drained the water off that ground that was creeping that was the reason why we got over the difficulty?—After the creep occurred, certainly. I am sure you cut off the main body of the water.

385. Will you inform the Committee how we were to get at the drainage question? Unless a shaft were put down how were we to overcome the matter of drainage?—That was the way you worked it. I should not have worked it so.

386. Did it prove a success with the tunnel?—You managed to get it finished anyway. You put the shaft down without referring to me in the matter, saying that you had liberty to act.

387. You stated to the Committee that we were in the habit of putting in bars up to 30 ft. in length?—I said they had to cover 22 ft.

388. How many lengths were put in in that way?—That I could not say.

389. Were there half a dozen lengths?—I know lengths where the creep took place were put in in that way. You had 18 ft. clear between the front set of timbers and the back brickwork.

390. The bar was long enough for two lengths?—It was.

391. You stated that the centre tomb was taken down in almost every instance?—I know it was taken down the night I was there, before the creep took place.

392. Do you know how many bars we had?—There were five bars.

393. As a matter of fact there were only three in. But now, will you explain in connection with this heavy timbering how the crown bar was to be moved foward without the moving of one of those tombs?—Well, I would not have used such long bars; you could get out of it that way.

394. As far as the timbers that we were using were concerned, then, it was absolutely necessary to take out that tomb?—You elected to take it out.

395. *Mr. Graham.*] At the time that tomb was removed could it have been done without moving that prop?—I did not try.

396. Do you know as an engineer whether it could be done?—It can be done.

397. In reference to this very leg, do you know whether it was put back that evening it was removed, and the crown-bar put in?—No, I cannot say I do, but understand it was not.

398. How long were you in the tunnel that night?—From 9 to 11 o'clock.

399. Two hours?—Quite two hours.

400. Now, in reference to the first creep that took place on account of the walls coming in, how was that first brought under your attention?—Mr. Witheridge told me.

401. The evening before it was reported to you that the side-walls were coming in, were you not in that tunnel?—I was there about the time; I could not swear it was the evening before. As near as I can remember I was at the tunnel about that time.

402. Do you remember putting the levels on the crown of the tunnel, and what was the result?—Yes, the tunnel was slightly low.

403. How much?—Five inches, I should think.

404. To what do you attribute the cause?—We were at a loss to know what the cause was at that time.

405. What did you state the cause to be at that time?—I suppose I imagined that it was low.

406. You imagined we were taking a wrong level?—Yes, I dare say I did.

407. Was there ever a reply sent to the letter I wrote on the 27th January, 1893, to the Minister for Public Works?—I do not remember.

408. In 1893, we, however—it is in evidence—made certain allegations against the Inspector, and we stated in the letter that we were prepared to substantiate our statements. Do not you think it would have been fair to us as contractors to have had some sort of inquiry into this matter?—That was a matter that rested with the Minister for Public Works. I am not prepared to say. It was addressed to him, not to me.

409. But in connection with that creep I informed you by letter the next day?—I did not get your letter then.

410. Going back to the old creep where the wall came in?—I could not say from memory. There may be a letter on my file; I do not remember it at the present time.

411. You stated in evidence that I specially requested you to allow Witheridge to superintend this work?—I specially instructed Witheridge to do so.

412. You did not state that I had specially requested you?—No; you did not speak to me about it; you arranged the matter with Witheridge, I believe.

413. I think the Committee are of impression that we found we could not contend with the difficulty, and we requested you to allow Witheridge, as superior man, to come there and take the thing in hand. Is that the impression the Committee are to receive?—I do not wish them to receive that impression. I specially requested Witheridge to go and see it put right, and get the invert put in.

414. Do you know of your own knowledge that Witheridge took the whole thing out of my hands and carried it through?—Yes, I say so.

415. I think the Committee have the impression that the difficulty in connection with the creep was so great that I had specially requested you to send Witheridge up there and see all properly done?—I did not say that.

416. You stated clearly and distinctly that the cracks in the portion completed under McGonagle are greater and more numerous than the cracks in the portion completed previous to the creep. Is that a fact?—That is the fact.

417. You know that from your own knowledge?—Yes.

418. How long have these cracks been in?—They started from the time it was done.

419. Were there not some cracks in the old portion something near ½ in. in width?—At one time, but they closed down again.

420. Do you know of any cracks ½ in. in width in the new portion?—There are some very wide ones. I did not measure them.

421. You do not know of any ½ in. wide?—Yes.

422. You stated, further on, that you could not vouch for anything that McGonagle did in connection with that work. Can you vouch for anything Witheridge did during the work?—I know that when Witheridge went up there he went up to go in the tunnel, but that sometimes when McGonagle went up there he did not go into the tunnel.

423. Do you know that of your own knowledge?—Yes, I know it.

424. Will you explain to the Committee how you know it?—I found out.

425. Of your own knowledge? You really do not know it, you simply have heard of it?—It was the case, all the same.

426. In carrying out that tunnel that you speak of, down in the South Island, how long were you in the service when you were Assistant Engineer there?—About four years.

427. What age were you, if I might ask such a question?—About twenty-two.

428. And you were in charge of the tunnel?—I was left on the ground—camped on the ground. As a matter of fact I was under Mr. Dartnall, and he had such confidence in me after checking the work that he left me in charge.

429. I am not doubting that. Do you remember if in that tunnel there were any weep-holes?—I could not say.

430. Do you remember my asking you to leave weep-holes in the Makarau Tunnel?—Yes.

431. And you would not do it?—I objected.

432. What was the depth of ground above that tunnel you speak of?—I should say from memory 60 ft. or 70 ft.

433. In every case that there were alterations in connection with this contract authorised by the department to be made, did you give written orders for them?—I do not think there have been any written orders except in the case of that bridge. Also there was a written order to you that the slips would not be paid for when you applied. We did not pay for slips; everything else we took for granted.

434. Did I ever refuse to carry out any of your instructions given to me in an official way, not in writing? Of course, I took it for granted that if you gave me an order for certain things outside the contract you would pay me for them. But in carrying out any works, if at any time you ordered us as contractors to do anything in connection with the work, did we ever refuse?—I do not think you ever refused, but you did not always do what I asked you to do.

435. Did you ever give us specific instructions which were not carried out?—Yes, in one particular thing I gave you specific instructions, and you refused to put a set of timber in front of the brickwork there to carry the back of the bars.

436. This set is the one we left in?—That was taken out while you were excavating.

437. *Mr. McKenzie.*] Who sent for you to come down here?—Mr. Blow.

438. Did he inform you that it was to give evidence?—Yes.

439. Before you left Auckland?—Yes; he sent me a copy of the petition.

440. Did he ask you to bring any papers or records?—He told me to get any information I had on it.

441. Did you bring it?—I brought some of it. I could not bring all of it.

442. Do you keep a letter-book?—Yes.

443. Have you brought that?—No.

444. Is there anything in your letter-book bearing on the question?—A great deal.

445. And you did not bring it?—No; all the letters have been put in.

446. I think you told the Committee that your Inspector was in the habit of sending in monthly reports to the office?—Yes.

447. Did he send you monthly returns?—He sent reports at different times.

448. Did the Inspector measure up the work?—No; the Inspector did not measure up the work. I did that myself. He might have done it on an odd occasion.

449. Were there any reports whatever from the Inspector to the Engineer?—Not in the shape of monthly reports in writing.

450. Have you got any other Inspectors under you?—Yes.

451. Do any of the Inspectors send in monthly reports?—I have Assistant Engineers on most of the works—resident there—and they send in monthly reports. The Inspector is to look after the practical work, and he reports to the Assistant Engineer, who reports to me.

452. Did the Assistant Engineer ever report on this work?—There was no assistant in this case; I was the only engineer on the work right through.

453. And you went there and took out the quantities at the end of every month?—Yes.

454. Now, you made a very sweeping accusation about the men engaged on the contract. You stated there was not a single man amongst them who knew anything about it?—Did I say "not a single man?" I think I made an exception in one case.

455. Now, you are familiar with the conditions of the contract?—Yes, perfectly.

456. Are you aware that, if you knew that these men who started on that work were not qualified to do the work, it was your duty to direct the contractor to dismiss them?—I advised the contractor to get better men. He said he could not.

457. And you allowed them to go on. Are you aware that it was your duty under clause 26 to tell the contractor to dismiss those men?—I did not exercise that clause. I am aware that the clause gives me power to do so; and my real duty in that case would be to report to the Engineer-in-Chief.

458. Do you think that you were justified in allowing working-men to go on working in a tunnel that was dangerous?—There was a certain amount of risk I admit, but I took the risk.

459. So that, in reality, you were satisfied that they were competent?—No; as a matter of fact the ganger was killed in the tunnel at the commencement.

460. But there was no one responsible for that except himself?—Unfortunately, it happened.

461. It had no bearing on the work being carried away. You say that your Inspector had nothing at all to do, or yourself either, with ordering the contractors as to how they carried out the work?—No; the responsibility rested with them. I did not interfere, although I could have.

462. Did you make the progress-payments?—I made all of them.

463. How much was there paid to the contractors before this break-down occurred?—I have not a memorandum of the progress-payments here. [Information supplied by Mr. Blow: £20,853.]

464. You paid away £20,000 of the colony's money before the breakdown, and under your specification, if you did your duty, you should have seen that the colony was protected and the work carried on safely?—It was carried on safely.

465. You tell the Committee that you were satisfied, even two nights before the breakdown, when you were in the tunnel, that the tunnel was not safe?—The timbering in the tunnel was not safe.

466. Did you give written notice to the contractors to that effect?—I did not; I drew their attention to it.

467. Was it not your duty to have done so?—Possibly it was. I will admit that it was.

468. You did not do it?—No.

469. Now, coming back to the first lining in the tunnel, will you look at clause 13 of the specification?—Yes.

470. What lining is provided for in that clause; is it 14 in. work, in brick?—Yes, that is mentioned.

471. There is nothing else mentioned—there is no reference whatever made to 22½ in. work?—Not directly.

472. Or indirectly. Can you point to anywhere that it is referred to?—There is no mention of 22½ in. work.

473. The contract only provided for 14 in. lining without an invert?—It does not say so in this specification.

474. There is nothing in that specification that gives you power to use that lining?—There is in the Conditions of Contract, because it refers to alteration of size of tunnel.

475. What I am trying to prove is, that there is nothing in that contract that provides for any lining except 14 in. lining?—We are told to take the specifications and plans together. What is missing in one is to be expected in the other. The Conditions of Contract gives you the authority to make an alteration; they are to be read jointly together.

476. Have you had much experience of plans and specifications being issued in calling for tenders for contracts in the form of tunnels?—Yes; and I had this one issued.

476A. Have you had any others?—Not lately.

477. Have you ever seen contract drawings, where there was a tunnel, where these two section plans were not upon them? In fact, is not this form of contract issued all over the colony?—It is issued where there is not any definition of strata given.

478. There has been no alteration made in these drawings ever since they have been used in the colony?—Oh, yes; that tunnel section has been altered. It used to be a straight wall, not circular.

479. Can you say how long these standard drawings have been printed?—There is a date on that one, I think. This contract was let in Mr. Blackett's time.

480. Was not Mr. W. N. Blair Engineer-in-Chief when this contract was let?—No, it was just about the time that Mr. Blackett died.

481. Is it not a fact to your certain knowledge that these standard drawings have been used in the colony for many years?—I do not know how long this drawing has been used.

482. Did you adopt an invert in this portion of the tunnel before the first slip took place; the sides of the tunnel would not have come in then?—No, we did not.

483. Did you consider that it was good engineering to have put it through without an invert?—Well, we were ignorant of what the material was, and naturally proved it by trying.

484. And do you consider it equitable to refuse to pay the contractor for your experiment in trying to do without the invert?—We paid him for the invert, and we paid him extra for taking out the ground at the schedule rate according to the contract. I could not alter the rate.

485. Do you admit that it was bad engineering that was the cause of this tunnel coming together?—It was coming into ground that unexpectedly gave way.

486. Had this ground given way when you started to put this invert in?—It had begun to slip by exposure to air and water.

487. How much of the tunnel was done before that?—There was about 8 chains in rock, and 2 chains of it in the clay.

488. Ten chains altogether, without an invert?—Yes.

489. When you found that the roof had settled down 5 in., and that the sides had given in 10 in. or 12 in., you thought it was time to put in an invert?—Yes; it only occurred in the last two chains, it did not require to be put in in the first 8 chains.

490. Now, in putting this invert in did the contractors have to use a large quantity of timber?—I do not know; they put struts across from wall to wall; but they were paid extra for that timber, £10.

491. Were they paid extra for putting it in?—They were paid the price of the excavation, and for the extra brickwork.

492. You state that you sent Witheridge up from Auckland when he told you about the tunnel. Were you in the tunnel the night before that?—I was there either the night before or the day before, and I took levels. I found the centre of the tunnel coming down. And then they discovered that the walls were coming together.

493. Did any one call your attention to it that night?—We found it out by using the staff and level.

494. Did you accuse the contractor of taking a wrong level that night?—I believe I said so.

495. Was he in the habit of taking wrong levels?—No, not always. I do not know that he was.

496. Did you have any bench-marks?—Yes; there were nails a chain apart, and bench-marks, some 5 chains, some 8 chains apart.

497. Were you satisfied that the contractor used the level so as to enable the levels to be determined?—I had no objection, because it was his own risk. He practically said that he was able to take levels.

498. So, then, you told the Committee that you sent Mr. Witheridge up from Auckland to act as foreman for Mr. McLean?—No. I told him to go up there and be particularly careful to get the matter put right. He did act as foreman, I believe; but I did not send him to act as foreman.

499. By whose authority did he act as foreman?—It was arranged between himself and Mr. McLean.

500. Was he not a Government officer?—Yes.

501. And do you allow your officers to act as foremen for contractors?—In a pinch like this, a serious matter as it was, I did not in any way mind him doing so.

502. Did you instruct him to do it?—I did not instruct him to do it; it was an arrangement between himself and Mr. McLean. I did not instruct him to go and take charge. He went up and did what was to be done to the best of his ability.

503. Are you aware that Witheridge and Mr. McLean did not work agreeably together?—I do not think that was always the case.

504. Did Mr. McLean apply to you to remonstrate with him or to have him removed before this slip took place?—I do not remember that he did before this slip took place, but later on I think he wanted something done.

505. Do you think it reasonable to suppose, considering the relationship between them, that Mr. McLean would ask Witheridge to act as foreman in this tunnel?—I believe that he did on this occasion; at any rate, they agreed to it between them. I do not think they were generally such bad friends.

506. Did you go up there yourself and have a look at it?—Yes.

507. When did you go up?—The first time I was up was a few nights before the slip.

508. How did you always come to go there at night?—A train leaves Auckland at four o'clock in the afternoon, and I could be there in the evening and see the work, and be back in town early next morning.

509. You did not go up the same day that Mr. Witheridge went up?—No.

510. Was this all "tommed" over when you went up?—It was "tommed" over. They had got props in, and were working back with the invert.

511. How long would that be?—The whole thing was done in a fortnight, invert and all. They put the timber in at once—in an hour or so.

512. Coming to that miner's sill, taking your own sketch—this is the crown bar. When you were in the tunnel, two nights before the break down, you say that this bar was 24 ft. long?—The crown-bars were 24 ft. long.

513. That it rested from here to here [reference to plan] without any support?—Yes.

514. You say that it had sagged 6 in. Do you not think it would be likely to sag 6 in. without any weight on it at all?—No. I think not.

515. You tell us that your instructions to your Inspector were that these miner's sills were to be removed?—That they were not to be built into the brickwork. I would not have the miner's sills left in in this soft ground.

516. At the same time you tell us that in your previous experience in tunnelling these sills were left in until after the brickwork was built?—Yes; but I did not approve of it.

517. Still, you put your own opinion against the practice of every engineer in the colony?—Yes. I have had to do that on more than one occasion.

518. Do you know Mr. Allan Maguire? Do you recognise him as an authority on tunnel driving?—I believe he has driven a tunnel lately in the Nelson District.

519. Do you know Mr. Donohue, who has given evidence?—Yes.

520. Do you think he is a practical man?—He is a good enough man.

521. Suppose he tells the Committee that it would not be safe for men to work among timber with these ends cut off, would you consider that his opinion was a good one?—Mr. Donohue has his opinion, and I have mine. My opinion is that they could be cut off.

522. At the same time you admit that Donohue is a practical miner, who has had a large experience in driving railway tunnels?—I do.

523. Of course, you know Mr. Stewart. Do you know whether he has had any experience?—He has put in one in Auckland, he has not had a large experience of New Zealand tunnels.

524. Suppose he expressed an opinion, would you consider his opinion was equal to yours?—I would give him credit in being faithful in what he said; at the same time, my opinion was that it can be done, and I continue to think so.

525. As a matter of fact, after McGonagle went to the tunnel, did he have a conversation with you as to leaving the sills in?—Yes.

526. And did you authorise McGonagle to leave them in?—On considering the matter, and on Mr. McLean speaking to me, it was decided to leave them in.

527. When McGonagle had the conversation with you you authorised him to leave the sills in without being cut?—It was a general arrangement between the contractors, McGonagle, and myself. They seemed to think that they would get on much better with the sills in. As I have said, the brickwork is not in such good order for it.

528. You went into the tunnel on several occasions, and saw the sills there without being cut?—Yes.

529. Was not that an admission on your part that it was a mistake to have taken them out at first?—I allowed this to be done for the sake of the contractor. I do not approve of it now. As I say, the thing did not turn out successful. If you look at the work it will speak for itself.

530. Did you pass the works finally?—Yes.

531. Are they substantial?—They will stand.

532. What more do you want?—Well, one piece may be better than another.

533. You passed them as substantial works?—Yes. There was nothing that required them to be pulled down. I was prepared to accept the work.

534. Now as to the slips: In your letter of the 13th January, 1896, you wrote to the Engineer-in-Chief that the slip at the mouth of the tunnel was no fault of the contractors?—Yes; I used those words. It was an official letter from me to the Engineer-in-Chief, and it did not convey the meaning you want to make out.

535. Was it your opinion at the time that the contractors were entitled to be paid for that slip?—I expressed what I had to say about it in the letter: that I considered it to be a serious slip, and that it was partly a natural slip. I considered it a case that I could not decide myself, and would have to refer to a higher authority.

536. If you had the sole interpretation of that clause in the specification, would you have paid the contractor for that slip?—I hardly know that I would. I do not think that I could answer that question.

537. Coming to the question of drainage: It is stated in the departmental letters that the slip was due to insufficient drainage. Has Mr. McLean pointed out to you on the plans where there was a large drain?—Yes.

538. Was there any drain that could be cut more effectually to drain it?—There was other water coming down below that that drain did not catch.

539. How far was that drain from the top of the cutting?—It was, I think, the best part of a chain from the top.

540. So that the only drainage area between that area and the top of the cutting was 1 chain?—Yes; it was not the rain-water—it was the sub-water coming out of the strata that was the trouble. You will see there is a sort of gully there [referring to plans].

541. Was there any ground there for water to lodge on?—It was the water that was coming out of the hill—one of these soaking streams.

542. It was coming out below the level of this drain?—Oh, yes. There was a stream there, now taken away by a similar thing to what you see here.

543. But there was no drainage provided in the contract to cut off that water?—That shoot at the bottom was provided.

544. Was not the shoot put in to carry that creek?—That was the idea; to carry the water that came down here [referring to the plan]. The intention was to drain that gully with it.

545. So that you do think that the slip was due to insufficient drainage?—It was caused through the water.

546. But not through insufficient drainage; that was provided for in the contract?—They could not put anything more in the contract than they did. The water oozed out. It was the water under the clay causing the slip.

547. And it did not come down for three years after the contract time was up?—The winter after the contract time was up it first commenced to slip down.

548. Under what authority did you pay the contractors for that wing-wall?—From the Government.

549. You had no authority in the specification?—No; that was an extra.

550. Why did you recognise it as an extra?—Because I thought the contractors were entitled to some consideration over it.

551. Did you have any stone drainage behind that wing-wall before it carried away?—There was some timbering left in, but it did not act as a drain.

552. There was no drainage provided behind the brick wall? Is it shown on the plans?—No, we did not expect to require it there.

553. You did not expect to require it; but ultimately, after the wing-wall carried away, you put it in?—Yes; and paid for it.

554. Did you not pay the contractors also for removing a portion of that slip?—No, not for the slip. We paid him for taking down the old wall.

555. About your Inspector: How long have you known him?—Since 1883.

556. And you have always found him to be a qualified Inspector?—Yes, a trustworthy man.

557. You have no doubt as to his mechanical qualifications?—No. I have had him at all sorts of work.

558. Is he a very agreeable man?—Well, he is with me. I do not know how he is with others.

559. Was this man always crotchety or officious or meddlesome?—No; he is not a meddlesome man.

560. Do you consider that Mr. Allan Maguire is an agreeable contractor to get on with?—Well, he has rather a peculiar temper.

561. Have you heard of him having disputes with Inspectors?—I have heard of other men quarrelling with Maguire besides Witheridge.

562. Will you give us the names of any of these?—I cannot remember now.

563. Have you ever had Witheridge looking after co-operative contractors in Auckland?—Yes.

564. How did he get on?—Very well.

565. Were there any complaints?—No; there were no complaints. He is rather successful with co-operative men.

566. *Mr. Blow.*] Some questions have been asked you as to whether you instructed the contractors to put in drains. Do you consider it incumbent on the Government Engineers to instruct contractors where they are to put in drains to prevent slips?—They can do so, but I do not consider that they are called upon to do so. If they consider it is necessary, they take advantage of the condition in the contract and do so.

567. The Conditions of Contract ordinarily provide that slips are not paid for—they are the contractor's risk?—Yes.

568. It is therefore important for the contractor to look after it himself?—I should think so.

569. In this particular contract slips were to be paid for when they were due to steepness of slope; but slips might be due to a variety of causes outside of that, might they not?—Yes; principally water.

570. And no matter how much you might sympathize with a contractor in his having a big slip, if brought down through moisture was it in your power to pay him?—No; I could not do so. I was equally bound by the contract as he was.

571. It is evident from the correspondence that you did sympathise with the contractor; but in your opinion the Conditions of Contract, as we have them before us, are quite clear that no slips can be paid for that are not due to steepness of slope?—That is so.

572. And as you were not one of the parties to the contract you could not vary it?—I could not vary it without the instructions of the Engineer-in-Chief.

573. You have already expressed the opinion that these slips were not due to steepness of slope. Do you see any reason to change that view?—No reason.

574. Mr. McKenzie has drawn your attention to two forms of tunnel lining shown on the plans, and asked you which of these forms, if either, is referred to in the specification. Under the terms of the general conditions of contract had you power to order the contractor to increase the thickness of lining or to diminish it?—I could alter it in any way I thought best, provided that I had the sanction of the Engineer-in-Chief; any increase to be paid for at schedule rates.

575. Any extra work thereby entailed would be paid for at schedule rates?—Yes; and there was only one rate that could be paid under this contract.

576. Some question has been raised as to the age of these plans (tunnel sections). If the plans had been drawn by Moses, provided it is attached to the contract, it is equally binding on you?—Yes, it is equally binding on me. That was the plan on which the tunnel was to be carried out.

577. As the plan is accepted by the contractor when he signs the contract, is he not firmly bound to carry out the work according to the design, the age of the plan being immaterial?—Yes. He tendered upon that plan.

578. As to the length of the polling-bars: do you say the contractors were in the habit of using long bars?—They used them about this time. I had the impression that they always polled with a double length.

579. We are not particularly concerned with the part that did not fall, but the part that fell. Do you know the length of the bars in that part?—The length went over a double span in that part, 24 ft. long at least.

580. We understand you to state that such long bars as that could not be conveniently got in without moving the centre tom; but was it necessary to have such long bars?—I should rather have worked with short bars. I should have had them in one length.

581. Could shorter bars have been got in without taking out the toms?—Yes, they could have got them in below.

582. A question was asked you, as to whether you considered your duty to have given written notice to the contractor as to the insecurity of the timbering in the tunnel. Did you speak to the contractor about it?—Yes I did, in the presence of the Inspector.

583. I think you have already said that communications between yourself and the contractor were usually by word of mouth?—Yes, I used to go up there myself; and I did not consider it necessary to write.

584. If an order for extras, for which you were responsible for payment, was good enough by word of mouth, do you not think an order for timbering for which you were not responsible was good enough by word of mouth?—Certainly, it should be good enough.

585. As to the sum of £20,000 having been paid for work done up to a certain date, and as to whether it should have been your duty to see that timbering was properly done on account of this sum of money having been expended: when you certified to progress-payments under the contract, were you satisfied that work to the amount of such payments had been done?—Yes; and I still retain 10 per cent. in hand on all the work completed.

586. And if this timbering had failed, or a fall had happened, would the colony have lost anything?—No; I should have had £2,000 pounds to work upon.

587. So the taxpayers of the country were not unduly prejudiced by the fact of this timbering being defective?—No.

588. Did you order the timbers beyond the brickwork to be moved?—No; I did not, most distinctly. I drew the contractor's attention to his being careful with this set of timbers.

589. You have no hesitation whatever in making that reply?—No hesitation at all.

590. Did you object to the timbers being removed?—I always requested the contractor to have them there; and the night I was in there, what I objected to was seeing the long span of these bars and the centre tom being out.

591. *Mr. McLean* (through the Chairman).] You have stated that we were taking that part of the tunnel out in two lengths—placing crown bars in for two lengths, and that the bar was unsupported for 18 ft. I want to know what length of bar it took to put in two lengths of brickwork, as we were putting it in?—The sill that supported this bar was a false sill—it would have been removed; they may not have had it right to the end of the bars; the bars were long enough to allow two 11 ft. lengths to go in between them.

592. Are you quite positive of that? Do you know it of your own knowledge?—I saw the bar in there that night, 18 ft. long between the back support and the fore support.

593. From the edge of the brickwork to the post which supported it?—Yes, I measured it with the tape.

594. You have not answered the length of bar it requires for two lengths of brickwork—that is, between that leg and the brickwork?—It would require a bar 24 ft. long. I did not measure the actual length of the bar, but it was unsupported for 18 ft.; it is fair to suppose that it was 20 ft. long.

595. Then, I understand that you simply suppose that it was for two lengths—that you do not know it of your own knowledge?—I assumed that it was intended for two lengths of brickwork.

596. *Mr. McKenzie* (through the Chairman).] Will you look at clause 11, subsection (2), and explain to the Committee how the contractor could remove any of that timber without his authority?—I take that clause to refer to the ribs supporting the brickwork; I did not apply it to everything—not to the polling-bars or to the framework which went over it.

597. Does not this clause apply to all staging in that tunnel?—I did not apply it so in carrying the work out. The only part that I interfered with was the ribs supporting the brickwork.

598. Will you give the Committee to understand how you interpret these words in that clause [clause read]?—I acted as I considered the words meant in this case, and that was that they applied to the striking of the ribs under the brickwork.

599. In the General Conditions, extras of two classes are provided for—within the contract, and without the contract. Will you tell the Committee what you understand by these expressions?—The expression "within the contract" I should think would apply to work specially mentioned in the schedule; but, in carrying out the contract, other classes of work might be added under this general clause that we have in the Conditions, and there might not be any schedule price in the contract. Then the work becomes an extra "without the contract," and you have to settle a price for it with the contractor.

600. In settling that price, I suppose the District Engineer and contractor agree as to the amount; there is no appeal to the Engineer-in-Chief?—I do not think I have said so. That is not my opinion.

601. Have you given any written orders for extras to the contractor?—I have given him one order—only one, that I remember—it was in connection with a bridge.

602. *Mr. Holland.*] I should like to ask if these Conditions of Contract are the same for all Government works?—There are two forms of Conditions of Contract—one for large contracts, and a simpler set for small contracts.

Mr. JOHN WITHERIDGE examined.

603. *The Chairman.*] What is your name?—John Witheridge.

604. And you are?—A mason by trade.

605. Where are you living?—In Auckland.

606. *Mr. Blow.*] Do you hold the position of Inspector of Works in the Public Works Department?—I have held the position of Inspector in the Public Works Department for nearly nineteen years.

607. In which district did you commence your work?—In Auckland.

608. Do you recollect the year?—It will be nineteen years next May It was, I think, 1879.

609. Who was District Engineer then?—Mr. James Stewart.

610. Did you act directly under Mr. Stewart's own eye?—Yes.
611. Was there any Resident or Assistant Engineer between you and him?—Yes.
612. Who was the Resident Engineer then?—A young man named W. P. Hales.
613. Have you been in the Auckland District all the time?—No; I was sent down South four years ago, in 1894.
614. And you remained for how long?—Until January, 1896.
615. When you went down South was it on promotion?—Yes.
616. Did you receive any increase in pay?—Yes, an increase of 10s. a week.
617. Had you ever had any underground experience before the Makarau contract?—I have been miles underground in the Old Country—over 200 fathoms—forty years ago, and I saw all the details and actual practice of mining, although not actually engaged in it myself.
618. What description of mines have you been in?—Copper-mines, tin-mines, and lead-mines. My father being a contractor, I was brought up with him; he used to do work for all classes of mines.
619. Are you familiar with the method of timbering adopted in different classes of country?—I could timber a tunnel before I came to New Zealand. I have been in many tunnels, and got a job in one that I would not take. I would not work in it simply because it was wet—a place like the Makarau Tunnel.
620. You declined on the ground of health?—Certainly; I would not work in a tunnel where it was wet.
621. You say you were employed under Mr. James Stewart—for how long?—I think about three years.
622. Do you hold any testimonial from Mr. Stewart?—I do; I have it with me. [Testimonial dated 15th September, 1885, read.]
623. Was that about the date that Mr. Stewart left?—No; it was at the time the Auckland Dock was being built, I applied for it; it was long after he left the department.
624. Were you Inspector of Works on the Makarau Tunnel from the start?—Yes.
625. Are you familiar with the slips that occurred on that contract?—Yes; I have seen them all.
626. Did the slip at the north face occur while you were there?—Yes.
627. Are you aware of the clause in the contract which provides that slips shall be paid for where they are due to steepness of slope, but not when they are due to defective drainage?—Yes.
628. Did you form any opinion as to whether these slips were due to steepness of slope, or due to defective drainage?—I think it was due to a small amount of drainage that could not be got away by the drain that had been previously dug to carry off the water from a higher level; a small amount of water running in from time to time.
629. Then, was the material that slipped down soft by moisture?—Yes; it became soft by moisture.
630. Do you know all about the work that took place in the tunnel up to the time of the big creep?—Yes.
631. What was the nature of the material passed through in the tunnel?—In the first 8 chains it was what we call sandstone rock. After that it was a sort of compressed clay—previously no doubt it had been a mud beach.
632. Was this difficult to excavate?—It was very hard in places, and in some places very soft. It was soft and difficult to excavate in wet ground.
633. But was it wet as you found it, or did it become wet by being allowed to lie?—It became wet after it was allowed to lie; but it always softened when we came to water, more or less.
634. If you had been carrying out this contract yourself, and had determined to push it through, and carry the brickwork on as quickly as possible after the heading, do you think you would have encountered soft ground?—In places we should have encountered softer ground than at others. It did not run all alike—some hard and some soft.
635. Did it get soft on exposure to the air and moisture?—Yes.
636. Would the Committee be right in inferring that if the contractors got the excavation out quickly, and the lining in at once, that they would not have encountered soft ground?—Well, the longer you let it lie the softer it would get.
637. Do you know whether the excavations of this tunnel were allowed to lie at any time in an incomplete state?—Only at Christmas time, for about three weeks; when it fell in, about a fortnight after.
638. Do you refer to the Christmas immediately preceding the fall?—Yes.
639. Do you think that the condition of the tunnel was in any way made worse by being allowed to remain for these three weeks?—Of course, the longer it was left open, the more it softened, and the more likely that there would be trouble with it.
640. Are you familiar with the method of timbering adopted by the contractors in the tunnel?—Yes.
641. Here are some sketches prepared by Mr. Vickerman. Do these illustrate the method of timbering adopted?—Yes.
642. Could you describe the method of timbering to the Committee?—Of course, this bottom sill was put in first for the two toms to rest upon, then the toms were put on; and after the toms there was the cap, and then the miner's sill on top of the cap; then these bars were put in [referring to plan], and the toms were put in as they were required to support the bars; then these intermediate struts were put in between the polling-bars.
643. When the brickwork came to be done, this rib was put in?—Yes; this was all put in before the brickwork was commenced. After the invert is in, the toms are put in to support the ribs; the ribs rest on them; then the laggings on top of the ribs; then the brickwork.
644. Was the rib ever moved before the brickwork was thoroughly set?—Not the rib.

645. How long was it left in usually?—It simply depended upon how many ribs they had on hand; sometimes it was longer than at others.

646. Then, was it left just to suit the convenience of the contractors?—Yes, the ribs were.

647. Were the ribs ever moved until the brickwork was thoroughly set?—No, never.

648. Does this plan show a set of timbers just beyond the end of the finished brickwork?—Yes, that shows the end of the 11 ft. bar.

649. At what stage of the proceedings was the temporary sill removed?—It was removed when we put in this sill here [reference to plan and explanation].

650. Do you know what length of crown bars were usually employed?—They were 23 ft. or 24 ft., as a rule.

651. Have you any knowledge of the length of the section that fell?—I know it was 18 ft. from here to here [between supports].

652. Do you know if it was any longer?—The bar was projecting over here, of course.

653. Have you any idea how much?—It may be 2 ft. or 3 ft., or it may be 1 ft.

654. What was the back end of the bar resting on?—On the brickwork.

655. Do you think that a proper method of construction?—According to all engineering knowledge they say so.

656. Did you think it would have been better if it had had a set of timbers?—I always was of opinion that there should have been a set put in to support it.

657. Was there a set of timbers immediately beyond the brickwork at the time the fall took place?—No.

658. Did you order the timbers to be moved from there?—No.

659. You are quite sure of that?—I did not. I was not there.

660. But you lived on the spot, did you not?—Yes.

661. How often were you in the tunnel?—Always when the brickwork was being done.

662. It was your special duty to watch the brickwork?—Yes.

663. Of course, it is impossible to get the brickwork in to the specified size unless the tunnel is excavated sufficiently?—Yes, of course.

664. Therefore, you did not consider it necessary to watch the excavation process minutely?—No.

665. But you are quite sure that you watched the laying of the brickwork carefully?—I was always there.

666. And you are quite satisfied that you gave no directions to move the set of timbers immediately beyond the end of the brickwork immediately before this fall took place?—No, I did not. But they were moved, because they were not there when the fall took place. This [pointing to plan] was the only set of timbers standing when the fall took place.

667. How far was the crown bar resting on the brickwork?—I say it was less than 1 ft.

668. What means had you of judging: did you measure?—No; I did not measure, but I could see plainly. When I went to measure there was 18 ft. from the face of the brickwork up to the strut at the other end of the bar.

669. Was the brickwork that it was resting on new or old?—It was new.

670. How new?—It was put in on the 13th and 14th January, and the fall took place on the 20th. It was about a week old.

671. Did you consider it a fair thing to bring the pressure which that crown bar would bring on to brickwork a week old?—No; considering there was this overlap here, with the length of the crown bar; scarcely any work could stand that.

672. The overlap of what?—The overlap of this 11 ft. length [showing on plan].

673. How great was that?—8 ft.

674. In addition to the pressure of the crown bar, there was an overhang of the back polling-bars of 8 ft.?—Yes.

675. The combined pressure of these was acting on the new brickwork?—Yes; it was an enormous pressure.

676. Was it the practice of the contractors to build-in their crown bars?—Yes.

677. Was it the practice to build-in the miner sills?—No.

678. Did you object to that being done?—My instructions were that the brickwork had to go in solid. They could not build them in, and put in the brickwork solid.

679. Was any portion of the tunnel carried out with the miner's sills not built in?—Yes.

680. How much of it?—Nearly 22 chains—excepting a few that were built back in the brickwork, in the sandstone rock.

681. How much of the tunnel in the soft clay country was constructed without the miner sills being built in?—About 12 or 13 chains.

682. And was that a satisfactory job?—Yes. Not an inch of it came down, and it is there yet.

683. Have you had experience in other tunnels than this?—Yes.

684. Did you usually allow miner sills to be built in?—No; it is not usual in any work that I have seen.

685. Did you carry out under your own supervision any other work?—Yes; on the Otago Central there was a tunnel of 7½ chains, and we never built in a sill nor a bar. This was under my own supervision. There was no contractor, it was done by co-operative labour. It was rock country, but very treacherous rock.

686. Was it what you call heavy ground?—Two lengths of it were in heavy ground.

687. Did it require heavy timber?—Yes.

688. As heavy as the Makarau?—No; the bars were not so big as in the Makarau Tunnel, but they were put in in the same way, and in the same quantity.

689. Is timber a scarce commodity in Central Otago?—Yes; no timber grows there.

690. Is timber a scarce commodity in the Makarau district?—No; there is any amount.
691. There was therefore no reason why the contractor should have been economical with timber?—No, there was no reason whatever.
692. Did you build in the crown bars in the tunnel on the Otago Central?—No; we took out every bar.
693. Did you go into the tunnel with Mr. Vickerman a night or two before the fall?—Yes.
694. Did you keep a diary when on that contract?—Yes. It was on the 17th January.
695. Have you got any entry in your diary with regard to that—concerning your interview with Mr. Vickerman shortly before the fall?—Yes.
696. Will you produce the diary?—Certainly I will.
697. Will you read the entry?—Yes. "17th January, 1893: Mr. Vickerman was up to take levels and centre of tunnel, 44 to 56, level and centre correct. 22 ft. further ahead: Arch of tunnel 4 in. too low, and centre 1 in. too far to the right. Received orders from Mr. Vickerman to raise walls of tunnel 1 in. every 11 ft. length till it gets to proper height. The centre bar was bearing on brickwork less than 1 ft.; the struts had been taken out in the centre and the bricklayer was taking out the packing on quarter of arch to give the bars a bearing on them. I told him to be careful to repack it up tight, which he promised to do. On account of bars projecting over the arch 8 ft. there was great leverage with no support underneath, and if they were not careful they would pull or drag all the brickwork to pieces."
698. *Mr. Graham.*] When was that entry made?—It was made on the next day—the same night or next day. I could not be sure.
699. The day after your visit on the 17th January?—Yes.
Mr. Blow: I submit that the Inspector having put his diary in in good faith, no other entries contained in it should be referred to unless they refer to this work.
The Chairman: He has made a quotation from the diary, which I will get the Clerk to read, for the purpose of seeing that it is correct.
Mr. Blow: Another entry in the diary appears which I would like to have inserted. I protest against the whole of the diary being used for the purposes of examination.
Mr. R. McKenzie: I say that I have every right to examine the witness; it does not matter what Mr. Blow thinks about it.
Mr. Blow: I simply place my view before you, and I claim that the witness should be examined as to the extract, and not from the diary.
The Chairman: In the meantime I will not give a decision in the matter. I will retain the diary. If the witness wants the diary for further quotations I will hand it back to him.
700. *Mr. Blow* (to witness).] How much of the tunnel was constructed up to the time you left it?—Twenty-one chains and 75 links.
701. What was the total length, 28½ chains?—I should say that; there was not 7 chains to construct.
702. Was the work progressing actively when you came away?—No, stopped.
703. Do you know whether the miner's sills were built in?—Yes, I believe they were built in. I was not there, but they were built in right enough, because I saw the place where they were built in.
704. Have you examined the tunnel since your return from the Auckland District?—Yes, many a time.
705. Are there any cracks at the lowest end of the tunnel?—Yes.
706. Any cracks on the other end?—Yes.
707. Which are the greater?—The cross patch in the ridge-piece was executed since I left. It would not be fair to calculate the 22 chains, because there is some good ground—some 12 chains or 13 chains—where there are no cracks.
708. Do you recollect the occasion when the invert was first put in and the side works had to be under-pinned?—Yes.
709. Will you give us a description of what was done?—In the first place, when I was going into the tunnel I met Mr. Neil McLean, and we looked over the whole affair, and we saw there was something wrong in the foundations and the tunnel was coming together. We came to the conclusion he ought to strut the tunnel, and put side planks in. It was getting late in the afternoon, and I caught the train to Helensville. I went to Vickerman that night and told him that there was no other remedy than to invert the tunnel.
710. Did you have anything to do with inverting it?—Yes; everything was done in accordance with my instructions—protecting the strutting and taking out the facings underneath the side wall. The facing was taken out by masons. The bricklayers took out the ground underneath the wall.
711. Did you do that to assist the contractor?—It was done to assist everybody.
712. As Government Inspector, was it your duty to personally supervise the work?—Mr. Vickerman instructed me to do so, as he knew I understood the work. It proved to be so because it never shifted the hundredth part of an inch. This I proved by driving nails in and measuring it with a rod, and there was no sign of it giving, from beginning to end.
713. Did the contractors raise any objection to your supervising these men in this work?—Not the least.
714. Did they agree?—Yes; or I should not have done it.
715. Did they request you to do it?—It was generally understood that I should do it.
716. Do you know what the men were called who were in charge on this work? Did they call them "gangers"?—No; they were all workmen.
717. Who directed them?—Of course Mr. McLean superintended the lining of the tunnel.
718. Who directed the contractor's workmen in lining the tunnel?—Of course they would receive instructions from Mr. McLean.

719. Who was over the men driving the tunnel?—A man named Wells, and James Mackay, at that particular time.

720. What particular time?—Oh, you mean right through the tunnel. There was a man first, by name of Reardon, that took the foremanship of the tunnel. He was killed. Then a man named Clemow came, and he acted as foreman; and then a man named Smith working on the line as a sub-contractor, and he was the foreman of a shift in the early part of the contract.

721. Anybody else?—A man came there by name of—I cannot think. He came from Waikato. He came as a first-class working-man, but had not worked in a tunnel.

722. Do you know any other man who had experience, who had never worked in a tunnel before they worked in the Poro-o-Tarao?—They said they had not.

723. Do you know the Poro-o-Tarao Tunnel?—I never was in it.

724. *The Chairman:* I understand, Mr. Blow, you put this in as an extract from the witness's diary?

Mr. Blow: I am in charge of the case, and I put the diary in for the sake of the extract bearing on this case.

The Chairman: I will hand it to the Clerk, as part of the diary bearing on the case.

FRIDAY, 17TH DECEMBER, 1897. (Mr. T. Y. DUNCAN, Chairman.)

Mr. WITHERIDGE further examined.

The Chairman: I think, Mr. McLean, it would be as well, if you have any questions to put to Mr. Witheridge, that you should put them now.

1. *Mr. Murdoch McLean.*] Mr. Witheridge, you stated to the Committee that you had been miles in a tunnel?—I said I had been miles underground.

2. Is it a fact that you stated to the Committee that you had had charge of some tunnelling prior to the Makarau Tunnel?—No.

3. You gave us an account of some experience you had had in connection with tunnelling?—No; I said I once got a job in a tunnel.

4. Then you really had no experience previous to your taking charge of this Makarau Tunnel?—No.

5. You stated in evidence that the weight was brought on to the bars on account of the exposure?—The weight always travelled up with the exposure.

6. Was there any water in the drains as we opened them?—Oh, yes.

7. Was the sand rock at times in the excavation?—Yes.

8. When such was the case, what state was the ground in?—It was in a very wet liquid state.

9. At any time during the construction of that portion of the work, did we leave the thing for an undue period?—Not that I am aware of when the water was there.

10. We pushed on the work as fast as we could under the circumstances?—Yes.

11. Very great stress has been placed upon the question of this exposure. At the time we closed up the tunnel at Christmas time, was the space slabbed right up to the brickwork?—I would not swear to that.

12. Then, as a matter of fact, you did not know of your own knowledge that the ground was left open and exposed to the air?—Above the miner sill?

13. I want to know from you, was the face of the tunnel boarded up to secure it from exposure?—I would not swear it was or was not.

14. As a matter of fact, of your own knowledge, you do not know that it was?—I do not know whether it was closed up or not.

15. Will you look at these plans again, Mr. Witheridge. Did you state to the Committee that this [indicated] was the first piece of timber placed in timbering the tunnel?—Yes.

16. Are you aware that the crown bar is the first piece of timber that is put in a tunnel? Mr. Blow asked you to describe the manner of carrying on the work as shown on these plans?—It is evident I made some mistake in connection with that.

17. You stated to the Committee that there was 8 ft. of overhanging bars here [indicated]?—Yes.

18. And, consequently, on account of the 8 ft., there had been brought an enormous weight?—Yes.

19. The 8 ft. there was supported with this sill [indicated], was it not?—No; not when I was there.

20. These crown bars were in when you were in the tunnel?—Yes, and the two shoulder bars.

21. There were three bars supporting?—There were three bars in on top, and they were in the act of putting in two quarter bars.

22. Will you explain to the Committee how these bars with 8 ft. hanging over here [indicated] brings an enormous weight here [indicated]?—Simply because this [indicated] was not it; it was only that. This [indicated] was put in after. It was here [indicated] to there, 18 ft. long. This [indicated] was taken away, so that you could excavate the main surface.

23. The crown bars and shoulder bars were supporting the ground?—Yes; there was nothing else to support it.

24. You say, because this [indicated] was 8 ft. long., there was an enormous weight brought there?—Yes.

25. Supposing you were to cut the 8 ft. bars off there, what would be the result?—You would not have that 8 ft. of leverage.

26. You must remember the crown bars were in. What were they doing?—They were carrying the weight so far as they could.

27. We will start at the first creep where the brick lining came in towards the centre: What date was it you met my brother in reference to this creep?—I do not know.

28. You put a copy of a diary in to the Committee. Do not you think that an important matter like this creep, where the whole of the tunnel was likely to come down, do not you think that would have been a matter you might have given us?—I am certain it was put in. There were a lot of books that I had in a cupboard, and we shifted our house because I was going away, and my wife was sick and wanted to get next door to my daughter; and there were a lot of books tied up in a bundle, which evidently got lost, and this is the only book out of the lot that I have any information in in reference to the tunnel.

29. As a matter of fact, you have not got the date?—No.

30. It has been stated in evidence, Mr. Witheridge, that we employed you as foreman in carrying out this particular part of the work?—When I went down to see Mr. Vickerman, I went to Auckland to see him after we agreed that we would strut up the tunnel before I came back. Well, I went to town, saw Mr. Vickerman, and explained to him that the whole tunnel was going to give for about 2 chains, and myself and Mr. McLean had decided what to do; and I explained to him what that was: that was, in putting a block each side of the tunnel and strutting it 10 ft. apart. I came back next morning and it was all strutted up, and a good job made of it too.

31. Then we did not employ you as a foreman to carry on that work?—I was not employed by you. It was agreed I should put up the work, because there was no one there that could do it.

32. I really had nothing whatever to do with it?—No.

33. You were there as Inspector, and saw that the work was done. The men were employed by me, under my instructions, were subject to my will in the matter in all respects and to my orders, in connection with the whole of the work, was that so?—They might have been employed by you, but were subject to my directions.

34. Did you at any time order the sills to come out?—You could take them out or cut them off.

35. Did you ever write a letter to my foreman respecting these sills?—Yes.

36. What was the purport of that letter?—He could take out or cut off the sill, to allow the brickwork to go in solid.

37. Were those the actual words of it?—As near as I can remember.

38. Did you ever say there was no weight on those bars?—Yes; many times.

39. And did you ever say there was no weight on the legs?—Yes.

40. Did you say to the Committee that it was very heavy ground right through?—I said the weight was stronger up behind us; and it was very heavy.

41. How can you account for your statement that there was no weight on those bars, and you say to the Committee the weight was going right through?—I could lift every lath on many occasions in order to sustain the larger tunnel; and if it was not for fear that anything might drop out, there was no need for timber in portions of that tunnel.

42. Do you remember on one occasion, Mr. Witheridge, stopping the work, presumably because the bricks were not fit to go into it?—

43. You said in evidence, in connection with this length that came down, that you cautioned the men about taking out the packing for these wing-bars. Would you explain to the Committee how the wing-bars came to be put in without taking out the bars?—I said the packings were taken out to let in the bars.

44. And what further did you say?—With reference to that bar [indicated], a man was taking out the packing over the arch before this bar was placed, and I said, "You had better be careful. The enormous leverage that is over here, with these bars hanging 8 ft. and with struts taken out in the centre, if you do not mind you will drive or pull the brickwork all to pieces"; and I asked him to pack it up, which he promised to do.

45. Was I in the tunnel?—In the tunnel, but not here [indicated].

46. Was I in the tunnel at the time?—Yes.

47. You considered that there was some danger about this?—Yes.

48. Then why did you not draw my attention to it?—Your attention was drawn to it by Mr. Vickerman. In his presence I have nothing to say.

49. You did not think it of sufficient importance to call my attention to that particular wing-bar?—I had heard Mr. Vickerman caution you about the bars, and therefore it was not necessary for me to interfere. I mentioned it to the man as I was coming out.

50. Did you at any time stop the work of the tunnel from Saturday to Monday?—No.

51. When it was ready for bricking?—No.

52. For any purpose whatever?—I never stopped the men.

53. *Mr. Flatman.*] I understood you to say you had a testimonial from Mr. Stewart, the Civil Engineer; what was the date of that?—1885.

54. How long had he known you?—Twenty years.

55. He knew you, then, in the year 1865.—Yes.

56. When did you leave England for the colonies?—I left England between thirty-five or thirty-six years ago.

57. When you left, thirty-six years ago, did you come direct to New Zealand?—I went to South America.

58. What year was it when you first came to New Zealand?—I landed on the 24th December, 1864.

59. Did you know Mr. Stewart previous to your coming to New Zealand? How does he say he knew you twenty years in the year 1885?—Because I worked under him at Mechanics' Bay.

He gave me this testimonial in 1885, when I applied for the inspection of the dock, and which Mr. Holland knows I ran second for.

60. You say you had been miles underground but not in a tunnel. What were you in underground?—In a copper-mine.

61. They are practically tunnels that you go underground in, are they not? They would be timbered in many instances?—Yes.

62. You said you do not know whether the tunnel was boarded up at the Christmas time when the work was left on the 19th December to the 9th January? You do not know whether that tunnel was boarded up or not?—I would not swear that it was.

63. Was it not your place to see that it was boarded up and left in a proper condition?—Not necessarily. I think it was the contractors' risk.

64. It had nothing at all to do with you?—I only interfered with the driving of the tunnel.

65. I am speaking of the boarding up?—Yes.

66. As an Inspector, was it not your duty to see that the tunnel was safely boarded up?—I never had anything to do with it.

67. After that, you found that the sides of the tunnel were coming in?—Not there.

68. Was it previous to that?—A long way back.

69. They were coming in?—Over 2 chains at once.

70. Had you any authority to have that strutted up to prevent it coming in without seeing Mr. Vickerman?—Of course, in a case like that, I have got to consult the contractor and see what he says. But I did not stop to see it boarded up.

71. I am speaking of strutting it up in coarse timber?—Yes.

72. You understood yourself that the tunnel was coming in?—Certainly.

73. Was it necessary for you to go to Auckland to see Mr. Vickerman, to get instructions about the threatened collapse of the tunnel?—It was necessary for me to go to Auckland and inform Mr. Vickerman that the tunnel was coming together, and also to inform him what Mr. McLean was going to do.

74. You knew he was going to do it?—Certainly.

75. What was the use of going to see Mr. Vickerman then?—To have instructions in reference to the invert. I wanted to know what was going to be done permanently.

76. You have said, Mr. Witheridge, that the contractor could take out or cut off the sill, whichever he pleased?—I did.

77. And that was the rule all through?—Pretty well.

78. *Mr. Graham.*] You say that you have been in the service of the Government for about nineteen years, Mr. Witheridge?—Yes.

79. Before that you came from England?—Yes.

80. Do I understand that in England you worked in tunnels?—No.

81. Had you ever any experience in working in tunnels in England before you came to this country?—No.

82. Have you had any experience of tunnel work in New Zealand previous to your being Inspector in this work?—No.

83. Never had any previous experience in any tunnel until this job?—No.

84. Will you tell me what are the duties of an Inspector of a work like this?—The duties are that I had to see the work put in in a workmanlike manner, that the quantity of cement, sand, good bricks, and lime was put in, and the tunnel carried out to a grade or otherwise.

85. To generally supervise the work, and generally see it is done correctly. If you see anything wrong, it is your duty to direct it, and direct what it ought to be?—In connection with the contract.

86. It is part of your duty to see every portion of the work in that tunnel. You are the man in charge. The men are under your orders?—Yes, inside the specification.

87. In the absence of your superior officer you are the person in charge, and you are responsible for seeing the work is carried on correctly?—Yes.

88. It is your business to see the work is done right, and your business to see that the things employed are removed after they have done their service?—I do not know that I have power exactly to do a thing like that.

89. You say you never have had previous experience with reference to the timbering of tunnels to prevent the work falling in?—I was thoroughly acquainted with the plan of a tunnel before. I said I have had nothing to do as Inspector of works in a tunnel before.

90. You had no previous experience?—No.

91. Do you think any man, either you or any one else, is competent to go and take charge of that without any previous experience?—You must understand I have been brought up to similar work all my life.

92. Have you ever had work as an Inspector of a tunnel before?—I have had similar work.

93. You were placed in charge of a tunnel, and you had to superintend the proper working of that tunnel, and you admit you had never had any previous experience?—I had nothing to do with the tunnel.

94. Are you a mechanic?—Yes.

95. What is your trade?—A mason.

96. Does that mean bricklayer, or both?—Anything, as far as constructing goes.

97. I ask you what is your trade. Is it a mason, or more than a mason?—I work at both.

98. You are an expert workman?—They say so.

99. I suppose you attach considerable value to the testimonial which you have produced from Mr. Stewart, the Civil Engineer?—No.

100. You worked for Mr. Stewart before that?—I worked under Mr. Stewart for Peter Grace.

101. As a bricklayer and mason?—Yes.

102. You never worked under him in anything of this kind?—No.

103. His testimonial as to value would only be as to your capacity as bricklayer and mason?—That refers to general work, where good judgment is required. You cannot start brickwork without going into heavy work.

104. You were very anxious to have this brickwork to look neat and tidy, and some of the sills had been left in and taken out afterwards, and they were unsightly. Did you order the sills to be taken out or cut off?—They could take them out or cut them off.

105. You ordered those sills to be taken out or cut off before the arch was built in?—Yes; I ordered it to be removed.

106. Your first object was that the brickwork might be put in?—Yes.

107. You had no knowledge of the danger?—Yes.

108. You had no previous experience of this kind of work, and yet you had the knowledge?—I have had similar work in connection with houses.

109. You have never inspected over any work of this kind before this particular tunnel?—No.

110. Do you think that a man who had previous experience would be likely to have a better knowledge than yourself?—It does not appear so.

111. Is it reasonable to suppose that a man who had superintended a number of tunnels would be likely to know more about it than a person who had never had any experience at all?—He may or may not.

112. A person of superior qualifications would be likely to know more about it?—When a man has worked all his lifetime at this sort of work he is supposed to know a good deal of it.

113. You do not think there is much danger about this class of work?—Not if properly carried out.

114. Such slips you met with there you felt you were capable of getting over?—I think I could do this work.

115. You think you could have carried this work through all right?—Yes.

116. Although you had never had any experience of this work before, and no experience of this one?—I had not inspected a tunnel before, but I understood this one.

117. When this creep came down, and the whole thing was coming in, I suppose it was rather an excitable time?—I had no doubt it was, but I was not there.

118. When were you there?—I was there on the 17th.

119. That is, three days before?—Yes.

120. What time was it you were there, when you were kind enough to get the contractors and the men out of their difficulty?—On the 17th.

121. You were afraid of this coming down?—Yes.

122. You thought, owing to your natural capacity for this kind of thing, you were able to take charge?—I never did anything of the kind.

123. It is an excitable thing when this sort of thing happens?—It never excited me.

124. You are a man of rather cool disposition?—I do not know.

125. You had no previous experience, but you think a work of this kind can easily be carried to a successful issue without previous actual experience?—Yes.

126. You said that a portion of the tunnel about 2 chains in length commenced to slip in?—Yes.

127. How far had the general tunnel work advanced beyond that point before the indications of failure?—I think about 1 chain.

128. How long did that chain take to execute?—About a month.

129. At the time these 2 chains were constructed, were there any indications of water?—Not in that portion.

130. The water appeared there a month after the work had been executed?—I could not say what time the water appeared there.

131. At least a month had elapsed?—Yes; more.

132. It gave way for want of proper stability?—No; in the foundation.

133. There was no invert provided?—No; and the foundation gave way.

134. There was no evidence of that when the tunnel was built?—No.

135. You said that you were the man that carried out the necessary alterations where the part failed?—I did.

136. Did you act under the authority of the Engineer in Charge?—Yes; he told me to see to it.

137. Were you simply to help the contractors, or were you to take charge of the work?—It was generally understood I was to take charge, because there was nobody there who understood anything about it.

138. Practically, the Government at that time took charge of the necessary repairs?—The contractor paid the men?

139. If you were the man that carried out the work, you must have been in chief authority in the tunnel at the time?—On that particular slip I was.

140. And as to measures to be adopted to check the tunnel from slipping in, you practically over-rid any orders that might be given by the contractors?—They were quite willing for me to work as I was.

141. Then, a great deal has been said about the slips that took place in the cuttings outside the tunnel. How long did those cuttings stand before they commenced to slip in? What time elapsed after the cutting was made before the sides commenced to give way?—I think in the first slip the cutting had not been completed.

142. Did the contractors make any attempt to draw off the water?—There was no place in that particular spot where that came down that you could do anything at all with it. It came down between two drains, was bigger in front than behind, and it was impossible to give that portion of the slip any drainage.

143. So that it slipped in between?—Between these two slides.

144. In spite of anything a contractor might have done to stop it?—I do not think there is any fault in connection with the contractor in that part of the slip.

145. Were there any slips that came down that could have been prevented by reasonable precautions on the part of the contractor?—There are plenty of things occur you cannot foresee, and a slip may occur at any time, although a contractor may carry out his contract rightly.

146. Did they neglect to do anything that, in your judgment, they ought to have done?—Not in that particular place.

147. Did the contractors neglect to do anything which, in your judgment, they ought to have done?—The slip at the north end of the tunnel—there was a drain cut to carry off a big part of the water, but there was a small stream at the end of the tunnel that was never carried off.

148. Did you give them any advice to have it stopped?—No, but it should have been stopped.

149. How was it you gave them no instructions, when you were foreman?—Mr. Vickerman, I understand, was the man who gave the instructions, Mr. Wright.

150. You, as foreman in charge, gave no instructions?—No.

151. *Mr. R. D. D. McLean.*] Have you been on any tunnel work since?—I was sent down to the Otago Central Railway to take charge of that railway four years ago.

152. What position did you occupy?—As Inspector.

153. What was the nature of the ground?—It was schist rock.

154. As far as difficulty goes?—Any one that knows the strata of that country knows that the rock lies in layers, and when it gets wet it comes away.

155. Was that work satisfactory?—Yes.

156. In giving the contractors instructions when overseeing the work, did you take your instructions from the Engineer in the first instance?—Yes.

157. Was he there the greater part of the time at Makarau?—He was there for a month, I fancy, in the early part of the work.

158. You took upon yourself every now and again the responsibility of telling the contractor what to do?—Not outside of my instructions.

159. What interval would elapse between the time he was there to give you instructions and you had to rely upon yourself? How long would you be there without having the Engineer to refer to for instructions?—Sometimes a week, a fortnight, or a month.

160. What was the weather like when these slips took place?—Very wet.

161. To what do you attribute the slips?—I attribute the slips partly to the nature of the ground and partly to the wet.

162. What about the drainage—do you think the contractors made all reasonable precautions?—In this particular case there was one small drainage never cut off. It was wet there, and always had a tendency to soften in that part.

163. Do you think, in carrying out this contract, the contractors provided all the drainage that was required under ordinary circumstances?—Not in that particular case.

164. What place is that?—At the north end of the tunnel.

165. Do you think that, under the circumstances, the contractors made all the provision they could?—There was always, as I said, a little water running down that was never cut off.

166. Did they generally take every precaution? What was the rainfall, was it excessively heavy?—Yes.

167. How many inches of rain fell?—I could not answer that.

168. *Mr. Crowther.*] Mr. Witheridge, did you instruct the contractors to take out that main sill contrary to their wishes?—I never instructed any one to shift an inch of timber in that part which fell down.

169. Did you not receive orders from Mr. Vickerman that that main sill must be taken out, and the hole filled up as the brickwork proceeded, prior to the arch being put in?—That was the general order.

170. Did you carry out that general work?—Yes.

171. Are you aware the contractors were very anxious to leave that top sill in?—He never said anything about it the night we were there.

172. I am asking you, did you receive instructions from Mr. Vickerman that that sill was to be taken out as the brickwork proceeded, and not to be left in and taken out after?—They could take it out or cut it off.

173. What does "cutting off" mean. Do I understand you to say that you had that instruction from Mr. Vickerman—the brickwork was to be continuously built up?—Built up ahead.

174. And that could not be without that sill being cut off?—Yes.

175. Did you order that to be done?—I told them several times that it had to be done.

176. Were you aware that that had to be done contrary to the wish of the contractors?—Sometimes they wanted it built in.

177. Then, it was contrary to the wish of the contractors?—If they wanted it built in, and it were not allowed to be done, it would be contrary to the wish of the contractors.

178. *Mr. Crowther.*] Have you ever seen brickwork set the same as this [plan produced]? Have you any reason to believe that the brickwork could have been finished on that plan, and the work could have been finished as built up continuously? Do you admit a good workman could build it on that plan?—This is a specimen of an arch you give me, and on equal pressure you want every inch to keep the thing in.

179. Have you not seen hundreds of works where brickwork has been finished in with steel, pending completion afterwards?—Yes.

180. Could this not have been done in that tunnel, and the practical work done strong, and the specifications been complied with?—From the fact of the wet travelling up, the Engineer had increased the thickness of the work. Consequently, if they left those large holes in it, what would

be the use of carrying on the work. My instructions were to take out those sills or cut them off. It simply depends upon the honesty of a man building them up, Mr. Crowther.

181. You said just now that it would depend more or less upon the work in stopping that hole? —Yes.

182. Very well, the work was under your supervision. I have known you a very great many years. We are bound to admit that you are a workman. You having supervision of this work, can you conscientiously say that you could not have had this work done under your guidance with your length of experience and skill. Could not that have been done?—Not equal to the way the contractor was instructed to do it.

183. Is that sill in terms of that plan? Is that in the arch?—The whole would be in the spring of the arch.

184. You said that there was one stream of water that could not very well be got rid of. How much was that stream below the surface? You said that the surface water was cut off?—One portion was cut off.

185. Which portion of the water was it you said was not cut off?—One of the portions on this plan [produced].

186. Can you give us a reason why you did not see that portion of the contract was carried out in terms of the plan?—Mr. Vickerman gave instructions several times in reference to cutting off the water.

187. Although you say this was a portion of the contract not being carried out, you still allowed it to go on without being carried out?—The plan had not been completed.

188. *Mr. Holland.*] In reference to these holes Mr. Crowther has been speaking about, you say they are about 11 ft. apart. The wall behind is packed, is it not?—Yes.

189. If you filled the holes full of soft cement, and then drive the bricks into it, it might be just as solid?—Just, but the weight was travelling up behind; that would require to be done as you go along.

190. There is another danger in building 14 in. there apart. You see, the arch strikes there [indicated] and goes over. Supposing you were going to take that wall [indicated] there, you would put handles there [indicated]. Take Macarthur's building in Queen Street, Auckland: Is not there a great weight there above the ground-level?—When you are excavating a large hole in the ground, you know, the ground travels. It is not like "taking up" in a building here, where it is permanent. You are putting in work here where you require it to be kept in position in an arch. The arch depends upon its true shape; the moment it is out of its shape it becomes weak.

191. This hole would not interfere with the arch coming out of its true shape. The first of the arch will not allow that to bulge there. That is just as strong then as if all this post [indicated] were left in. The 14 in. of brickwork through the surface to the arch, do you think it would weaken that arch?—It would split it all to pieces.

192. You had 11 ft. of work between each of those holes?—Yes; but sometimes we had 5 ft. only.

193. Do you think that wall would be very much weakened by those holes?—Experience has shown me that it does weaken it.

194. Some of them were left in?—But they were correct.

195. No matter how solid the work the extra pressure will crack?—You know when an arch is put out of position it becomes a weak structure.

196. Did these slips occur after their contract had expired?—Most of them occurred about the end of the contract time.

197. If they had handed that over the Government would have been liable for these slips? While they had the contract in hand they were liable?—Yes.

198. *The Chairman.*] Did you consider it safe to cut that miner sill, and to leave it there while the brickwork was to be finished overhead? Was it safe for the men?—It has proved perfectly safe for 21 chains 25 links, because there has never been a slip.

199. Is it perfectly safe to cut the ends off?—Yes.

200. If a crush comes on it, would it be sufficient during the time the brickwork is going up? —Yes.

201. What length of time does it take to finish this arch?—From seven hours and a half to eight hours and sometimes more. It simply depends whether the bars are clear so that you can allow the brickwork to go into its proper thickness.

202. Will you tell me that to leave it six hours endangers the structure?—As you come up you must take out those struts.

203. The fact that this sill is not firm after six hours, is it then taken out and the place filled up?—Say this sill [indicated] was left in, a bricklayer starts here [indicated] to construct that arch. In perhaps an hour from the time they start that strut is taken out on the other side. Perhaps in the next half-hour this one is taken out, and this one [indicated] is taken out.

204. Have you measured up the quantities of all these laths yourself?—No, Sir.

205. Did any one measure them up?—Not that I am aware of, because Mr. Vickerman has charge of that.

206. If you had this work and a lot of men attached, to either lose or gain, would you make up your mind to allow a man to superintend that work, though he had never had any previous experience in that work before?—If he was a mechanic, and built work of that description, although never in a tunnel, I would employ him as a straightforward man.

207. This is a very strong point with the Committee all round, this supervision of the man that was in charge, and giving directions to see that this was to be done?—I considered that I was competent.

208. You said, further, that there was nobody there to take charge of the men that knew anything about it when they under-built the wall?—I did.

209. You were the man that was chosen to do it?—Yes, Mr. Vickerman told me to see to it.

210. At the time of the 17th December, did you then look how they were leaving your brickwork?—I am always the last man in the tunnel when the brickwork has been going on.

211. Then you were the last man there before they closed down?—

212. Did you inspect the last length of brickwork in that arch previous to the Christmas holidays?—Yes.

213. Were you satisfied with the way in which it was left?—Yes, perfectly satisfied with the way it was left before Christmas.

214. None of the brickwork came down?—It is real good work; the cement is sound and the bricks were good, and it was well executed in every way.

215. *Mr. R. McKenzie.*] You have had considerable experience in mining in England, Mr. Witheridge?—I have seen any amount of mining. I came from one of the largest mining districts in the Old Country.

216. What was the nature of the mining?—Copper, lead, and tin.

217. What were you doing there?—Working there in engine-houses, in boiler-houses, in well-pits, and all sorts of occupations.

218. How many years ago is that?—I suppose thirty-eight or thirty-nine years ago.

219. How old are you now?—I am fifty-eight, and I was working in South America between thirty-five or thirty-six years ago.

220. What part of South America?—In Brazil.

221. Do you understand how to timber a railway tunnel, Mr. Witheridge?—Yes.

222. You said you learnt all about tunnelling before you left England?—I said I had been underground.

223. Did you know how to timber a railway tunnel before you left England?—It is all timbered on the same principle.

224. Did you have any instructions to insist on these sills being taken out?—I have answered that question before.

EXHIBITS.

EXHIBIT No. 1.

Messrs. McLean and Son to C. Vickerman, Esq., District Engineer, Auckland.

Dear Sir,— Auckland, 26th September, 1891.

Re *Makarau Railway Contract.*—The difference in the levels in the tunnel detected by you when last there has given us very serious trouble and anxiety. Notwithstanding that you and Witheridge consider that we have made an error in giving the levels, we are quite sure that the proper levels were given, and the brickwork was built to the correct levels at the time of building. We are therefore of opinion that subsidence has taken place. We can hardly think that the brickwork has gone perpendicularly down, but it is possible for it to shift towards the centre at the footings. If such is the case every inch that it shifts weakens the structure until it will become unsafe. We were testing the widths at formation level to-day (Saturday), and will wire you the result on Monday.

We have, &c.,

John McLean and Son,

Contractors, Makarau Section, Helensville Northwards Railway.

EXHIBIT No. 2.

Public Works Office, Kanohi, 14th December, 1891.

Gentlemen,—I am directed to instruct you to discharge William Webb at once, for executing improper brickwork, to save further trouble.

John Witheridge, Inspector of Works.

John McLean and Son, Contractors, Makarau Contract.

EXHIBIT No. 3.

Claim for Extras, Makarau Section, Helensville Northwards Railway.

	Cubic Yards.	£	s.	d.
Slips.—At 43 miles 45 chains to—				
„ 43 „ 50 „	480			
„ 44 „ 8 „	1,200			
„ 44 „ 33 „	1,250			
„ 44 „ 63 „	7,050			
„ 46 „ 9 „	1,600			
	11,605 cubic yards at 1s. 3d.	725	6	3
Tunnel—	Cubic Yards.	£	s.	d.
Additional cost of excavating 20 chains of tunnel	13,370 at 6s.	4,011	0	0
Additional cost of excavating to allow for timbering	530 „ 12s.	318	0	0
Additional cost of brick invert	635 „ 10s.	317	10	0
		4,646	10	0
		£5,371	16	3

EXHIBIT No. 4.

MEMORANDUM for Messrs. J. McLEAN and SON.

Makarau Contract, Slip at North End of Tunnel.—In reply to your inquiry as to whether you will receive payment for this slip, I have submitted the matter to the Engineer-in-Chief, who replies, "As the slips at the north end of the tunnel cannot be said to have been owing to the steepness of the slopes of the cutting the contractors are not entitled to be paid as an extra in the contract for the work required in removing it and making good the cutting in accordance with the contract drawings."

CHARLES R. VICKERMAN, Resident Engineer.

Public Works Office, Auckland, 4th February, 1896.

EXHIBIT No. 5.

DEAR SIR,— Mount Albert, 12th February, 1896.

Re *Slips at North End of Makarau Tunnel.*—In reply to your letter stating that the Engineer-in-Chief has decided that it cannot be said that the slips have taken place through steepness of slopes, and therefore the contractors will not be paid for them as an extra, we fail to understand to what other cause they can be attributed to—in fact there can be no other cause, unless, as in the present instance, through the weakness of the wing-wall, for the greater portion of the slip that has occurred lately has taken place certainly not through the steepness of the slopes, but because the wing-wall at the end of the tunnel was not of sufficient strength to hold the ground up; but surely we are not held responsible for this, for we have built it faithfully with the materials specified and to the full dimensions shown.

We at present refuse to take the responsibility, and have consequently stopped removing the slip until we get satisfactory instructions as to what has to be done with it. We may say that we would not have started removing this slip only that, from your conversation at the time, you led us to understand that we would probably be paid for it, nor did we wish to waste such fine weather as we have been having. We may state that if the slip had occurred in the ordinary way, we would have gone on removing it, trusting that the Engineer-in-Chief would have treated us fairly in the matter. Instead of that he seems to be treating us as harshly as it is in his power, for if ever a clause was intended to cover slips, clause 8 of the specifications surely had that intention. The only thing that is wanting is a written order, and we have endeavoured to obtain that from you, but you have not given us one, although the specifications clearly intended that these slips should be paid for; and we, acting in good faith, have gone on removing them. A slip occurred at the very first of the contract. We wrote then claiming payment for slips under this clause; but Mr. Hales would neither say we would be paid, or we would not; but now that we have spent thousands of pounds removing slips he decides not to pay us, under the technicality of the slips not occurring through steepness of slopes, which, of course, is fatal to us. We hope still that the Engineer-in-Chief will alter his decision in the matter, and pay for these slips.

We are, &c.,

The Resident Engineer, Auckland. JOHN McLEAN AND SON.

EXHIBIT No. 6.

MEMORANDUM for Messrs. J. McLEAN and SON.

Makarau Contract, North End Tunnel Slip.—I am instructed to draw your attention to the second paragraph of section 8, pages 3 and 4, of specification, which provides for drainage and slips therefrom—viz., "The contractor shall remedy them and restore the slopes to the specified or a flatter rate of inclination, such inclination being that at which the material will naturally and permanently stand." As this slip seems to be due to the want of proper drainage, this will apply to it; also, I have to request you to at once proceed with the removal of the slips, and to finish the works in terms of your contract.

Please therefore inform me what steps you are taking in this matter, as it is desired that your contract should be completed without further delay.

CHAS. VICKERMAN, Resident Engineer.

Public Works Office, Auckland, 17th February, 1896.

EXHIBIT No. 7.

DEAR SIR,— Mount Albert, 20th February, 1896.

In re *Slips.*—In reply to yours of the 17th instant, calling our attention to section 8 of the specification, we can hardly think that you are in earnest in attributing the slips to want of proper drainage. We are positive that all the drainage in the world would not have prevented these slips. We, in the very first place, dug a drain around the cutting to catch the water, but only succeeded in getting some of it, as the balance was running at a great depth and spreading all round the basin, so that a drain would have been useless.

We suppose, however, that, as you seem to shirk every responsibility which you should properly take, we must go on under protest. We have sufficient of the slip clear to enable us to get the

permanent-way through, but do not think it advisable to go on with it until we have removed sufficient of the slip to insure it not blocking up the line again. We hope to have enough removed by the middle of next week, and then we can go on with the permanent-way, the materials for which you will kindly forward us. We have about one hundred rails on the ground. We have not counted the sleepers, as they are a good deal scattered. We shall require about that time eight ballast-trucks, which we trust you will let us have. The four ordered a week ago have not come yet, nor do we want them at present, as we have been able to do without them. The two we have we will not require after Saturday next until we start the platelaying.

Hoping you will forward the material as soon as possible, and that you will not forget to send as many green ends as is necessary,

We remain, &c.,

The Resident Engineer. JOHN MCLEAN AND SON.

EXHIBIT No. 8.

2nd July, 1897.

WE enclose particulars of our claim for extras, in addition to those allowed by you, the amount of which we respectfully submit we are justly and equitably entitled to receive. We would refer you to the correspondence that has passed between us respecting the contract for the purpose of affording you the data upon which we base our claim.

Trusting that the same will meet with favourable consideration,

We are, &c.,

Chas. Vickerman, Esq. MCLEAN AND SON.

EXHIBIT No. 9.

MEMORANDUM for Messrs. J. MCLEAN and SON.

Makarau Contract.—In reply to your letter of the 2nd July, 1897, I am instructed as follows:—

Slips: 11,605 cubic yard slips are not allowed, as they are connected with want of drainage, and the way work was left without drains after being opened out and exposed to the weather.

Bank, &c.: The extra depth at 43 miles 68 chains 19 ft., where 9 ft. was only shown, will be allowed. The deviation at 45 miles 51 chains, for which 300 cubic yards is claimed, must be dealt with as a matter of addition, and also deduction for work and pitching not done. Bridge at 46 miles .02 chains made up for 80 ft. span, 500 cubic yards: how is this arrived at, as it does not appear how there can possibly be excavation for a shorter span?

Tunnel: The claim on the soft ground is a matter for contractors' risk, as no guarantee of the character of the ground was given. In the same way, the excavation for timbering comes under this heading. The cost of the brick invert can only be allowed at schedule rates, as contract provided for it in bad ground.

80 ft. Span: The cast-iron blocks will be allowed for if handed over in good order, with weighbridge ticket of weight. The screw-bolt ends cannot be taken, as the truss-rods in 80 ft. spans must be solid bars, without welds.

Will you see about the blocks, &c., and call at office.

CHAS. R. VICKERMAN, Resident Engineer.

Public Works Office, Auckland, 20th August, 1897.

EXHIBIT No. 10.

DEAR SIR,— Mount Albert, 4th September, 1897.

In reply to your letter of the 20th ultimo *re* extras on our Makarau contract, we beg to state as follows:—

Re Slips: We consider that there was not a slip occurred on the contract through want of drainage. The first slip of any size that took place was at 44 miles .08 chains. There is not a drop of water shows there until rain comes, the ground falling away to the back leaves just a narrow ridge where the slip comes from, and we cannot see where drainage would effect this. At the south end of the tunnel we took every precaution to prevent slips, but, as you must be perfectly aware, the ground is of such a nature that drains have no effect. At the north end of the tunnel, where our greatest trouble has been, we took the precaution to excavate a ditch the whole length of the cutting before we even started to take the earth away, intercepting a stream of water which ran at a right-angle across the line of railway, leading it down some distance away from the cutting. It had little or no effect, the ground being of such a nature that drainage was useless. It is simply a pug-hole on the top of a greasy back, and all the drainage in the world would not keep it back, and so we may say of the whole of the slips for which we claim.

In *re* the 300 cubic yards claimed for at 45 miles 51 chains: You state that the deviation was made with the view of saving us expense, on account of the creek being so close, and consequently the earthwork would be washed away, and with our concurrence. We have no recollection of the circumstance.

In *re* the 500 cubic yards at 46 miles .02 chains: We find we were under a misapprehension in thinking you had ordered an 80 ft. span only, to substitute the 40 ft. and 4/20 spans originally intended, instead of to substitute the 40 ft. span only.

Re Tunnel: We fail to recognise the reason given by you as any just or equitable ground for disallowing our claim for tunnel in soft ground, and cannot see how it should be considered as "contractors' risk." There is no mention made in the specifications providing for tunnel in soft

ground, but, on the contrary, the data given in the specifications show conclusively that the department considered the tunnel would be in firm ground; and, acting on these data, we concluded that the department were satisfied that the same would prove firm ground, and accordingly based our tender thereon. We would point out, in addition to the above, that there appears on the drawings a general sectional plan showing a tunnel through soft ground. This tunnel was not adopted by the department. We consider it unfair to state that we are bound by our schedule rates for tunnelling in soft ground, and that we are only to be paid according to that schedule, which was never intended by us to cover such an extraordinary outlay. As to the matter being one of "contractors' risk," you might as well say that any extra material or excavations that have been done, such as the invert extra brickwork in walls and arch, would come under the same heading.

In *re* the extra price for "invert": The schedule does not mention "invert," and we therefore consider we are fairly entitled to the claim made.

In *re* the bolt-ends: We venture to state there has not been a bridge built in New Zealand in which there are bolts with over-screws on the ends that have not been welded; and your action, if insisted upon, would mean that the bolt-ends will be left on our hands.

We consider that the treatment we are receiving, in view of the extraordinary circumstances attending the contract, as most harsh and arbitrary, and we again appeal for a more favourable consideration of the position and our contention.

We have, &c.,

JOHN McLEAN AND SON,

Contractors, Makarau Section, Helensville Northwards Railway.

The Resident Engineer, Public Works, Auckland.

EXHIBIT No. 11.

MEMORANDUM for the ENGINEER-IN-CHIEF *re* Helensville Northwards Railway, Makarau Contract Damage by Flood.

ON the 23rd instant one of the most severe rain-storms ever experienced passed over this contract. Probably 5 in. or 6 in. of rain fell within twenty-four hours. As a result several severe slips have occurred. On the completed portion, which has the rails and ballast on, and which has stood all the previous winter rains, slips have occurred as follows:—

43 miles 52 chains: Approximate quantity, 100 cubic yards. Cutting has slipped on west.

43 miles 54 chains to 43 miles 55 chains 50 links: Approximate quantity, 800 cubic yards. Bank has slipped with solid base.

43 miles 73 chains to 43 miles 73 chains 50 links: Approximate quantity, 800 cubic yards. Bank has slipped with solid base.

43 miles 57 chains: Approximate quantity, 50 cubic yards. Cutting and signs of a lot more to come.

44 miles 8 chains: Approximate quantity, 100 cubic yards. Cutting has slipped in the old place.

44 miles 30 chains to 44 miles 32 chains: Approximate quantity, 200 cubic yards. Cutting has slipped off rock.

Then, on the other side of the tunnel, there are slips which have come in during the previous winter rain and this gale:—

44 miles 63 chains to 44 miles 66 chains: Approximate quantity, 3,000 to 4,000 cubic yards. Slipped in all round towards mouth.

44 miles 79 chains: Approximate quantity, 200 cubic yards. Bank has slipped.

45 miles 13 chains 75 links: Approximate quantity, 100 cubic yards. Slipped on west bank.

45 miles 18 chains to 45 miles 25 chains: Approximate quantity, 200 cubic yards. Cutting slipped on east.

45 miles 31 chains to 45 miles 35 chains: Approximate quantity, 600 cubic yards. Cutting slipped on east.

45 miles 39 chains to 45 miles 40 chains: Approximate quantity, 100 cubic yards. Cutting slipped on east.

45 miles 43 chains: Approximate quantity, 150 cubic yards. Cutting slipped on east.

45 miles 63 chains: Approximate quantity, 70 cubic yards. Cutting slipped on east.

46 miles 8 chains: Approximate quantity, 70 cubic yards. Cutting slipped on west.

45 miles 76 chains: Approximate quantity, 100 cubic yards. Gap cut on bank by water.

Also, the big bank on south of tunnel at 44 miles 17 chains is constantly setting and slipping away, and it does not seem likely that the tunnel material will ever form a substantial bank.

The drive through the fall in the tunnel is being enlarged to form a bottom heading, and then a top heading will have to be driven. It is going on slowly, but, so far, safely.

CHAS. R. VICKERMAN, Resident Engineer.

Public Works Office, Auckland, 1st March, 1893.

EXHIBIT No. 12.

The Under Secretary for Public Works.

Public Works Office, Auckland, 9th January, 1896

MAKARAU TUNNEL.—I have to report that another difficulty has arisen at this tunnel, at the north face, eastern wing wall. The wings were put in about a month ago, with an invert, as the ground was

the same blue indurated mud or clay as inside, and showing signs of slacking all round. Last week the eastern side of face of cutting began to move in fairly dry weather, but to a certain extent with a lot of moisture in it, and slipped against this wing, causing the wall to cut right off at about 1 ft. above formation-level, and to move bodily forward till it now stands almost parallel to the centre line, and to prevent it tumbling over heavy timbers have been put across to the other wing. This has blocked the road again, and the whole wing will probably have to be taken down, the pressure of the slip eased, and then the whole rebuilt. So far I have not had time to carefully examine it, but hope to do so in few days. CHAS. R. VICKERMAN, Resident Engineer.

EXHIBIT No. 13.

The Under-Secretary for Public Works. Public Works Office, Auckland, 13th January, 1896.

MAKARAU CONTRACT (*Slip, North End Tunnel*).—I examined this slip on the 11th instant, and find that it is going to be a very large slip. Looking at the section of the line, there are two hollows just beyond the north end of the tunnel. The present slip is in the first hollow. The water in the bottom of the hollow has got down on to a rotten bottom fully one chain away to the east of the tunnel, and the whole body is gradually sliding down. It has cut the east wing wall off just like a knife about 1 ft. above formation, and there will probably be some 3,000 cubic yards on the move. Whether it will all have to come out or not I do not know yet. But the bottom must be lightened, and, if possible, a drive put into it to get the water out, as it is the latter which is doing the mischief. Contractor is starting to lighten it, and will do what he can to get it away, but he asks this question: "Am I not entitled to be paid for this?" It is certainly no fault of his, but entirely owing to the treacherous nature of the material, which starts to slack and run as soon as exposed to air and water. He says he will go on with the work, but has asked for an answer to his question, and I should be glad to have your instructions in the matter.

CHAS. R. VICKERMAN, Resident Engineer.

EXHIBIT No. 14.

Resident Engineer, Public Works, Auckland. 20th January, 1896.

MAKARAU CONTRACT (*Slip at North End of Tunnel*).—In reply to your memorandum (No. 50/38) of the 13th instant, inquiring whether the contractor is to be paid for making good the damage caused by the slip at the north end of the tunnel, I send you the following copy of a minute by the Engineer-in-Chief on the subject—viz.: "By the terms of the specifications the contractors are bound to complete and maintain the whole of the works in the manner shown on the contract drawings, including the cuttings, which are to have the widths at base at formation-level and slopes as specified, according to the nature of the material in which they are made, and no slips can be paid for by the Resident Engineer except those that, in his opinion, are due to steepness of slope, and for which an order has been given beforehand. As the slips at the north end of the tunnel cannot be said to have been owing to the steepness of the slopes of the cutting, the contractors are not entitled to be paid as an extra on the contract for the work required in removing it and making good the cutting in accordance with the contract drawings."

H. J. H. BLOW, Under-Secretary.

EXHIBIT No. 15.

(Telegram.) Auckland, 13th February, 1896.

I HAVE conveyed to Messrs. McLean and Son contents of instruction *re* slip at north end of tunnel, and they have written stating that they have stopped removing this slip until they get satisfactory instructions from you about it, and that they refuse to take the responsibility of it. Please instruct me what to do. CHAS. R. VICKERMAN, Resident Engineer.

The Under-Secretary, Public Works, Wellington.

EXHIBIT No. 16.

(Telegram.) Wellington, 15th February, 1896.

SLIP at north end Makarau Tunnel seems to be due to want of proper drainage, which is a case specially provided for by the specification. The contractors have to remedy all such slips and restore the slopes to be specified or a flatter rate of inclination. You should again instruct contractors to remove slips and finish works in terms of their contract, and tell them that if they fail to do so without delay Government will do the work at their expense. Please report what action contractors take in the matter. H. J. H. BLOW.

Resident Engineer, Public Works, Auckland.

EXHIBIT No. 17.

MEMORANDUM for UNDER-SECRETARY for PUBLIC WORKS *re* Makarau Contract, Slip at North End of Tunnel on East Face.

IN forwarding the copy of John McLean and Son's letter of the 12th to you for your instructions, I would mention that I particularly gave Mr. M. McLean to understand that I would not undertake in any way to settle whether he would be paid or not, but that I would refer the matter to you

for your directions, and it was after informing him of your decision that he replied in this way: "As to the wing-wall being the cause of the slip owing to its weakness, there is nothing in the statement. The centre of the slip is beyond the end of the wing-wall, and from the side, not the face of the cutting. Had heavy timbers been put in across from wing to wing when the face started it might have stopped the wing-wall moving, but this was not done till too late." In the meantime contractors have taken their men off the slip, and this practically stops the contract, as no progress can be made till this slip is cleared.

CHAS. R. VICKERMAN, Resident Engineer.

Public Works Office, Auckland, 14th February, 1896.

EXHIBIT No. 18.

MEMORANDUM for UNDER-SECRETARY for PUBLIC WORKS *re* Makarau Contract, Slip at North Tunnel Face, and your Telegram of 15th.

IN reply to your telegram, I wrote on the 17th to contractors requesting them to proceed with the removal of the slip at once. They had, however, on their own account started before they received my letter, and now write to me to state that they do so "under protest." I attach a copy of my letter to them, and also their reply.

The slip is not by any means finished yet, although they speak as though it was; and it is probable that it will not be fit to lay the permanent-way for some time yet through it. However, I will have it watched, and if it is not safe will inform them of it.

CHAS. R. VICKERMAN, Resident Engineer.

Public Works Office, Auckland, 22nd February, 1896.

EXHIBIT No. 19.

Messrs. J. McLean & Son. *Re* yours of—— Auckland, 17th February, 1896.

MAKARAU CONTRACT (*North End Tunnel Slip*).—I am instructed to draw your attention to the second paragraph of section 8, pages 3 and 4, of specification, which provides for drainage and slips therefrom—viz.: "The contractor shall remedy them and restore the slopes to the specified or a flatter rate of inclination, such inclination being that at which the material will naturally and permanently stand." As this slip seems to be due to the want of proper drainage this will apply to it. Also I have to request you to at once proceed with the removal of the slips, and to finish the works in terms of your contract. Please therefore inform me what steps you are taking in this matter, as it is desired that your contract should be completed without further delay.

CHAS. R. VICKERMAN, Resident Engineer.

EXHIBIT No. 20.

MEMORANDUM for the ENGINEER-IN-CHIEF.

MAKARAU CONTRACT (Helensville Northwards Railway).—The Makarau Tunnel continues in a very bad way indeed. As already reported, contractors got frightened inside, and started and sank a shaft about half a chain beyond the creep, or at 44 miles 57 chains 16 links. This was finished and a drive started back to cut the inside heading. Just as the two met, about the 5th instant, the ground at 44 miles 56 chains 45 links to 44 miles 56 chains 63 links started, and settled right from the surface.

It was the filling-up of the old cavity caused by the creep in January, I believe. Since then a few men have been at work cleaning out the shaft and drive with windlass and buckets. Now that the whole has settled solid again it may be safer to work than before, but at any rate it will be very soft and dangerous ground. Contractors do not seem to grapple with the situation, which is certainly very bad; and I should be glad, if you had an opportunity, for you to come and see it.

CHAS. R. VICKERMAN, Resident Engineer.

Public Works Office, Auckland, 19th May, 1893.

EXHIBIT No. 21.

DEAR SIR,— Auckland, 2nd June, 1893.

Re our conversation with you on Saturday last about stopping the works: We now ask your permission to entirely stop the work on our Makarau Contract, Helensville Northwards Railway, for six or seven months, to allow the ground in the tunnel to consolidate. Under present circumstances we find it impossible to make any progress; the ground, as you know, is broken through to the surface something over 100 ft., and the water coming from the sand-rock mixing with the clay we are driving in, therefore the weight is something enormous, and the stuff is just like mortar; we cannot open an inch of ground but it comes oozing through the timbers; we have used every means in our power to overcome the difficulty, but have failed. As we stated to you, we can contend with the top weight, but the enormous face weight brought on through the liquid state of the ground we find it impossible to contend with.

We have been working at it continuously since the break, not giving the ground any chance to settle. We are of opinion that if the ground gets time to settle and become firm there is a probability of getting through; but if we keep going on as we are we will never make any progress, and are only throwing money away to no purpose. We have already paid away over £1,000 in

wages since the break, and we are no further ahead than we were then. We have at present stopped work, as the ground is all on the move and unsafe to work. We will not make a start again pending your reply, which we sincerely hope will be favourable.

We have, &c.,

JOHN MCLEAN AND SON,

Contractors, Makarau Contract, Helensville Northwards Railway.

C. R. Vickerman, Esq., Resident Engineer, Public Works, Auckland.

EXHIBIT No. 22.

MEMORANDUM for the ENGINEER-IN-CHIEF.

MAKARAU TUNNEL.—The contractors, Messrs. J. McLean and Son, have written to me asking my approval and consent to stop the driving of the tunnel for six or seven months, to enable the ground round the present "creep" to consolidate, and give them a chance to pick up the length that has caved in, as already reported. They have to fight a very bad pressure at present, as the water is more or less all through the material, and the pressure is very bad, both on top and at the sides. The material runs like porridge, and is certainly very bad indeed to contend with. It is not the top pressure, which is also very great, so much as the side pressure they complain of. In putting the drive in, they cannot (see "A" on the sketch) open the face to advance, as the stuff starts and runs and drives them out. This has occurred several times, and contractor has now come to the conclusion to try and let the ground settle. I do not quite agree with this, as the break in the ground up to the surface has cut all the water-leads, and the water will always come down here; and as long as the water gets at this material it will maintain this soft state. Probably by driving heavier slabs well ahead this might be stopped, but the contractor seems to have lost heart about it, and has written this letter, copy of which I attach. Overseer Witheridge does not seem to think there would be any improvement by waiting, and also thinks it can be done with heavier slabs. I attach a rough sketch. Contractors were increasing the size of the bottom-heading, and would then have to drive a top-heading on top of it.

I should be glad to see you, or be instructed what to do.

CHAS. R. VICKERMAN, Resident Engineer.

Public Works Office, Auckland, 5th June, 1893.

EXHIBIT No. 23.

MEMORANDUM for the ENGINEER-IN-CHIEF.

MAKARAU TUNNEL.—The contractors, J. McLean and Son, have not attempted to make a further start at this tunnel since you saw it early in the month of June. I forwarded a copy of their letter to you of the 2nd June, 1893, with my memorandum, 43/118, of the 5th June. The weather here still continues unusually wet, but, still, there is nothing to prevent the work going on. Do you wish me to take any further action in the matter?

CHAS. R. VICKERMAN, Resident Engineer.

Public Works Office, Auckland, 1st July, 1893.

EXHIBIT No. 24.

MEMORANDUM for the ENGINEER-IN-CHIEF.

MAKARAU TUNNEL.—In further connection with my memorandums of the 5th June and 1st July, I have to report that nothing has been done at the tunnel, which stands just as you saw it. I have not instructed contractors in the matter pending your reply.

CHAS. R. VICKERMAN, Resident Engineer.

Public Works Office, Auckland, 5th August, 1893.

EXHIBIT No. 25.

MEMORANDUM for the UNDER-SECRETARY for PUBLIC WORKS.

MAKARAU TUNNEL.—I feel sure that delay is endangering the chance of getting this tunnel put through. There is no doubt that the effect of the water and air is not improving the ground at the heading and shaft, and that steps ought to be taken at once to have the tunnel carried on for at least 1½ chains. Contractors do not seem able to cope with the difficulty, and it would be advisable to have more experience and instruction as to what is considered the best way of excavating this class of ground. If you have an experienced tunnel hand in timbering and driving in what is more like porridge 110 ft. deep than anything else it would be well to have his opinion on it.

CHAS. R. VICKERMAN, Resident Engineer.

Public Works Office, Auckland, 27th January, 1894.

EXHIBIT No. 26.

MEMORANDUM for the UNDER-SECRETARY for PUBLIC WORKS.

MAKARAU TUNNEL.—Since writing to you memorandum No. 44/398, of the 27th January last, contractors have endeavoured to get a bottom heading driven through the creep. At first it seemed very bad, and a lot of water and slurry was met with; but as they have got a little further in, better

progress has been made. Some 6 ft. or 8 ft. have been driven by an Australian miner named O'Donohue, who is going ahead by putting in solid sets one after the other of 9 in. timber in a box form. It is certainly a little more hopeful than before, but still it is hard to say what the final result will be. As he gets further in from the end of the brickwork there seems to be less water. I will report further progress as soon as anything occurs.

CHAS. R. VICKERMAN, Resident Engineer.

Public Works Office, Auckland, 21st February, 1894.

EXHIBIT NO. 27.

Resident Engineer, Auckland,— Wellington, 2nd March, 1894.

Re MAKARAU TUNNEL.—I am glad to receive the more hopeful intelligence *re* above referred to in your memorandum of 20th ultimo (44/501).

As regards your memorandum of 27th January (44/398) on the same subject, the Engineer-in-Chief minuted the same as follows, viz.: "After standing over an exceptionally wet winter and spring, I do not think that any further damage to the tunnel can result from delay in proceeding with the drive, and so long as the works remain in the hands of contractors it would not be advisable to send any person to advise or instruct them in the management of their works in the tunnel or other parts of the contract, which would in effect be releasing the contractors from the responsibility devolving upon them under the contract."

H. J. H. BLOW,
Under-Secretary for Public Works.

EXHIBIT No. 28.

MEMORANDUM for the ENGINEER-IN-CHIEF.

MAKARAU CONTRACT TUNNEL (Helensville Northwards Railway).—Mr. Witheridge came to my house on Monday night, 28th, having left tunnel at two that afternoon, and stated that the side walls of tunnel, from 44 miles 42 chains to 44 miles 44 chains, or through the clay country, had started on the 26th moving inwards, and in one place had come in about 12 in. on the two sides. This began on the 26th, continued on the 27th, and on the 28th was so bad that he immediately started contractors to timber across with longitudinals at footing, and cross-props every 6 ft. or 8 ft. It is evident that the water and air had reduced what appeared to be an excellent foundation of indurated sea-mud or clay to a very soft mass, and that nothing but an invert would prevent the tunnel collapsing. So I ordered him to have it securely timbered right up to face. Put in the short length (just got ready), 44 miles 44 chains 12 links to 44 miles 44 chains 20 links, with four rings and invert of same, and then start back and put in a 14 in. invert as far back as both sides had shifted, and then a 9 in. invert where one side only had moved. This to be done in short lengths, and with walls securely cross-timbered.

From this I gather that the cracks which we have already noticed are rather from the foundation yielding by spewing inwards than from the weight overhead, although, no doubt, this is very great. So that we shall continue to put in four rings and invert of the same from 44 miles 44 chains 20 links onwards, unless some further change takes place.

CHAS. R. VICKERMAN, Assistant Engineer.

Public Works Department, Auckland, 29th September, 1891.

EXHIBIT No. 29.

ANSWERS by PETITIONER to Mr. WRIGHT'S Questions as to State of Account at Time of Petitioner asking to be relieved of his Contract.

		£
Amount expended on contract		27,000
Amount received and due for detention		23,000
Amount of bond		1,500
Amount expended since	(about)	37,500
Amount received	(about)	30,600

EXHIBIT No. 30.

REPORT by the ENGINEER-IN-CHIEF.

Hon. Minister for Public Works.

WITH regard to the matters referred to in this petition it may be remarked—

1. That the petitioners did tender for and entered into a contract on the 26th February, 1890, for the construction of a section of the Helensville Northwards Railway, known as the Makarau Contract, the amount of contract being £26,616, and the date for the completion of the whole of the works the 1st March, 1892.

2. In the works to be executed under this contract there is the construction of a railway-tunnel 28½ chains in length, which is an important part of the works contracted for, though not the principal part in extent and value.

3. The statement that prior to calling for tenders for the contract the Government caused borings to be made to ascertain the nature of the ground through which the tunnel would pass on

the line of railway to be constructed, and supplied information obtained from these borings to intending contractors to guide them in making up the amounts of their tenders, is incorrect, as, in fact, no borings were made on any part of the ground on which the works included in this contract were to be carried out, nor were any borings shown or noted on the contract drawings or referred to in the specification, in neither of which is there any description of the nature of the ground, or any guarantee given of the character of the material to be dealt with in excavating for the tunnel, which was constructed to the exact line and levels shown on the contract drawings, no alteration or deviation in either the alignment or levels of the railway at the tunnel having been made in carrying out the works in the contract. That the contractors assumed that the ground through which the tunnel was to be excavated would be soft is shown by the price in their tender for tunnel-excavation, which price is much too low for excavating a tunnel through rock or any other hard material.

4. As before stated, there are no descriptions or details given in the specification that can be taken as expressing a guarantee of the nature of the ground through which the tunnel was to be excavated; but the appearance and character of the country on the surface indicated that the tunnel would go through fairly solid and firm ground; and this proved to be correct in the main, as the material throughout nearly the whole length of the drive was so hard in places that most of it had to be shot out, though it was not anticipated that this hard material would slack away and become merely mud when taken out and exposed to the air or weather.

5. This refers to a trial survey for the railway (which was made about two years previous to the line on which the contract was let, being surveyed, set out on the ground, and the contract plans prepared), therefore had nothing to do with Messrs. McLean's contract, the trial survey-line not being adhered to in locating the line for the contract. A single boring was made on this trial line, but it was not in any part of the ground on which the contract works were to be executed. It was not referred to in the specification, nor shown on the contract plans; consequently, if intending contractors assumed that the ground to be excavated for the tunnel would be the same throughout as that at this bore they did so at their own risk, as they must have known that the bore was not on the line of works to be contracted for, consequently could not be depended upon to indicate the character of the ground at the site of their works with any degree of accuracy.

6. Relative to this, it is only necessary to repeat that no borings were made on the line of works contracted for—borings were not quoted or referred to in the contract documents; so that there are no valid grounds for the contractors' repeated assertion that borings were misleading to them in making up their contract.

7. The circumstances were, I think, as stated by the petitioners, that after excavating and lining about eight chains of the south end of the tunnel a different class of ground was come upon, which required to be more closely timbered to support the ground until the lining could be got in.

8. When the ground became too heavy for the ordinary 14 in. tunnel lining it became necessary to increase the thickness of the brickwork in the walls and arch, and put a brick invert in the bottom, the contract drawings providing for a heavier section of lining with an invert to be used in soft ground; the remainder of the lining of the tunnel was carried out on a modified plan of this heavier section.

9. At one portion of the tunnel excavations there was a considerable quantity of water in the ground, which gave the contractors a lot of trouble, as it tended to soften the material in the cutting and increased the difficulty of timbering and lining; and on the 20th January, 1893, a portion of the drive collapsed, bringing down with it a short (5 ft. 6 in.) length of the brickwork of the arch that had just been put in, and was therefore not in a fit state to support a heavy pressure owing to the cement mortar not having had time to set.

10. The collapse of the tunnel at this place, I consider, resulted from several causes, for most of which the contractors' mode of working was principally responsible. In the first place, the tunnel had been excavated and lined up to a part where the ground was of the heaviest character, and required the work of excavating, timbering, and lining to be carried on quickly and continuously, so as to keep the ground supported and allow it no time to settle down as the tunnelling advanced until the permanent lining was in or firm ground was reached; but, instead of doing so, the contractors knocked off work in the tunnel on the 19th December for the Christmas holidays, and did not resume it again until the 9th January—three weeks' stoppage—during which time the ground at the end of the drive was becoming disintegrated and saturated with water, so as to cause a settling-down of the superincumbent material and very heavy pressure on to the timber and brickwork; consequently, when they had put in a short length—5 ft. 6 in.—of the lining, and were getting in the timbering for the next length, a considerable settlement was taking place, which brought a heavy pressure on the crown-bars, causing them to sag in the middle, and the back ends of these bars, resting on the brickwork of the recently-built arch, tended to drag it forward, loosening the green brickwork and destroying its stability, so that it gave way, letting down the ends of the bars and the mass of loose saturated ground above them into the tunnel-drive.

Relative to the statement regarding the action of Mr. Witheridge, and the allegation that such action caused the damage to the works described, it may be pointed out that Mr. Witheridge was the Inspector appointed by the Government to supervise the works on the contract, and in that capacity had nothing to do with directing the contractors as to the manner in which they should conduct their temporary works, and, being an experienced Inspector on contracts, was very unlikely to interfere with the contractors in the manner described, except to prevent them from building the temporary timber-sills into the permanent brickwork of the tunnel, which it was clearly his duty and perfectly right for him to do; but, as a matter of fact, the particular sill the taking out of which the contractors say caused all the damage was not taken out, but was built in notwithstanding the protest of the Inspector.

11. As the contractors, who themselves were in sole charge of and personally conducted the tunnel-work on the contract, had, it is understood, no previous practical knowledge or experience of tunnelling, they perhaps did follow to the best of their ability the methods described in "Sim's Practical Tunnelling," which, though for a long time a standing authority on this class of construction, is a very old work mainly descriptive of the manner of working adopted in some of the tunnels constructed in the first English railways; it is therefore somewhat out of date, and should not be altogether relied upon as a guide under all the circumstances that might arise in carrying out the work of tunnelling, for which some practical experience is required besides the theoretical knowledge to be obtained from books on the subject.

12. That the timbers employed by the contractors for supporting the ground in the tunnel-drive were strong enough for the purpose required, is perhaps, correct; but it is somewhat doubtful if, owing to the inexperience of the persons in charge of the works, the best method of placing the timbers was always adopted; in any case, the resting of the bare ends of 18 ft. long bars on the brickwork of a newly-built arch, where, with the weight of the ground pressing them down, and with no intermediate supports, they acted as levers to displace the green brickwork, is not a proof that the brick lining was deficient in the strength required in the lining of the tunnel.

13. This has been referred to in a former paragraph, and need not be further remarked upon.

14. The Resident Engineer was on the ground and inspected the work a short time before the fall occurred, and made a thorough examination of the tunnel immediately afterwards, but, his powers only extending to the carrying-out of the works in accordance with the terms of the contract, he could make no concessions to the contractors that would release them from any of their obligations under it.

15. Some time after the fall in the tunnel occurred, one of the contractors (Mr. Murdoch McLean) had an interview with the Hon. Mr. Seddon at the Minister for Public Works' office, Wellington, at which I was present, when Mr. McLean represented to the Minister that owing to the difficulty and great cost of excavating the tunnel in soft ground they would sustain a heavy loss if compelled to complete the works in accordance with the terms of their contract, and proposed that the contract should be set aside, and that they might be paid for the tunnel-work at its actual cost to them, or that they (the contractors) should be released altogether from the contract, and be paid for the work done and material supplied; to which the Minister replied that "as there was a contract existing for the carrying-out of which the contractors as well as the Government were responsible, the Government could not release the contractors from their liability or vary the terms of the contract in any way, but when the contract was completed the Government would consider any representations they (the contractors) might make regarding it; as the matter stands at present nothing can be done."

16. For a considerable time after the fall in the tunnel occurred the contractors were endeavouring to overcome the difficulties connected with the inflow of water and the broken-up state of the ground at the fault.

17. When the contractors were ready to recommence the work of lining the tunnel, the Resident Engineer, no doubt, increased the thickness of the brickwork at the fault, as that was necessary owing to the ground being disturbed and partially in a state of puddle for a considerable distance all round the place, owing principally to the length of time that the works were allowed to stand before efficient steps were taken to proceed with them.

18. As the works on the Makarau contract were at a standstill, and a competent experienced Inspector was required for special works on the Otago Central Railway, Inspector Witheridge was transferred temporarily to undertake the supervision of that work, and Inspector McGonagle was sent from Rangitikei to Auckland to take up the Inspector's duties in the district; consequently, when the contractors on the Makarau contract were ready to proceed with their work, during Mr. Witheridge's absence, Mr. McGonagle was employed as Inspector on that contract. Mr. Witheridge, the Inspector referred to, is a steady and thoroughly reliable man, as well as a trained and competent mechanic, who had extensive experience in building, mining, and works of construction generally previously to being employed in the Government service about eighteen years ago, since which time he has been engaged in the position of Inspector on some of the largest and most important public works in the Auckland District, all of which were carried out in a satisfactory manner without a hitch occurring during their progress, and until the difficulties arose in connection with the works in the Makarau Tunnel, for which he was not in any sense responsible, no complaints were ever made by the contractors of the Inspector ever having failed in or exceeded his duties. It is therefore somewhat out of place for the contractors to reflect as they do on the capabilities of the Inspectors, as, even if it is true that some of the work in the tunnel has been more affected by the settlement of the ground than other portions, they must know that the difference results from other causes than the action of the Inspector, who had no direct control of the works being carried on by the contractors, whose inexperience in the management of works of this class was the main cause of the failure of supports and consequent giving-way of the brickwork in the arch.

19. Considering the low price at which the tunnel excavation was scheduled in their contract, and the length of time the work was in hand, the contractors have, no doubt, suffered some loss on this part of the contract works, but they have received payment in full of the amount of the contract, and all extra works done by them have been paid for at the schedule rates in accordance with the terms of the contract.

20. During the six years the contractors had the works in hand several slips occurred in cuttings, the total amount of which is estimated at 11,605 cubic yards of earth cleared away by the contractors; but the specification provides that "No slips shall be paid for under this clause except those that are in the opinion of the Resident Engineer due to steepness of slope, and for which an order has been given beforehand." The Resident Engineer could not therefore allow the contractors payment at the scheduled rates for the removal of these slips, as none of these slips

could be claimed to be caused by the steepness of the slopes of the cutting in which they occurred, and no orders for their removal had been given; besides, some of the heaviest of these slips occurred nearly three years after the time for the completion of the contract had expired, and therefore were owing to the long time the works were allowed to remain in an unfinished state.

21. If the statement "that the contractors carried out the works to completion at a loss to themselves, relying on the promise of the Hon. Minister for Public Works that on the completion of the works their position would receive at the hands of the Government favourable consideration, and that their claim would then be justly and equitably dealt with by them," refers to the interview Mr. Murdoch McLean had with the Hon. Minister for Public Works in Wellington, at which I was present, it is very incorrect, as the Minister made no promise except that the matter would be considered, and said nothing that could be held to be an inducement to the contractors to continue or discontinue working on their contract.

22. With regard to the supposed benefit accruing to the Government through the action of the contractors in connection with these works, it may be pointed out that the public was deprived of the use and benefit of this section of railway for about five years from the time it should have been completed and handed over to the Government in accordance with the terms of the contract. There was consequently a very large amount of forbearance exercised by the Government in dealing with the contractors; besides, after making an ample allowance for the time required to execute the extra works, penalties amounting to £4,880 for overtime had, under the conditions of the contract, accrued, and were due and payable by the contractors, but payment of these have not so far been enforced by the Government.

WILLIAM H. HALES,
Engineer-in-Chief.

Wellington, 6th December, 1896.

Approximate Cost of Paper.—Preparation, not given; printing (1,300 copies), £48.

By Authority: JOHN MACKAY, Government Printer, Wellington.—1897.

Price 1s. 9d.]