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VICTORIA.

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**HARBORS.**

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**REPORT**

FROM

**THE SELECT COMMITTEE**

ON THE

**HARBORS OF MELBOURNE AND  
GEELONG,**

TOGETHER WITH THE

*Proceedings of the Committee.*

AND

**MINUTES OF EVIDENCE,**

ORDERED BY THE COUNCIL TO BE PRINTED,

**14th JANUARY, 1853.**

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MELBOURNE:

PRINTED BY JOHN FERRES, AT THE GOVERNMENT PRINTING OFFICE.

1853.

EXTRACTED FROM THE MINUTES.

TUESDAY, 13TH JULY, 1852.

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6. MELBOURNE AND GEELONG HARBORS.—Dr. Thomson moved pursuant to notice: That a Select Committee be appointed to enquire into the best means of improving the Harbors of Melbourne and Geelong, with power to take Evidence; the Committee to consist of the Auditor General, Mr. Strachan, Mr. Westgarth, Mr. Splatt, Mr. Miller, Mr. Johnston, Mr. Mercer, and the Mover.

Question—put and passed.

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LIST OF WITNESSES EXAMINED.

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## REPORT.

*The Select Committee of the Legislative Council appointed "to enquire into the best means of improving the Harbors of Melbourne and Geelong," have, after a careful examination of the Witnesses examined before them, agreed to the following Report of their views upon this important subject.*

- 1.—In the first place, it appears to your Committee, that any attempt in the present state of the Colony, to cut a water communication from Melbourne to the Beach, must be attended with enormous expense; and from the varying nature of the evidence they have had on this point, even as to the successful termination of this project, if attempted, your Committee are inclined to think such an outlay as that required to complete it, would be quite unwarrantable; especially as very great, almost sufficient, accommodation can be afforded the Shipping by the erection of wharves at Williamstown running parallel with the coast. Your Committee are therefore in favor of affording facility to the Shipping by means of such wharves there, in preference to any attempt by wharves or otherwise on the Northern and most exposed Beach of the Harbor.
- 2.—Secondly:—Your Committee are in favor of forming a Stone Breakwater, to run out from Gellibrand's Point a sufficient distance, (about (200) two hundred yards), to protect that portion of the Shipping at the wharves from the violence of the sea during strong southerly gales.
- 3.—Thirdly:—Although of opinion that the formation of Docks should be left to the enterprise of private individuals, or Companies, your Committee cannot help recommending that measures be taken to construct a Dry Dock as soon as possible, in the most convenient locality; and, failing the practicability of this, a Patent Slip should be erected without delay. It would then be necessary for the complete protection and safety of these works to divert the present channel of the River, by dredging out the original channel now called "the Boat Channel."
- 4.—Fourthly:—Your Committee are in favor of deepening the channel known as "the Ship Channel," leading into the Inner Harbor of Geelong, to a depth of (16) sixteen feet, at low water; the opinion of the most experienced men who have visited this Port being also in favor of this Channel. Besides, it is generally admitted that from the nature of the ground at the bottom, this Channel could be made available for large ships at a less cost than any other. To provide accommodation for the discharge of Shipping, it is absolutely necessary to extend two Pile Wharves from the locality of those at present erected at Geelong, into (16) sixteen feet at low tides; these Wharves to be not less than (30) thirty feet wide. It will also be necessary to have mooring chains laid down to the west and north-west of the Wharves, to keep the vessels steady during northerly and westerly gales.
- 5.—Fifthly:—It appears to your Committee to be absolutely necessary for the safety of ships entering the Heads, that a Light-house should be immediately erected on Point Lonsdale; that another should be erected as soon as possible on Cape Schank; and that a plain, but substantial land-mark painted white, should be erected on the most convenient part of Swan Island.

Ginn, 47, *et seq.*  
Blackburn, 165, 166.  
Blackburn, 172.  
Ferguson, 244.  
Lennox, 186.  
Ginn, 2.  
Blackburn, 107.  
Ferguson, 216, 250.  
Gilmore, 304, 324, 331.  
Campbell, 357.  
Lennox, 186.  
Ferguson, 224, *et seq.*  
Gilmore, 312, 332, 339.

Blackburn, 100.  
Lennox, 195.  
Gilmore, 306, 308, 309.  
Campbell, 390.

Ginn, 71.

Ferguson, 254.  
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M'Lean, 422.

Ferguson, 272.  
Campbell, 384.  
Gilmore, 343, 346.  
Campbell, 384.  
Gilmore, 347, 350.  
Campbell, 383, 385.

6.—Sixthly:—Your Committee are decidedly of opinion, that no vessels but those engaged in the coasting trade, should be allowed to venture the passage of the Heads by night or day, without a Pilot; and would therefore recommend that at least two Pilots be stationed outside the Heads, for the boarding all vessels coming into the Bay, when it is practicable to do so—and when it is not so, to lead the ships safely through, by steering their own boats as a guide before them. These Pilots should be compelled to go (10) ten miles to sea when not engaged on a ship and should be provided with good substantial Pilot Boats of not less than (18) eighteen tons.

7.—Seventhly:—As to the great amount of labor necessary for the immediate carrying out of these urgently required Port improvements, your Committee would suggest that a great proportion of such labor might be beneficially supplied from the large body of Prisoners who are now being sent to the Hulks and Prisons that are being established at Williamstown and Geelong.

8.—In conclusion, your Committee would express their regret, that owing to the press of business latterly before your Honorable House, the time of Honorable Members has been so fully occupied, that it has been with difficulty that a quorum of your Committee could be obtained; and from this cause many valuable suggestions offered by competent Engineers, accustomed to Dredging and Harbor improvements in the Mother Country, have been excluded from the Report.

Gilmore, 341, 350.  
Campbell, 396, 400.  
Ferguson, 257, 288.  
Gilmore, 240.  
Gilmore, 353.

PROCEEDINGS OF THE COMMITTEE.

WEDNESDAY, 28TH JULY, 1852.

*Members present :—*

Dr. Thompson called to the Chair.

The Auditor General, Mr. Miller, Mr. Mercer, and Dr. Thompson.  
Plans and Reports of the Colonial Architect, and the City Surveyor considered.  
Course of proceeding arranged, and list of Witnesses to be summoned agreed upon  
Adjourned to Friday, the 30th July.

FRIDAY, 30TH JULY, 1852.

No Quorum.

Adjourned to Friday, 6th August

FRIDAY, 6TH AUGUST, 1852.

*Members present :—*

Dr. Thomson in the Chair.

The Auditor General, Mr. Miller, and Mr. Mercer.  
H. Ginn, Esq., Colonial Architect, called in and examined.  
Adjourned to Thursday, 12th August.

THURSDAY, 12TH AUGUST, 1852.

*Members present :—*

Dr. Thomson in the Chair.

The Auditor General, Mr. Strachan, Mr. Miller, and Mr. Mercer.  
J. Blackburn, Esq., City Surveyor, called in and examined.  
D. Lennox, Esq., Superintendent of Bridges, called in and examined.  
Adjourned to Thursday, 19th August.

THURSDAY, 19TH AUGUST, 1852.

*Members present :—*

Dr. Thompson in the Chair.

Mr. Miller and Mr. Mercer.

J. Ferguson, Esq., Harbor Master at Williamstown, called in and examined.  
Adjourned to Saturday, 21st August.

SATURDAY, 21ST AUGUST, 1852.

*Members present :—*

Dr. Thomson in the Chair.

Mr. Westgarth and Mr. Strachan.

G. Gilmore, Esq., called in and examined.

A. Campbell, Esq., Harbor Master at Melbourne, called in and examined.  
Adjourned to Tuesday, 24th August.

TUESDAY, 24<sup>TH</sup> AUGUST, 1852.

*Members present :—*

Dr. Thomson in the Chair.

Mr. Miller and Mr. Strachan.

A. Campbell, Esq., called in and further examined.

Adjourned to Friday, 27<sup>th</sup> August.

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FRIDAY, 27<sup>TH</sup> AUGUST, 1852.

No Quorum.

Adjourned to Friday, 3<sup>rd</sup> September.

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FRIDAY, 3<sup>RD</sup> SEPTEMBER, 1852.

*Members present :—*

Dr. Thomson in the Chair.

Mr. Johnston and Mr. Strachan.

Mr. J. M'Lean, called in and examined.

Adjourned to Friday, 14<sup>th</sup> January, 1853.

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FRIDAY, 14<sup>TH</sup> JANUARY, 1853.

*Members present :—*

Dr. Thomson in the Chair.

Mr. Westgarth and Mr. Splatt.

Draft Report brought up and considered ; and the different Clauses put one by one and carried.

MINUTES OF EVIDENCE.

FRIDAY 6th AUGUST, 1852.

MEMBERS PRESENT—The Auditor General, Dr. Thomson, Mr. Miller, and Mr. Mercer;

DR. THOMSON called to the Chair.

Henry Ginn, Esq., called in and examined.

1. *By the Chairman.*—Q. You are Colonial Architect? A. I am.

Henry Ginn, Esq  
6th August, 1852

2. Q. There has been a great alteration in the affairs of this Colony since your last report upon the improvement of the harbor; and we would therefore wish to ask you whether you still adhere to the opinions expressed in that report, or whether you have since seen cause to change them? A. I still adhere to that Report, as far as the permanent improvements are concerned; but there are other improvements that may be made at once that would greatly relieve the present unforeseen requirements of the shipping. These improvements are first, the formation of a tramway or a road of light rails, over and supported on the dam and along the south side of the river, by which that side would be at once available for the discharge of cargo. Next by the formation of a Wharf at Williams Town, with a tramroad to Melbourne along the banks of the river. Fender wharves could be made at each of these spots for the shipping to unload. In my original design I only looked to the permanent improvement and advantage to the trade of the city; but now we have to take into account the very great requirements of the shipping; and these, I think, will be met by adopting, at once, a portion only of my first views, by which great relief to the shipping may be gained. By the formation of a wharf at the beach, adopting the proposed fender wharves of the New Channel, with a tramway to Melbourne, very much would be gained in this respect, particularly as the material for the formation of the roadway can be taken from the proposed cutting for the canal. This tramway I would have to come out a little below the Abattoirs, as I look upon this spot as likely to be the most central business part of the town, when we consider what Melbourne is likely to be at some future, but no very distant period. There are, now, no warehouses above the Princes Bridge, and the formation of the land, seems to preclude any possibility of the extension of the shipping business in that direction; we must therefore look for the extension that will be required, in the direction of Batman's Swamp. Then taking the same distance in this direction from the Abattoirs, as between the Abattoirs and the Bridge, and on both sides of the River, I do not think that this space will be too large for the requirements of the shipping in a very short period.

3. Q. What area would this comprise? A. I am not in a position to answer this.

4. Q. Do you know what the area of the St. Katherine's Docks is? A. I do not, but I think I can ascertain.

5. Q. You have already spoken of one side of the Bay, but if our commerce goes on as we anticipate, shall we not need to have access to both sides of the Bay? A. It may be found necessary; and I may mention that off Williams Town, there is a ledge of rocks running out into the Bay, upon which a stone wharf might readily be constructed. But if a wharf is erected on this side, care would have to be taken not to build it at right angles with the flow of the river, as in that case the current would be intercepted, and a great deposit of sand would be sure to be the result. This would offer a very great hindrance to the convenience of the shipping during the time required to remove the sand. These sand banks are formed in this way; either the channel is filled up by the falling in of a bank, or the current is checked by some natural obstruction, or a counter current; and a sand bank is thus formed by the deposit brought down by floods. These obstructions are often found to be at very nearly right angles to the course of the river, or current.

6. Q. Then a wharf thrown out from Williams Town, would increase the deposit of sand in the Bay? A. It would, by preventing the free run of the current. These banks are all formed of alluvial detritus, brought down by floods, and checked in their progress by some obstruction, or when met by the tide current, and whilst the two are in a comparative state of rest, the sand is deposited, and in this way the banks are formed.

7. Q. Then any wharf on the Williamstown side of the river, would be likely to check the current and induce a deposit of sand? A. If the line of coast were kept, and wharves formed along that line, there would not be so much likelihood of this result. If this plan were followed it would have the disadvantage that no increased area could be gained, but then if Jetties are thrown out they will be sure to stop the run of the current, and thus to injure the anchorage of the Bay.

8. Q. In devising permanent improvements I think that expense ought not to be taken into consideration, especially under our present circumstances; have you then been in any way limited in your suggestions by the consideration of expense? A. I have not.

9. Q. What has been done lately with regard to the improvement of the basin of the river; it is rumoured that plans have been issued, and that a tender has been accepted for enlarging the basin; do you know of this? A. I do not. It does not come within my office, the department of the Superintendent of Bridges has the management of this.

10. Q. Have you any other suggestions to offer to the Committee that may tend to the improvement of our harbour? A. Nothing but what I have already mentioned as forming a

Henry Ginn, Esq.  
continued,  
6th August, 1852.

portion of my former scheme. The formation of a tramway on the south bank of the Yarra offers an advantage by allowing the earth required for the roadway to be excavated from the new channel of the river. The formation of docks I would leave to private enterprise.

11. Q. Has your attention been called by the Government to the subject of a railroad between Melbourne and Williamstown? A. No; but I have reported upon the subject that the best direction for taking such a road would be across the flat land between Melbourne and the beach.

12. Q. In what line? A. From the point I have mentioned, just below the Abattoirs, to the mud flat near the entrance of the river.

13. Q. You would require it to be of great width here? A. No; from 25 to 35 feet wide would be sufficient. The roadway would be brought up to it on supports. The greatest span need not be more than 50 or 60 feet; and the roadway would be supported on piles under foundations.

14. Q. Would it not be cheaper to go the whole line from Williamstown without crossing the river? A. No; I think not; there would be always one stream to cross, the Salt Water River, and the distance would be considerably more.

15. Q. How much more? A. I have not measured the distance, but it cannot be far short of 8 or 10 miles.

16. *By the Auditor General.*—Q. By a straight line crossing the flats, the distance cannot be more than six miles? A. I have not measured the distance, but at all events I believe it would be about twice the distance of the line I propose.

17. *By Mr. Mercer.*—Q. But in taking your line would you not have to bridge the creek between the Salt Water River and the mouth of the Yarra? A. No, I would cross before reaching there, at the Mud Flat, at the Fisherman's Bend.

18. Q. Would a bridge here interrupt the navigation of the river? A. I propose that the bridge shall be a swing bridge.

19. *By the Auditor General.*—Q. What is the distance from the proposed bridge to Melbourne? A. It is not more than three miles from the Princes Bridge.

20. Q. And not less? A. No.

21. Q. And what would be the distance across to Williamstown in a straight line? A. Not much more than a mile or a mile and a half at the utmost to the proposed commencement of the wharves.

22. *By the Chairman.*—Q. Or about four miles and a half altogether? A. Yes.

23. Q. I see you estimate the cost of a balance bridge at £22,000? A. I do.

24. *By the Auditor General.*—Q. What is about the average expense of rails per mile in England? A. About £1500; and you may take the estimated cost for a level country for a railway at about three times this amount in addition.

25. Q. Then there is the permanent roadway? A. That I include in this estimate.

26. Q. Then about £4000 per mile will be sufficient? A. This is rather a low estimate. I see by a recent magazine that I have received, that a contract has been taken in England for the formation of a railway between Cape Town and Williams Town at a trifle under £7000 per mile.

27. Q. Would you consider £10,000 per mile to be a fair calculation here at present, considering that the same distance can be made at the Cape for £7000? A. Yes, a full amount for this Colony.

28. Q. What is your authority for the statement you have made relative to the Cape Town railway? A. The Engineers' Journal of a very recent date.

29. Q. For how many miles was the contract taken? A. For 72 miles and a half.

30. Q. There is a Williams Town on the frontier of the Caffre country, and the railway, I presume, must be from there to Graham's Town; if so, it is by no means a level country, and therefore hardly a fair criterion? A. The magazine states it to be to Cape Town, but I have no idea of the nature of the localities.

31. *By Mr. Mercer.*—Q. I see in your report that you are in favour of a canal in preference to any other mode of communicating with the beach; do you still retain that preference? A. Yes, for the reasons I have stated in my report; and because, if a ship canal were cut, dock companies would soon be formed, and ships would thus be able to be discharged at once.

32. Q. Would you have locks on the canal? A. None.

33. Q. Would not the sand wash in without these? A. No, because the line of the canal is very nearly at right angles with the present sweep of the river.

34. *By the Chairman.*—Q. But by the mouth of the canal opening unprotected into the bay, would not the alluvial detritus in time of floods be deposited there by the stream? A. There would be wharves run out at its entrances and the deposit would be small.

35. *By Mr. Miller.*—Q. You still adhere to the recommendation of your report? A. Yes, as far as the permanent improvements of the river is concerned.

36. Q. Do you happen to know that it is the opinion of the public that a ship canal would be found to be the most beneficial mode of communicating with the beach? A. Yes, I have heard opinions expressed that it would be so.

37. Q. You made a survey of the land I believe? A. I did.

38. Q. And do you conceive that there are any engineering difficulties to prevent the formation of a canal? A. I do not perceive any very great difficulties to be surmounted.

39. Q. Would the quicksands you speak of in your report on the survey, form any serious obstacle? A. They would not. They are not really quicksands, but I call them by that name as no other word is applicable to give expression to what they are.



Henry Ginn, Esq.  
continued,  
6th August, 1862.

40. Q. Will you explain to the Committee the nature of these sands? A. They are a mixture of sand and alluvial soil with water, of such a character that, in boring, the rod sank at once on reaching it to a considerable depth, and it was some time before I could continue the boring, and I was compelled to use the pump. But the reason that I consider that this will be no difficulty, is because when once the cut is made, there will be a natural weepage of the water from this stratum into the canal, in the same way as there is now, I believe, a drainage into the river, and out at the beach. There is this underground weepage continually going on now between the river and the beach; and by making the cut the water would drain out into the bed of the canal, whilst the soil would gradually settle down, and there would be no danger of the sides falling in from such settlement.

41. Q. In reference to this opinion of yours, you have, I presume, seen a letter that was sent to the Governor requesting him to direct you to make further trials of the soil; His Excellency's answer I believe was that no engineer would stake his professional opinion upon a project that he did not believe could be carried out? A. If I had any doubt about the feasibility of the project I certainly should not have recommended it.

42. Q. Have you had any instructions from the Government to proceed with this work? A. I have not.

43. Q. Why has it been delayed? A. I am not aware

44. Q. Do you know the date of the letter I have referred to? A. It was sent only some short time since; some four or five weeks back.

45. Q. Do you think that in the absence of free labour, convicts might be employed to advantage in cutting the canal? A. No doubt they might.

46. Q. From the isolated position of the works, would not this labour be peculiarly fitted for convicts, not only as regards giving them employment, but also with respect to their safe custody? A. Yes, no doubt it would, if they were kept under proper control.

47. Q. Can you call to mind the amount of your estimate for this work? A. £60,600.

48. Q. The cost at present would be much more than this? A. Yes, about 150 per cent. on the amount already estimated.

49. Q. At present then the work would require £150,000? A. Yes, from that to £200,000.

40. Q. Could it be done now, even at that? A. It is doubtful.

51. *By the Auditor General.* Q. In this estimate of the cost of a Canal, do you suppose that £60,600 will put it in a complete state, thoroughly fit for the use of the shipping? A. I do.

52. Q. And what ending or termination will be required? A. Fender Wharves.

53. Q. At each end? A. Yes.

54. Q. Do you not contemplate Stone Wharves at the entrances at either end? A. No, I would secure them by puddling.

55. Q. And along the banks? A. By puddling, also, where it may be required.

56. Q. You have seen the effects of the wash from the Steamers on the banks of the river? A. I have, and I think puddling will be found sufficient. For the sum stated, I would conclude the work, finishing it as far as the purpose for which it is required will demand. Of course, there would have to be some restriction as to the speed at which steamers should go.

57. Q. You have contemplated the working of steam tugs in the Canal? A. I have.

58. Q. If Wharves are thrown out, you say they tend to the accumulation of sand? A. Not unless they are thrown out in the form of Jetties; then they tend to do so.

59. Q. Then those you propose to run out at Williams' Town, would have this effect? A. Only in case they were thrown out as Jetties, but if they are carried along the coast line they will not.

60. *By Mr. Mercer.*—Q. Would pile Jetties have the same effect? A. They would, because they stop the run of the stream, and therefore favor a deposit.

61. Q. To such an extent that the Harbour could not be kept clear by the Steam Dredge? A. Not to such an extent as that, but then the working of the Dredge would interfere with the Shipping.

62. Q. With regard to the quicksand soil, how would you puddle it? A. When the cut is made through this soil, there will be a weepage into the Canal of the water contained in the soil; then, as this drains out there will be a subsidence of the soil, and the whole will become firm, by settling down. We shall then have to puddle the places that may require it.

63. *By the Auditor General.*—Q. Will it not be necessary to puddle the whole of the banks? A. No, I think not.

64. *By Mr. Mercer.* Q. Will not this weepage carry some deposit with it? A. Not much, because there is not a sufficient current of water to carry the soil with it.

65. Q. Would it be underneath? A. No, at the sides, and into the Canal, as the soil is cut through to make the bed of the Canal.

66. Q. Would there be such a subsidence of the soil as to require you to raise any portion of it? A. No, it would not be to such an extent as that.

67. Q. Nor yet to render it necessary in course of time to raise the embankments? A. No, not after completion of work.

68. Q. You have stated that it is the general opinion, that a Ship Canal is the most advisable plan of communicating with the Beach, do you judge of this from what you have heard amongst the Shipping class? A. It is the opinion of all those I have conversed with on the subject, and many of these are parties connected with the Shipping interest.

69. Q. To render a Canal at all efficient, I believe it is necessary to have Docks? A. It is.

70. Q. And the foot of Batman's Hill is the locality you fix upon for them? A. Yes.

Henry Ginn, Esq.  
continued,  
8th August, 1852.

71. Q. Have you made an estimate of their cost? A. I have not, I left that to private enterprise, I am not aware that any of the Docks at home, have been made by Government.

72. *By the Chairman.*—Q. Would not the Docks require to be on the other side of the river? A. No; they would have to be as near the vicinity of the town, as possible, without the necessity of crossing the river. Besides this, the character and formation of the ground at Batman's Hill, rising as it does from the flat, offers an excellent site for warehouses.

73. Q. Would not such a Canal as you propose, be nothing more than a new channel for the river? A. Yes, perhaps, that would be the more proper term for it.

74. Q. You have said that it is not usual for the Government at Home to construct Docks, neither is it usual for them, I believe, to cut canals? A. It is not, but I look upon a Canal as a water road; and if this were made by a private company, it would be the cause of very heavy charges being laid upon the Shipping.

75. *By Mr. Mercer.*—Q. Would you enclose the entrance to Docks with flood gates? Yes, eventually.

76. Q. Would the abutments be puddled, or of stone? A. They would either be formed of stone, or of piles.

77. Q. If we had a Canal, would it not be useless to us without Docks? A. Perhaps so.

78. *By the Chairman.*—Q. You have been asked as to an expression of opinion, I will ask you if you have ever heard any opinion expressed as to a Railway being required between Melbourne and Williams Town, or between Melbourne and the Beach? A. They are both required, and for this reason, that they can be sooner constructed, and can therefore be much sooner brought to the relief of the Shipping; and because, if any larger number of Ships visit our port, we shall not have room for them at our Wharves.

79. Q. How many years will it require to cut the Canal and Docks? A. I will make a calculation, and inform the Committee.

80. *By Mr. Miller.*—Q. I presume, that a certain amount of Wharfage accommodation may be secured on the banks of the river, from the present Wharves, as far as Williams' Town? A. Yes, any number can be made, as far down as the Salt Water River, there being no obstruction to the Channel to that distance.

81. Q. Have you observed the manner in which Cole's Wharf is constructed? A. I have.

82. Q. Could not a great portion of accommodation be gained by opening out the bank on that plan? A. Yes, a great deal, all along the bank of the river.

83. Q. Has not the ground round Batman's Hill the appearance of having been intended by nature for Docks? A. It has, and the Wharf made by Mr. Cole, shows how easily this may be done.

84. *By the Auditor General.*—Q. But by a Dock, are we to understand you to mean a mere cutting in upon the bank, such as there is at Cole's Wharf? A. No, not in the permanent and extensive Docks.

85. Q. Then these cuttings are nothing more than mere basins? A. Exactly.

THURSDAY, 12TH AUGUST, 1852.

MEMBERS PRESENT—Dr Thomson, The Auditor General, Mr. Mercer, Mr. Miller,  
and Mr. Strachan.

DR. THOMSON, called to the Chair.

James Blackburn, Esq., called in and examined.

86. *By the Chairman.*—Q. You are the City Surveyor? A. I am.

James Blackburn,  
Esq.,  
12th August 1852.

87. Q. You have sent in to this Committee a plan of the line of Canal you propose between Melbourne and the Beach? A. I have.

88. Q. And do you still adhere to that scheme, or do you think that present circumstances require that it should be modified? A. I still think my plan as there laid down is the best, apart from the consideration of the state of the labor market; supposing labor to complete the work, to be obtainable, the plan there proposed I consider to be the best.

89. Q. The cut you propose, would be, I presume more a new channel for the river than a Canal? A. It would.

90. Q. How many ships would it accommodate? A. The cut itself would give no such accommodation, except at its north-eastern end.

91. Q. And that is just where the present breakwater now is? A. Rather above the breakwater near the Princes Bridge.

92. Q. How many vessels could be accommodated there? A. About fifteen or twenty small craft; perhaps not above twelve. This of itself would not give much room, but when taken in connection with the proposed basin, the advantages become more obvious.

93. Q. This basin you propose to have on the south side of the river? A. Yes, on the

south of the present course of the Yarra, but on the north of the proposed cut. The basin would also occupy the present bed of the river. James Blackburn, Esq., continued, 12th August, 1852.

94. Q. Would not this involve the necessity of removing the breakwater? A. It would.

95. *By the Auditor General.*—Q. You propose excavating on the south side of the river, I believe? A. Yes.

96. *By the Chairman.*—Q. What advantage would accrue from the removal of the breakwater. A. That the tide would then be permitted to flow as high up the River as Hodgson's punt; and consequently to ebb out also from the same distance; this would give a body of water that would tend in a great measure to keep the river clear. Wherever a river disembogues itself into the sea, bars and shoals are found at or near to the shore. The tide coming in from the sea checks the velocity of the outgoing waters, which bringing with them alluvial detritus and checked in their course, deposit the matters brought down on the bottom of the estuary, and ultimately form a bar. Such are the principal causes that operate in the formation of shoals, and they have in my opinion led to the formation of some of the shoals in the river. From observations I have made, I believe that these shoals are still forming, and that they are increased by the obstruction of the tidal way offered by the breakwater, even if they have not been caused by that obstruction. By removing the breakwater however you would obtain a natural scouring power to keep clear the bed of the river, and to check the rise of the shoals; you would thus be able to keep a proper regimen to the river; the outflowing tide would give you all the power requisite for this.

97. Q. Then the cut would not act, or would perhaps be useless without the removal of the breakwater? A. It would; because the tide would only flow up to the breakwater and no further, and thus the mouth of the cut would sooner or later fill up.

98. Q. What effect would the new cut have on the old channel? A. The effect, though a very distant one, would be to fill up the old channel. This however would be a very slow process; because if the course of the river be diverted, nothing would enter the present channel but the tidal waters, and these hold no matter in suspension, and consequently have nothing to deposit. The cut would carry off all the upland waters, with all the alluvial and other matters likely to cause a deposit, and all the waters coming into the deserted channel would be those caused by the tidal flow, with nothing as I have stated to deposit. Thus the formation of a bank, or the increase of those existing, must necessarily be a slow process; and it would only be when there were freshes coming down the Salt-water River, which would necessarily have their backwater in the old outfall, that there would be any deposit in the old channel.

99. Q. But does not this offer a new suggestion as to the modes to be adopted for clearing away the present obstructions in the river? A. No; the new cut will be found far less expensive than improving the old channel; in my opinion it does not admit of a doubt that if improvements of this class are to be made, it will be found much better to make a new outfall than to improve the river itself; and not only on the score of expense but also because a more direct route is found, than by the river.

100. Q. You have doubtless inspected the anchorage at Williamstown; what can be done by way of improvements here? A. The most important improvement in this locality would be the formation of a breakwater to run out from the Light-house Point, so as to increase the shelter of the Bay, and consequently the ground available for anchorage.

101. Q. Do you know what bottom there is here? A. Yes, a good sound bottom of boulders and clay.

102. Q. And what would you use in the construction of the breakwater? A. Boulders and rocks which might be excavated from the Point itself.

103. Q. Could this be made to protect the whole of Hobson's Bay? A. No.

104. Q. Would it benefit the present anchorage? A. Yes, by increasing its extent. The line, the best adapted for the breakwater is about due east from the Light-house Point.

105. Q. What effect would Jetties have, if run out from the coast above the Light-house? A. They would have the effect of attracting deposits, by impeding the tidal currents.

106. Q. Would pile Jetties have this effect? A. Not so much as compact ones, but even they, though less attractive, would still check the currents and collect deposits.

107. *By the Auditor General.*—Q. Supposing Wharves were erected along the line of coast, would they collect deposit? A. No, but have quite a different effect, if run out to the edge of deep water.

108. Q. And following the line of coast? A. Yes, certainly.

109. *By Mr. Strachan.*—Q. But by running out these Wharves to deep water would you not cripple the Harbour; would it not be better to run out Jetties from the line of coast? A. No, but to form a Quay parallel or nearly so to the line of shore.

110. *By the Auditor General.*—Q. But would not these Quays have the effect of checking the current? A. Jetties would do so, and a deposit more or less would be caused by them.

111. *By Mr. Miller.*—Q. You propose then to remove the Dam and to allow the tidal waters to go up the river? A. I do.

112. Q. Are you aware why the Dam was constructed? A. Yes; to keep the fresh water from mingling with the salt.

113. Q. And if the Dam were removed the result would I suppose be that the two would again mingle? A. No doubt they would, unless some other means were adopted to prevent them.

114. Q. Do you know that the inhabitants of Melbourne and the neighborhood have to go there for their supply of fresh water? A. I do.

115. Q. How would they be supplied? A. They would have to get it at the half-ebb tide; and would be able to supply themselves twice a day for three hours each time, during which the water would be fresh.

Henry Blackburn,  
Esq.,  
continued,  
12th August,  
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116. Q. But on occasions of very high tides, such as occur at particular seasons, what would they do; you are not perhaps aware that at times, before the Dam was constructed, the water was not fresh for some days together? A. I am not, I was not here prior to the construction of the Dam.

117. Q. On these occasions then the inhabitants could not supply themselves? A. Not without some mechanical contrivances, such as tanks, for the preserving of water.

118. Q. And those pipes that are now being laid down to Williamstown, would also become useless? A. The supply would become imperfect to some extent.

119. Q. Is it absolutely necessary in order to scour the bed of the Cut, that the Dam should be removed? A. It is.

120. Q. But has it not struck you, that the tide flowing up the Cut, would have some scouring power, and to the same extent that the river would have? A. This is a point that I have frequently thought upon; but I do not believe that supposing the Dam to remain, the water coming in with the tide would have the same effect as the uninterrupted current of the river. The scouring necessary might however be given by having flood-gates to pen back the fresh water, and to discharge it at the proper time, that is when the tide was ebbing.

121. Q. Then to preserve the fresh water it would become necessary to have flood-gates? A. Yes, they would meet the difficulty you now suggest, and the water could be discharged with the ebb-tide.

122. Q. Would not the erecting of these flood-gates be expensive? A. Yes, rather so.

123. Q. Are you aware that borings have been made in the direction of the proposed Cut? A. I am, from having seen Mr. Ginn's section.

124. Q. Can you get from these sections and borings such information as can be depended on? A. Yes, I have no doubt of it.

125. Q. Have you verified them in any way? A. I have.

126. Q. In what respect? A. By boring. The rods used were lent to the Corporation by the Government, but unfortunately they were not the best kind of rods for determining the strata with any great precision. The borer was a shell auger of a large size, that would not retain samples of the sub-soil. The best auger for the purpose contains a cylindrical chamber by which portions of the soil at any particular depth required can be brought up. From the insufficiency of the tools then, I cannot say what the exact nature of the subsoil is, and can only answer for there not being rock.

127. Q. From these borings can you form any opinion as to the practicability of the scheme? A. Yes, I was fully persuaded of the practicability of the Cut, before I made my Report.

128. Q. Mr. Ginn in his Report alludes to a quicksand that he found; do you know what this is? A. A quicksand is a sharp sand unmixed with alluvion.

129. Q. But would this form any objection to the making the Cut? A. No, It would be an impediment to the execution of the work; but, after the Cut is made it would do no harm.

130. Q. It would be no disadvantage then to the work? A. No, not when completed.

131. Q. Do you think then that Mr. Ginn's line is practicable? A. No doubt it is, but I consider my line to be more so, owing to the cut having to be made through more compact strata than his, mine would go through the foot of the Emerald Hill, whilst Mr. Ginn's would pass along the lower part of the flats, and through more unsound ground. Through the whole strata on the line I bored, I found the rods pass easily, except in one or two cases where I encountered a stiff clay, so strong in one instance that the rod broke in it. I think I may say also, that no quicksand, properly so called, will be found on my line, though there may be a very light sand stratum; but the only mischief this will entail will be to necessitate the employment of a large pumping power, to dispose of soakage.

132. Q. Would not this water escape into the Bay? A. Yes, up to the level of high water, but below that it would not.

133. Q. Not at the source of the water? A. No, not at all.

134. Q. Supposing the whole Cut were a failure, and useless for the purpose intended, would it not be a valuable drain to the flat country around? A. Yes it would act as a drain by means of the very strata that I allude to as likely to impede the progress of the work, by their soakage.

135. Q. And would thus render the land more valuable for sale? A. Yes, there would be such a mass of stuff from the cut that you might raise much of the flat with it.

136. Q. This I presume would render the land valuable for building purposes? A. Yes, such of it as was raised, but a large portion of it would still be useless for building.

137. Q. Have you ever contemplated the practicability of making a railway between Melbourne and the beach? A. Yes, and on the same line as that I propose for the Canal.

138. Q. Could not the stuff taken from the cut help the formation of a railway, by making a road for the lines at an elevation above the reach of floods? A. Yes, it would.

139. Q. To what height have the floods generally risen? A. The highest floods that I have witnessed, rose to only about five feet above high water mark, measuring on the little flat below Mr. Raleigh's wharf, and near to Flinders Lane.

140. Q. At what height should the road way for the rails be, in order to be safe? A. Eight or ten feet above high water mark.

141. Q. Would the soil taken from the cut be more than enough to furnish the stuff for such a roadway? A. Yes; it would cover many acres of ground. I believe the stuff to be taken from the cut is estimated at two millions of cubic yards, and this would cover about one hundred and forty acres of ground, three yards deep.

142. Q. Is not Mr. Ginn's cut a shorter one than yours? A. It is.
143. Q. And would therefore be less expensive? A. Yes.
144. Q. And would not require tide gates to keep it clear? A. That I would not say, for I think the present river requires flood gates.
145. Q. But as far as the mingling of the fresh and salt water? A. No; for the dam prevents this at present, and on Mr. Ginn's plan would prevent it still.
146. Q. As I understand you then, you have two objections to Mr. Ginn's plan; one, that there is not sufficient scouring power; and the other, that you think the soil the cut has to pass through, is not as good as that through which yours would go? A. Yes, but the latter is only a difficulty of execution; in my cut there would not be so much soakage; but when once completed the one cut would be as good as the other in this respect.
147. *By the Chairman.*—Q. Then do you think that neither cut would be available until the dam is removed? A. I do think so. You cannot keep the river free and clear, without removing the dam, still less will you be able to keep open the new cut.
148. *By the Auditor General.*—Q. But with flood gates? A. Yes, by having flood gates.
149. *By the Chairman.*—Q. What quantity of earth do you calculate will come out of your cut? A. About 2,000,000 cubic yards. The report I now hand in, (appendix A,) contains the whole of my views on the subject.
150. Q. Does the amount of your estimate of cost, include the cost of constructing a basin. A. No, it does not. I have merely calculated for the completion of the outfall.
151. Q. This basin then, you look upon as a dock? A. Yes, I have so called it in my report; and I propose to encompass it with a wall, or with a strong close fence.
152. Q. At what advance on your estimate can the works be now done? A. I do not think you could get them done at all now, unless you could contrive some plan to give the men an interest in the work, or introduce laborers specially for the purpose.
153. *By Mr. Miller.*—Q. But might not convict labor be employed? A. It might, if you could get enough of it.
154. Q. And how long will the work take to complete? A. From a communication I have had with Captain Ferguson, I learn that by the modern plan of ship building, vessels do not draw so much water as formerly, being made broader on the beam and less in depth. Taking the depth of the cut then at 15 feet below high water mark, instead of 21 feet as recommended in my scheme, the quantity of earth to be excavated, will be about a million and a half of cubic yards. Supposing it to be this number, and calculating that one convict will do three yards of excavation and filling in a day, this would give 500,000 days for one man, or 1000 days for 500 men to do it in, or rather more than three years and a third. Three yards a day for a man however, is only a small allowance of work, but I now calculate upon the employment of convicts whose labor is notoriously inefficient; an English navigator would turn out fifteen yards a day easily. Moreover I calculate that the hauling up and depositing of the stuff, would be done by machinery.
155. Q. Supposing this had to be done by barrows and waggons? A. It would have to be done by machinery; for though any man can excavate and fill, it is not every one that can remove; and it is in this that our English navigators so greatly excel.
156. Q. What number of men would be required to convey away the stuff? A. Quite as many more.
157. *By the Auditor General.*—Q. But supposing an embankment were made with the soil taken from the cut? A. You would not be able to dispose of it all in this way. The cut is above two and a half miles long, and according to this estimate, the stuff to be taken out will cover, say 100 acres. If an embankment one chain wide were made along the whole line on either side, it would measure to 400 chains, and have an area of 40 acres; consequently the stuff taken from the cut would make an embankment three yards deep; and about two and a half chains wide.
158. *By Mr. Miller.*—Q. But two chains and a half would be very insufficient for building purposes? A. It would not give a very large area for such purposes; but I have reckoned a uniform depth of three yards, and in places the depth of forcing would be less than this; for there is a rise of three or four feet towards the beach.
159. *By the Chairman.*—Q. What width do you propose to make the cut? A. 150 feet at the high water level line.
160. *By Mr. Miller.*—Q. Supposing a railroad to be carried along on the top of such an embankment; how would you carry it over the river? A. By a pile bridge.
161. Q. Where? at the site of the present pile bridge? A. No, the spot I should recommend would be opposite the end of Elizabeth-street.
162. Q. Would that site be as good as that of the present pile bridge? A. Yes, quite; better for many purposes.
163. Q. Would there be any fear of the current carrying it away in the times of floods, if placed where you propose? A. No; not if properly constructed, it is comparatively still water there.
164. *By the Auditor General.*—Q. Would not the bridge placed where you propose, be protected by the Princes Bridge? A. No, not at all, nor would it need to be so, the water way at the Bridge is 150 feet wide, which gives a very great capacity.
165. Q. In your calculation, by which 500 men will be required for 1000 days, I presume this is for the mere excavation of the cut? A. Yes, for excavation and filling—500 convicts for 1000 days.
166. How many men will it require for the other portions of the work, for the same time?

James Blackburn,  
Esq.,  
continued,  
12th August,  
1852.

A. As many more. The quantity of work to each man for a day, has been estimated on the supposition that prison labor will be employed; my estimate of this is founded on the labor of convicts in the adjoining colonies, under a system of rewards such as is being introduced in this, probably more work may be attained. Free men, however will do much more.

167. Q. You calculate, I think, you said, upon getting from ten to fifteen yards a day done by free labor? A. No, not so much as that, unless we could get out English Navigators for the the work. A common laborer will do about two-thirds their quantity, say from eight to ten yards.

168. Q. Could you get them to turn out ten yards on an average? A. No, I think not quite so much.

169. Q. Of the number of men that are put on the works of the Corporation, do you find that but very few of them understand what they are about? A. Only very few. It is exceedingly difficult just now to get the works done in the City; since the men employed have been mostly unaccustomed to the kind of work, and employ themselves thus as a temporary expedient or a last resource.

170. Q. But would not men, even prisoners, be able to do much more work than you mention, if they were provided with the Plough Scoop? A. I do not think any machine or engine would beat our English navigators at short runs.

171. Q. These men, however, are accustomed to such work? A. They are; and from their ability to run along planks and up inclined planes with loaded barrows, they can do a much greater quantity of work than other laborers; to break new hands into this will require a long time and great physical powers.

172. Q. Then just at present it seems to you to be hardly possible that the work can be done? A. Hardly; at all events a very great difference in the cost will be made. The labor now in town is really not fit for the purpose. The Corporation now employs about fifty men, and with but few exceptions, they are such as I would not have at any other time, so very inefficient are they. Much of this, however, I attribute to the restlessness and hankering caused by the Gold Fields, because many of them seem to me to be men that have the physical ability to work; but generally speaking, I know by experience, they have not the inclination.

David Lennox, Esq., called in and examined.

David Lennox,  
Esq.,  
12th August,  
1852.

173. *By the Chairman.*—Q. You are Superintendent of Bridges? A. I am.

174. Q. Have you been employed in preparing any plans for the improvement of the Harbor? A. I have not, but I know the land.

175. Q. But in regard to a basin for the Shipping, have you received no instructions? A. Yes, I have.

176. Q. Has there been any proposal made to enlarge the present basin? A. Yes, to continue the Wharves along over the river, and to make a dock at the foot of King-street.

177. Q. Have any tenders been called for, for the execution of these works? A. They have not, for there is no money, for the purpose. I applied last year for £5000 for the purpose, but no sum was voted.

178. Q. Would you enlarge the present Basin? A. I will explain, my instructions are to make the platform of the present wharf, rather more than double its present width, and this I have already made a beginning upon; then, to extend it as far down as Cole's Wharf; and afterwards, from Raleigh's Wharf to Batman's Hill. Here I have began a Basin for small craft to lay in.

179. Q. And what kind of Dock do you propose making at King-street? A. This is a suggestion of His Excellency the Lieutenant Governor, who, after inspecting the ground, required me to make a plan of a Dock, about Cole's Wharf, and I made a plan for a Basin from Market-street to the foot of Elizabeth-street. But both these spots are much confined, and the entrance, where His Excellency proposes it to be, seems to me to be a very bad place for the purpose. I now produce these plans, and also a plan for the continuation of the Wharves from below Raleigh's Wharf.

180. Q. What depth do you propose to have the Dock? A. About ten feet.

181. Q. And what length? A. We can take it as far as we think proper. The width will be 150 feet, sufficient for two vessels to pass.

182. Q. And the Wharves below Raleigh's Wharf? A. They are to be double the width of the present Wharves, with sheds at the back. But there is a drawback to this work, as a portion of it will require the aid of a pile driving machine, and there is not such a thing to be got in the Colonies.

183. *By Mr. Strachan.* Q. How many feet wide is the platform to be? A. Forty-one feet.

184. Q. Will not this space be too small, when the sheds are erected on it? A. No, I think not.

185. Q. Are not these sheds likely to give an encouragement to persons to leave their goods on the Wharf? A. We shall build them so as to be no obstruction to vessels discharging, since there will be covers for any finer kind of merchandise that is landed, and being open front and back, there will be no fear of persons leaving their goods there.

186. Q. You have seen the plans for a Cut from Melbourne to the Beach, have you any opinion to express on it? A. Yes, I am of opinion that a different line altogether ought to be chosen than that of either of the present plans. My reasons are that where now proposed, a mass of sand will soon block up the mouth of the cut, which is open to the full wash of the Bay; and that there is no shelter for the shipping laying off the entrance.

David Lennox,  
Esq.,  
continued.  
12th August,  
1852.

187. Q. Where then do you think that it should enter the Bay? A. At the East end of the mud flat, where there is good shelter, whilst at Sandridge it would have the whole fetch of the sea in upon it.

188. Q. Would there be deeper water where you propose? A. No, much about the same as in the other spot.

189. *By the Chairman.*—Q. Have you any farther remarks to offer? A. Yes, the slopes proposed are too steep, there should be two horizontal to one perpendicular.

190. *By Mr. Strachan.*—The Dock at Elizabeth-street is to be 150 feet wide? A. Yes, and to be carried right up to the end of Elizabeth-street. The entrance is proposed to be at the Breakwater. Another is also to be made at the foot of Batman's Hill.

191. Q. But would it not be much easier to make these Docks on the other side of the River? A. Yes, far easier, and I have always held the opinion that it is here that the Docks should be made.

192. Q. Are you not afraid that what you now propose will be too confined? A. Yes, entirely too confined.

193. Q. The best mode of improving the Basin, would be to build a Bridge over the River, and to have a Basin on the other side? A. Yes, to have a dock with a wharf on each side, but not above Queen-street, or else you will drown the lower part of Melbourne. By such means, double accommodation will be gained, and nothing need be interfered with.

194. Q. What is your objection to Mr. Blackburn's plan? A. Because he carries his cut near to Prince's Bridge, and if this is carried out, the lower part of Melbourne would be flooded.

195. Q. Can you suggest any improvements at Williams Town? A. No, I cannot; though the Lighthouse Point seems to be a good place for extending a Breakwater, and the bottom where the Jetty is now erected is sound.

196. Q. Could you give the Committee any idea of the expence of throwing out a Breakwater at Gellibrand's Point, so as to enlarge the Bay? A. It would depend upon the length and depth of water.

197. Q. Do you think material could be found to accomplish the work? A. It is very doubtful. It would almost require a mountain; and unless the stuff were ready and put in quick enough, it would all be lost by the wash of the sea.

198. Q. For a Railroad to Williams Town, at what part of the River ought a Bridge to be built? A. That would depend entirely upon where good land for a road is found. For my part, I do not think the South side of the River is the proper course for a Railroad, as very great difficulties will have to be overcome; and I think the Railway must go round by the race course.

199. Q. What difficulties are in the way of making Wharves at Williams Town as has been proposed; are there any rocks or other obstructions? A. None that I am aware of. We have driven piles there, and it is the best ground that I have found in the colony for holding them.

200. Q. Have you surveyed above the present Jetty? A. I have not.

201. Q. The best berth for the Wharves at Williams Town would, you think, be near the Lighthouse? A. Yes.

202. Q. If they were built there, would they be the cause of any deposit? A. The Jetty at Williams Town does not cause any; as least it has not yet, no doubt there would be some small deposit were a stone wall run out; but this would not be the case with piling.

203. Q. But suppose that one or two were made nearer the mouth of the River, would they be the means of inducing a larger deposit? A. No; none of any consequence; there would be no accumulation worth mentioning.

204. Q. Would it be possible to make Wharves on the North side of the Bay with safety? A. Yes, quite.

205. Q. What would be required? A. Simply a series of Jetties thrown out from the land.

206. Q. With what would you propose to protect them? A. If a number of Jetties were run out in a proper direction, one would protect the other, but they would require to be close upon the mud flat. Here the wash is very trifling and by no means dangerous.

207. Q. In the event of a Canal opening out near the mud flat, or of the cut being made between that and Sandridge, would it not be much more convenient that the Wharves should be on the North rather than the South side of the Bay? A. No doubt it would.

THURSDAY, 19TH AUGUST, 1852.

MEMBERS PRESENT:—Dr. Thomson, Chairman, Mr. Miller, and Mr. Mercer.

Charles Ferguson, Esq., called in and examined.

Charles Ferguson,  
Esq., 19th August,  
1852.

208. *By the Chairman.*—Q. Are you aware that there are three schemes for the extension of steam navigation between this Colony and England? A. Yes; I have heard that there are.

Charles Ferguson,  
Esq.,  
continued.  
19th August,  
1852.

209. Q. Are there any facilities for loading and discharging and taking in fuel, and so forth, for those vessels which enter Melbourne harbour? A. Very much depends upon their draft of water. If vessels exceed 10 feet, or  $9\frac{1}{2}$  feet, they cannot go along side of the wharves.

210. Q. What wharves do you allude to? A. I mean those at Williamstown or at Melbourne.

211. Q. What depth of water have they at Williamstown Wharf? A. About  $7\frac{1}{2}$  feet at low water.

212. Q. Then beyond that there is no accommodation whatever for them? A. None, except by the present means of steam boats going along side.

213. Q. But is not that a very unsatisfactory mode for loading and discharging? A. Yes, it leads to very great detention and consequent loss of time.

214. Q. What would you suggest as the best mode for carrying out these requirements? A. Erecting a deep water wharf.

215. Q. Do you think that a coal wharf is imperative? A. I do not think it is imperative; I think it would be equally advantageous to the steamers to have a hulk with coal on board moored in the Bay. Vessels could then run alongside and put their coal into the hulk, and they would be ready for shipment at any time. That is the plan which the Sydney steamers are adopting now, and it is, I believe, a saving of time and expense.

216. Q. What do you think is the best mode for improving the harbor of Williams town for that purpose? A. There are many ways; but it would be advisable at once to run a wharf out into deep water.

217. Q. Have you seen any of the late plans? A. I have not seen any of them, but have heard of the canal. Wharves might be easily constructed at Williamstown out to eighteen feet at low water, so that vessels laying there would be sheltered from the prevailing winds (which blow strongest from S. S. W. round to S. E. in the summer, and from N. round to W. in the winter) by a breakwater bearing due E. from the light house, carried out into four fathoms water, for which there is abundance of materials at Gellibrand's Point. This work could be done by prisoners.

218. Q. You are acquainted with the run of the tides? A. Yes.

219. Q. Where do you find the chief deposit from the floods? If any jetties or wharves were constructed there, would they have the tendency to create further deposits? A. Any jetties carried out beyond the line of still water into the current, would have that effect.

220. Q. But I think you hold that is not necessary for any useful purpose? A. Yes.

221. Q. How many feet do you think necessary for any useful purpose? A. Eighteen feet; there would be no difficulty in carrying jetties out to that depth.

222. Q. What water have you on the edge of the bank? A. Eighteen feet about two hundred yards from the shore.

223. *By Mr. Miller.*—Q. Are you acquainted with the bay directly opposite to Sandridge? A. I know the general character of the ground there and the tides.

224. Q. Do you think that a wharf might be constructed there with advantage, having reference to the position of Melbourne, and the construction either of a canal or a railroad? A. I think if the wharf were constructed further up than Liardet's, so as to get protection from Point Gellibrand, it would be far preferable. A wharf constructed in the locality you allude to, would be exposed to the whole fetch of the bay, which with southerly winds is considerable.

225. Q. Then you would propose to erect it more to the westward? A. Yes; I think that it is practicable to do so.

226. Q. Do you think that a breakwater constructed there would prevent the evils which you apprehend? A. It would lessen the effects of the swell, no doubt; but it would require to be in 26 feet water.

227. Q. What distance would you recommend to the westward? A. So far to the westward as to bring Point Gellibrand to bear south from the wharf, in order to get the protection of that point.

228. Q. If a breakwater were carried out there in a sufficient length from Point Gellibrand, would it shelter the proposed wharf at Sandridge? A. There is no doubt that the further you carry the breakwater to the eastward the more shelter you give to the north side of the bay.

229. Q. Yes; but still you recommend the wharf to be constructed to the westward? A. Yes; to the westward of the old stock yards.

230. Q. And if constructed there, do you think that vessels could lie there in safety? A. Yes.

231. *By Mr. Mercer.*—Q. Without this breakwater? A. The southerly and south west winds would be broken by Point Gellibrand.

232. *By Mr. Miller.*—Q. Which do you think is the least expensive and most expeditious way of constructing a wharf? A. A pile wharf

233. Q. Have you considered the possibility of constructing a wharf by old vessels being moored or sunk? A. I have with reference to the basin at Melbourne, but I have not sufficiently given my consideration to that subject to make my opinion of any value. There would be a vast difference between a wharf constructed of sunken vessels and a pile wharf; besides breakwaters and piers should be solid if you wish to give them strength sufficient to resist the shocks of the sea. In sinking a vessel for the purpose of a wharf, it could only be done on level ground.

234. Q. Where do you think the mouth of the Canal should join Hobson's Bay? A. At the place where I spoke of erecting the Docks.

235. Q. And where should it join at Melbourne? A. I think the nearer the town the better.



236. Q. Where should the Canal join the River? A. I would recommend that the terminus of the Canal should be below Raleigh's wharf.

237. Q. At what breadth would you recommend? A. Not less than eighty feet. There ought to be in the Canal sufficient room for two vessels to pass each other easily. For vessels of a large class, there ought to be from forty to forty-five feet for each.

238. Q. And how deep? A. I think if you had a Canal excavated sixteen feet at low water, you could take in nearly all the vessels at present in Hobson's Bay. There are a few of the old class of ships which draw over twenty feet; but the modern constructed vessels draw much less.

239. *By Mr. Mercer.*—Q. You are aware that a Canal is formed of shelving sides. A. Yes.

240. Q. Then you would give your eighty feet breadth from the bottom? A. From the bottom eighty feet I conceive requisite for vessels of a large class passing each other abreast, unless there were small docks on each side where vessels could, when meeting others, haul in to allow them to pass.

241. *By the Chairman.*—Q. You would have no difficulty you think to take a vessel into any new cut? A. None; if the entrance were wide enough, it would require to be trumpet mouthed as it may be termed. The wharves at the entrance would afford a certain amount of shelter; close piling is a sort of breakwater of itself.

242. Q. Have you any means of ascertaining whether any of the shoals have shifted of late years? A. It is my impression that the banks at the mouth of the river are increasing.

243. Q. Do you think they are increasing in size so far as the present jetty? A. I feel assured that the banks at the mouth of the river at low water are now considerably higher than they were seven or eight years ago.

244. *By Mr. Mercer.*—Q. Do you consider in the event of a Canal being cut to the north part of the Bay, that it would afford facilities to all vessels? A. Not such a Canal as has been spoken of.

245. Then the facilities would be required to be carried all round the Bay? A. I think the present practice of vessels going up the river would still have to be continued.

246. Q. You have already said that you do not think a Canal sufficient for the purpose of the town by itself? A. No, unless indeed it were made considerably wider than eighty feet.

247. *By the Chairman.*—Q. Do you think some quay room would be required on the Williams Town side also? A. I do.

248. Q. Do you think it would be a good plan to have a rail road connecting both sides? A. I see great objections to any railway crossing the river unless you intend to do away with the use of the river. You could not navigate vessels so as to keep clear of damaging the work at the entrance; such a plan would be found impracticable at the present moment. There is scarcely a quarter of an hour passes but some vessels are going either up or down.

249. Q. You are well satisfied, are you, that the present accommodation of the river will never meet the requirements of the mercantile community? A. I am fully convinced of that.

250. Q. And that is necessary to go about immediate improvements, and wharves should be constructed at Williams Town? A. Yes.

251. Q. What amount would be required to provide accommodation to the ocean steamers? A. It is very difficult to estimate the expense just now.

252. Q. I observe in the recent report that £8,000 or £10,000 will be required at the Cape of Good Hope to accommodate the English steamers running round to Australia—Do you think a similar sum would be required here? A. There is such a disproportion in the rate of labor at the Cape and here, that I cannot state what sum it would require.

253. Q. Do you think that there should be a wharf exclusively devoted to the steamers? A. There should be a steam wharf both for regularity in the sailing of steamers and for the advantage of the public.

254. Q. And would such an arrangement accommodate the inter-Colonial steamers as well? A. Yes, by making the wharf large enough.

255. Q. I put the question because I observe these vessels never come to Melbourne, and I had occasion the other day to observe that the "Yarra Yarra" was four days unloading? A. That was owing I believe to the difficulty of procuring lighters. The mouth of the river is now nearly blocked up in consequence of the heavy freshes running down, causing vessels coming up the river to become unmanageable and take the ground.

256. *By Mr. Mercer.*—Q. Could that be remedied by the banks of the Canal being widened? A. It is the winding nature of the river which makes it so difficult to navigate at such times; during freshes it is not a fair running stream.

257. Q. Then you are in fact of opinion that the jetties are required at Williams Town, and also that the river is not altogether serviceable for the purposes of transit? A. Not until it is deepened. If the river were deepened, there is no doubt it would afford greater facilities than a narrow Canal.

258. Q. And are you aware of the probable expense? A. I am not; but there is very little doubt if the wide parts of the river were close piled it would increase the velocity of the current, which would tend to deepen the channel.

259. Q. Would not a railroad from Williams Town to Melbourne make the wharves at Williams Town more valuable? A. Yes; I think good wharves at Williams Town, in connection with a railway, would go a long way to meet all the demands for accommodation. You could easily erect wharves and construct docks at Williams Town wherein vessels of any draft could lie in perfect safety.

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Esq.,  
continued.  
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260. *By the Chairman.*—Q. Do you think it desirable that the docks should be situated in the centre of the City, or would it not be equally as advantageous to have them down at Williams Town in connection with a railway? A. I think it desirable to get ships as near to where their voyage terminates as possible, and if practicable, have them even along side the warehouses.

261. Q. I believe you were Harbour Master at Geelong before you removed to Williams Town? A. I was.

262. Q. Will you be kind enough to favor the Committee with your opinion as to what is really necessary to improve the Harbour of Geelong? A. The most important work is to make a deep water entrance to admit vessels into the Bay; any number of vessels could lay in Corio Bay if they only had water enough to enter.

263. Q. You have sounded all Corio Bay? A. I have, and am well acquainted with the ship channel, and was engaged for nearly three months surveying it.

254. Q. From your knowledge of the Harbour, what do you think would be the best mode of deepening the river—which channel would you select? A. I would select the present ship channel.

265. Q. What depth would it be necessary to deepen that ship channel? A. To sixteen feet at low water, which would be sufficient for all purposes. None of the ships that left Point Henry last year exceeded sixteen feet.

266. *By Mr. Mercer.*—Q. Have you ever examined the middle cut? A. I have not examined it by boring. No doubt if you had a sixteen feet channel cut there, it would be of great advantage.

267. *By the Chairman.*—Q. Do you think this improvement could be easily accomplished? A. I think not. I am not aware if in making the report, the parties who sounded it took sufficient notice of the tides. I know that the tide will set across the proposed cut.

268. Q. Do you think there would be any chance of the north channel filling up if it were deepened? A. I think not; the more you deepen so in proportion you would increase the velocity of the current, which would tend to remove all loose deposits.

269. Q. When you get vessels inside, could you run out jetties? A. Yes; you have eighteen feet of water about two hundred feet from the end of the present steam wharf at Geelong with a fine clay bottom. You would require simply to run out a series of wharves similar to that but twice the breadth where vessels could be safely protected from all winds except from the north east quarter. Some large mooring buoys laid out to the north-east of the jetties would steady vessels when these winds prevail.

270. Q. Have you had any experience, dredging? A. I have no practical experience of it.

271. Q. There will be no lack of accommodation for merchant vessels, if we had a Railway from Melbourne to Geelong? A. In order to give increased accommodation, you must increase the number of Wharves.

272. Q. Now, you have no doubt given considerable attention to the necessity for Lights for this Harbour, what improvement would you suggest in that way? A. I would recommend the erection of a Light House on the pitch of the reef at Point Lonsdale; this I consider necessary to indicate the position of the Port. The present Light on Shortland's Bluff is principally useful as a Harbour Light

273. Q. Unless it is as a Harbour Light, then, it is of little use for vessels entering the Harbour, it does not answer the purpose intended? A. As it is situated, it is a good mark into the Port when you have once seen it.

274. Q. But do not vessels require to make the Port, in fact, before they can see it; I mean, before they open Point Lonsdale? A. It is on that account I would recommend a Light to be erected on Point Lonsdale.

275. Q. Is there any other eligible sight for a Light House? A. If it is found not to be practicable to erect a Light House on the reef at Point Lonsdale, I think one should be erected on the high land there; but in this case is another Low Light, would be required bearing south west by south from the present light on Shortland's Bluff, as a leading light into the Port. Some time back, I examined the reef at Point Lonsdale, and think a building could be erected there. It seemed to be a flat rock of considerable breadth. But as this subject more properly comes within the province of a civil engineer, my opinion may not be of much value.

276. Q. Of what kind of stone? A. Free stone. No vessel could possibly, except from great carelessness, get on shore at the Heads, were a Light erected on this reef.

277. Q. Then, are the Committee to understand that no other Light would be required, if there was one on Point Lonsdale? A. Additional lights along the Coast would be of great use, no doubt; but to add to the safety of this Port, and make it easy of access, we require, in addition to the Light on Point Lonsdale, a Floating Light moored at the Upper or North Fairway Buoy off the West Channel.

278. Q. How far is that from Point Richards? A. About nine miles. The North Fairway Buoy is twenty miles from Gellibrand's Point, and eleven from Point Lonsdale. I think, with a powerful light on the pitch of the reef at Point Lonsdale, and the present one as it is, with a Floating Light at the upper part of the Channel, we shall afford all the facilities vessels require in the way of Lights into this Port; and with these marks or guides, nothing but sheer carelessness on the part of the person in charge, would get a vessel on shore.

279. Q. How far is the Light at Point Gellibrand seen? A. It is seen at a distance of from eight to twelve miles, according to the state of the atmosphere.

280. Q. Do you think it would be discerned from the Fairway Buoy? A. No.

281. Q. But the two lights would be sufficiently near for any practical purpose? A. Yes;

James Ferguson,  
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the light at the Fairway Buoy would also be an advantage to the Geelong traders as well as vessels bound to Melbourne.

282. Q. Is it a straight channel? A. No, a ship cannot steer a straight course through it.

283. Q. Is the Harbour sufficiently buoyed? A. At the present time it is not; but the various buoys voted for last year are in course of preparation now, and will be laid down in such places as I consider necessary.

284. Q. Are any of them ready? A. Some of them are, although the iron buoys are not, as I have had some difficulty in getting them contracted for.

285. Q. What would you suggest with regard to the Pilotage Department? Have we a sufficient number of Pilots just now? A. We have twelve Pilots just now.

286. Q. Are they sufficient? A. No; in the estimate for 1853, I have recommended twenty; that is, eighteen for Melbourne and two to be established at Geelong. At present, the Geelong shipping are supplied with pilots from here, and great delays take place in consequence.

287. Q. Of course such an arrangement would only be for the accommodation of vessels sailing from Geelong? A. I propose that the Pilots shall be divided into two classes, one class of Pilots not to come higher than the Light Ship at the Fairway Buoy, which vessel should be large enough for the accommodation of the Pilots, as well as serve the purpose of a Light Ship. The Sea Pilots would take ships from sea to the Light Ship, and the other class of Pilots would relieve them there. By this plan we should always have Pilots stationed at the Heads.

288. *By Mr. Mercer.*—Q. But you would have them congregated at the Fairway Buoy in the event of southerly winds? A. Not always. It is proposed to have two Pilot Schooners to go outside the Heads, into which these Pilots will be drafted, and a portion stationed at the Light Ship. Each Schooner as they get relieved of Pilots, will come up to the Light Ship and receive others.

289. Q. Now is it not a grievance for these men to be stationed at the Heads? A. Latterly there has been some discontent on account of their quarters; but I think it will add much to the comfort of the men, and to the efficiency of the service generally, their having separate houses for their accommodation.

290. Q. Is there not some objection to that arrangement? A. I am not aware of it. The Lieutenant Governor has sanctioned the erection of eight two-room cottages for the accommodation of the Pilots, at my recommendation. The Pilots were refused permission, I believe, to erect houses or to purchase land for themselves. One of the two-roomed cottages has been erected a few days back at Shortland's Bluff.

291. Q. What scale of remuneration do you propose for these Pilots? A. The scale I have recommended for 1853 is for the *Sea Pilots* one pound per day, and the other class, namely, the *Bay Pilots*, seventeen shillings per day. They are a valuable class of men, and ought to be well paid.

292. Q. What scale of pilotage on the shipping would be chargeable to meet that expense? A. I think that you already have the scale laid down in the Port Bill. It is in proportion to the tonnage, commencing at £3 10s.

293. Q. It struck me, looking over the charges, that you divide very minutely—to a halfpenny? A. Yes; to charge each ship an equal proportion in accordance with their tonnage,

294. Q. What is your objection to the old scale of charges, which appeared to me to be faulty, inasmuch as it went down almost to nothing; the *minimum* was fixed at ten shillings. Now, would it not be better to fix a high *minimum*, say four pounds, and adhere to the principle of the old Act, instead of working out these fractional charges? A. That would fall heavily on large ships. The rate of Pilotage passed last year was three pence a ton upon all vessels, and one penny halfpenny on vessels in ballast. This caused a number of small ships to take Pilots; many of these vessels paid something like twelve shillings for the service of a Pilot, while large ships were compelled to go without.

295. Q. Have you any prospect of getting a Steam Pile Driver from the Government? A. At the Governor's request, I have communicated with some parties in Van Diemen's Land, who, I heard, had a Pile Driver for sale. I have also seen Mr. Dow, who is of opinion he could construct a Steam Pile Driver. I have requested him to submit his plan to the Governor.

296. Q. You have had no opportunity of inspecting the vessel intended for a steam dredge? A. I have inspected her.

297. Q. What depth of water will that vessel draw, with her machinery on board? A. Six feet; she is very flat bottomed, and I think with all her machinery on board she ought not to exceed that draft.

298. Q. Then would vessels of that description be serviceable in a channel of this kind, or in cutting the cut for the river? A. Yes; she would be serviceable for that purpose so far as her draught of water went.

299. Q. You have not had any experience in Steam Dredging, I believe? A. No; I have merely observed the machinery in operation at various places I have visited, but have not gone into the details in any way. There are various kinds of steam dredges; some are made to work in the middle, and others are constructed to work at one side. The dredge it is proposed to have here will be of the latter description.

300. Do you think that Prisoners could be employed on the steam dredge? A. No; I do not think that prisoners should be employed anywhere where there is machinery, for, by a little manœuvring they might disarrange the whole of it, and seriously obstruct the public work.

SATURDAY, AUGUST 21, 1852.

PRESENT :—Dr. Thomson, Chairman, Mr. Westgarth, and Mr. Strachan.

George Gilmore, called in and examined.

George Gilmore,  
21st August,  
1852.

301. *By the Chairman* :—Q. You were for many years commander of the *Shamrock* Steamer, trading to this Port? A. I was.

302. Q. And are now Commander of the Yarra Yarra Steamer? A. I am.

303. Q. You have consequently been for many years well acquainted with the Port of Melbourne? A. I have.

304. Q. Then from your long experience, what would you suggest as being immediately required for the improvement of the Port? A. The most important thing is that sea walls, wharves, or quays should be erected at Williamstown, and that Jetties should be run out from the shore, so that large steamers, such as the Yarra Yarra might be able to run up to them and discharge at once, instead of being compelled as they now are, to anchor off the shore, and to discharge by lighters.

305. Q. You have seen the proposed lines for a canal—would they give any increased facilities for discharging? A. I think not; the canal would scarcely be available for large vessels, for I doubt if on a lee shore and a sandy beach, an entrance could be kept clear.

306. Q. What then would be most advisable? A. Good walls at Williamstown, so as to shelter the vessels from the strong southern gales.

307. Q. Would this be better than making any improvement on the north side of the harbour? A. Yes, because of the heavy gales from the south west, which during their prevalence render this shore difficult of access to boats.

308. Q. Would the Harbour be improved by a Breakwater running out from Gellibrand's Point? A. Yes, very much; and a very little trouble in this respect, would give a very great increase in the accommodation.

309. Q. It would require, I believe, only about 200 yards of Breakwater to double the present accommodation? A. I should think not much more.

310. *By Mr. Westgarth*.—Q. Your observations, I presume, refer only to the interests of the shipping? A. Precisely.

311. *By the Chairman*.—Q. And the accommodation of the public? A. Of course, in accommodating the shipping, you benefit the public.

312. You think it would be more desirable to have Jetties at Williamstown, than on the north side of the Harbour? A. Undoubtedly.

313. Q. What further improvements would you suggest to be immediately done? A. I do not know whether the road from Williamstown to Melbourne is available; but a good road would be very acceptable, in case of having Jetties at Williamstown.

314. Q. There is no road now? A. Not a good one, though I have gone from Melbourne to Williamstown in a cab; but it would require to be made available for omnibuses.

315. Q. You cannot come up to the Wharf at Melbourne, with your steamer the Yarra? A. She could come up, but at present it is impracticable as the river is so crowded with vessels.

316. *By Mr. Westgarth*.—Q. What is your impression with regard to the plan of making wharves on the north shore of the Bay; would they answer do you think, if they were protected by lines of piles to break the wash of the sea? A. I should prefer the Williamstown side.

317. Q. Could the inconvenience you have spoken of as arising from the strong south west gales be obviated by means of piles driven in front of the wharves? A. It could be, but only at very great expense. What I propose at Williamstown, however, could be done at once. I came in last night, and having no means of landing my passengers, I had to keep them on board all night; now if there had been a Wharf at Williamstown I could have landed them at once.

318. *By the Chairman*.—Q. But it has been stated by the engineers who have been examined, that Jetties run out from the shore would have the effect of obstructing the current, and of attracting deposit; but that a Quay parallel to the line of coast would not? A. I should myself prefer the Jetties for unloading; even the present Jetty if run out farther into the deep water and made solid, would be sufficient.

319. Q. And how far would it be necessary to run out the present Wharf, in order to get another fathom? A. About a hundred yards.

320. Q. Would this give sufficient water for large Steamers to come alongside? A. Yes; you will find very few Steamers for which fifteen feet water is not sufficient.

321. And could this be done in a month? A. If the Government were to take it in hand at once, it would not require much more than that time; the chief difficulty would be in procuring the piles.

322. Q. I suppose you are aware that the cut that is to be made, is not for a Canal, but merely to make a new and direct course for the River; and that the Docks spoken of are to be nothing more than open Basins? A. My opinion of this cut is, that the mouth being on a shore exposed to the whole violence of the Southerly gales, in fact on a lee shore, you will never be able to keep it open. With regard to the cut itself, that is a matter for the consideration of Engineers; but I cannot help thinking that it will be labor thrown away, because you have

already a good canal, formed by nature, quite sufficient for all coasting purposes, whilst large vessels, if some increased accommodation be given to them, can load and unload as they do now.

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323. Q. The proposed cut would seem almost to have been the original course of the River? A. It is probable.

324. *By Mr. Westgarth.*—Then you think that there would be sufficient room at Williams Town, not only for Steamers but for merchant vessels to load and unload? A. I do, if a large Quay were made; it would require however to be very extensive, more so than Jetties. There would have to be stringent regulations for the Wharves, so that vessels should not be allowed to remain too long a time alongside; and if you could take the water from Melbourne down to the Wharf at Williams Town, it would be a very great advantage. Masters of vessels will not send boats over to the North Beach for water, but prefer rather to pay for it from the tanks.

325. Q. But the filling is a matter of only a few minutes? A. Yes, but there is a long way to go for it; two or three miles there and the same distance back with a heavy laden boat, takes a long time; and in heavy weather the Beach is unapproachable.

326. If there were a Railway, could not water be brought from Melbourne to Williams town more cheaply? A. Yes, I presume the pipes could be laid down along the line.

327. *By Mr. Strachan.*—You approve of Williamstown as the site for the Wharves? A. I do.

328. Q. And you consider that a Breakwater at Gellibrand's Point would afford a great protection to the northern shore of the Harbor? A. Yes, if carried out far enough.

329. Q. Do you approve of a Circular Wharf at Williamstown or of a Jetty? A. I think that a Jetty, larger than the present one, should be constructed at once so as to give immediate accommodation.

330. Q. Would not the accommodation given by one be found to be too confined? A. I would not limit the number to one, but one I consider to be required immediately for the Steamers.

331. Q. Then if this were done, all necessary facilities would be afforded to the shipping? A. It would be every thing that would be required for the Steamers; and you must make provision for Steamers, for you will find that the number will now increase very rapidly. The whole of the inter-colonial trade must very shortly be carried on by Steam, and then you will have as many Steamers arriving in Port in a day, as you now have in a week.

332. Q. The water being brought down to the north side of the Harbor at Liardets, you think of very little service? A. None send for it, since Masters of vessels prefer paying for it at the tanks.

333. Q. And you conceive that there is an immediate necessity for these works being completed? A. I do; they are required at once.

334. *By Mr. Westgarth.*—Q. In speaking of a breakwater, what is your idea of it; is it necessary that it should be of stone? A. There is plenty of stone at the spot that can be made available for running it out in the shallow water.

335. Q. Is it necessary to have a breakwater in shallow water? A. It is.

336. Q. But a breakwater will not shelter the shipping from the violence of the wind? A. They are well protected from the wind now, all that is wanted is to break the force of the waves.

337. Q. What will be the best mode of forming the breakwater? A. In the shallow water with stones; and beyond it could be made of rows of piles filled in between with stones. Such is the plan generally adopted.

338. Q. Would it not be cheaper and just as serviceable if the space between the piles were filled in with trunks of trees or other floating matter? A. I think not; but it is hardly necessary to consider this point, since the construction of a breakwater is not a subject of very immediate importance, for I have never seen the day, let it blow ever so hard, that I have not been able to go with a steamer to the Wharf at Williamstown.

339. *By the Chairman.*—Q. Then if Jetties were made on the North Beach, even with a breakwater, they would be still exposed to the South West gales? A. Yes, too much for any permanent traffic to be carried on at them. The heaviest gales are from the South West and the South, and to these the beach is quite exposed.

340. Q. With regard to the subject of pilotage; where in your opinion should pilots board vessels? A. It would be desirable that they should board outside the Heads. This will be necessary until something else is done to the entrance of the port; but to do what is required will be very expensive.

341. Q. What would you recommend to be done? A. The entrance should be well defined by lights, and if there were a sufficient number of lighthouses, pilots would not be required to go outside the Heads; in the present state of things, however, it is not safe for any foreign vessel to attempt to enter the Heads without a pilot.

342. Q. Would a light on Point Lonsdale, with the one on Shortland's Bluff be sufficient? A. I should prefer having two lights on Shortland's Bluff, two lights to bring into one so as to mark the fair way.

343. Q. Would it not be desirable also to have a light to guide vessels to the entrance of the port? A. Yes, such a light at Cape Schank would be of great service, it being understood, however, that no master was to attempt to make the port during the night.

244. *By Mr. Westgarth.*—Q. Would you have the two lights so placed that a vessel would always be in safety whilst she kept the two in one? A. Yes, that is precisely my meaning.

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continued.  
21st August,  
1862.

345. *By the Chairman.*—Q. I believe vessels cannot, when coming from certain directions, see the light at Shortland's Bluff? A. No, unless they come from the south, foreign vessels mostly come from the west, and they have to open the Heads before they can see the light.

346. *By Mr. Westgarth.*—Q. Then you prefer a light on Cape Schank as a guide to the port? Yes, with another to bring into one with the light at Shortland's Bluff.

347. Q. Is there any locality that you could indicate where such a light could be placed? A. Yes, there is a sandy shore just inside the Bluff which would answer the purpose. On this land there is a bush laid down in the charts as a leading mark. Even without a light an obelisk here would be of the greatest benefit.

348. *By the Chairman.*—Q. Would not the second light do if placed on the rocky side under Point Lonsdale? A. It is probable.

349. *By Mr. Strachan.*—Q. Could the port be so lighted that you might dispense with the pilots going outside? A. Yes, what I propose would do so.

350. Q. But you think that no prudent man should attempt to enter the Heads after dark, even though he had these lights to guide him? A. I certainly think not, unless he be compelled by stress of weather to do so. I speak in reference to strangers and foreign ships.

351. *By Mr. Westgarth.*—Q. Even though we had these guiding lights, you would not have him enter? A. No, no foreign ship should do so, with the strong tides and eddies that there are at the Heads.

352. Q. But would he not be safe so long as he kept the two lights in line? A. Yes, if there were any necessity for him to enter; but it should be perfectly understood that no master of a foreign ship should attempt the entrance unless obliged to do so.

353. *By Mr. Strachan.*—Q. And then if obliged to enter, after passing the lighthouse he could anchor? A. Yes, he would have plenty of shelter in good anchorage.

354. *By Mr. Westgarth.*—Q. The light you propose on Cape Schank would serve also as a guide into Western Port? A. Yes.

355. Q. At present the pilots should be required to go out outside? A. Yes, at present it is necessary that they should do so; and it will be so until there is a light on Cape Schank.

356. Q. When a vessel is going out is it necessary that she should take a pilot out with her? A. No, when she comes to the Heads the pilot can give directions to take her out.

357. Q. Then they would be merely required outside by vessels arriving? A. Yes.

358. Q. Would one boat be sufficient? A. No, two would be required, one to take the place of the other, because in many cases the boat would have to run in before the ship to show the way, owing to the difficulty of boarding outside the Heads in bad weather.

359. Q. Would it not be possible to put up a guiding obelisk at once, where you suggest the light to be on Swan Island? A. Yes, it might be done directly.

360. Q. One built of broad palings, or logs, painted white would be sufficient for the purpose? A. Yes; such an obelisk could be put up in twenty-four hours.

361. *By the Chairman.*—Q. Is there anything else you would propose with respect to the Harbour lights? A. Yes, a light ship would be serviceable; one at the Fairway Buoy would be extremely useful.

362. *By Mr. Strachan.*—Q. Would a light ship at this spot enable a vessel to run up at night? A. Yes, if the master were a man that was used to the port; but it would require him to be well acquainted with the channel, or else two light ships would be required to make certain.

363. *By the Chairman.*—Q. But a pilot knowing the Channel might do with one light? A. I think not unless it was moonlight. In following the Channel you have to pick up the black buoy off Swan Point, and this in a dark night, and with strong tides running is rather a nice point. I have myself run through the Channel at night by the bearings of the light and the land, by moonlight; but it would not be safe at other times to do so, even though you should know the Harbour well.

364. Q. I think I understand you to say that even with the additional lights it would be unsafe for a vessel to make the Harbour at night? A. Not unsafe, but I should not recommend it.

365. *By Mr. Westgarth.*—Q. Do you think that, if there were room enough to erect it, just below the present lighthouse would be the best place for the second light? A. Yes, that position would be preferable if there were sufficient room, because if two lights to be brought into one, are too far apart, a master may see the one without seeing the other; and it might happen that one would be mistaken for the other.

366. Q. But if there be too little space for a lighthouse, will not a light boat do? A. No, this would be dangerous, as it might shift its position.

367. Q. At all events you would have the obelisk? Q. Yes, at once.

368. *By the Chairman.*—Q. Are there a sufficient number of buoys in the Harbour? A. Yes, at present the Channel is very plainly marked out.

369. Q. *By Mr. Strachan.*—Q. Would you require all foreign ships to take a pilot, or would you allow them to refuse one? A. Most certainly, I should require it; no foreign ship should be allowed to refuse a pilot.

370. *By Mr. Westgarth.*—Do you consider the entrance to the Port Phillip Heads to be a dangerous navigation? A. I consider it so for sailing vessels, owing to the strong tides and currents.

371. Do you consider the navigation of Bass's Straits, to be comparatively speaking dangerous? A. I do not,—not so dangerous as the navigating of the Channel of the United Kingdom.

372. Q. Have not an unusual proportion of maritime disasters occurred in these Straits? George Gilmore, continued. 21st August, 1852.  
 A. Not in the Straits, but at the entrance to the different Ports disasters have frequently occurred, from errors in judgment.
373. Q. How long have you been engaged in the Navigation of these seas? A. Upwards of ten years. I have commanded steamers plying constantly on the line between Sydney, Melbourne, and Launceston ever since June, 1842.
374. Q. During all that time, have you ever met with any serious accident at sea? I have not.
375. Q. During all these voyages considerably upwards of one hundred for the entire round of the different ports, you have never met with any maritime disaster? A. None.
376. Q. Do you consider that such great and desirable safety in the navigation of these seas can be generally attained? A. I do.

Archibald Campbell, Esq., called in and examined.

Archibald Campbell, Esq., 21st August, 1852.

377. *By the Chairman.*—Q. You are Harbour Master at Melbourne? A. I am.
378. Q. What do you think is immediately requisite to increase the accommodation for Shipping at Melbourne? A. Something is immediately required to be done at the Queen's Wharf; and, in my opinion, the Wharves will have to go down to the Old Slaughter Houses, and even beyond them, in order to meet the present and increasing requirements of the Port.
379. Q. But there is no room there? A. Yes, there is plenty of room for one vessel to lay alongside the bank.
380. Q. Then the present Wharf should be continued down below Batman's Hill? A. Yes, in my opinion to the old Slaughter House.
381. Q. Is nothing else required? A. Nothing, except it be a bridge immediately over the falls.
382. Q. Have you frequented the Port? A. I have.
383. Q. What is your opinion with regard to the expediency of putting an additional lighthouse on Swan Island? A. I think that a light placed about 300 yards below Shortland's Bluff, would take in the fair-way; but there is no foundation there, it is nothing but sand. Keeping that and the Shortland's Bluff light even, would be fair right up to the Bluff; but a guiding obelisk would be sufficient, because no vessel should come into the Heads at night.
384. Q. Is a lighthouse required at Cape Schanck? A. Yes, very much, vessels could then see it, whether coming from the west or the east.
385. Q. Then a lighthouse on Cape Schanck, and an obelisk on Swan Island, would be sufficient for all purposes, and would obviate the necessity for sending pilots outside the Heads? A. It would, but if it were thick weather, the master would be unable to see the obelisk, and therefore no vessel should attempt to enter in such weather, unless forced to do so by stress of weather.
386. Q. Is there anything respecting the Wharves, as far as you and your duties are concerned, that will require further regulation than at present? A. There is one thing that gives me great cause of complaint; that is, I have not a Harbour Master's authority over the Steamers. A few days ago, while on duty in getting a vessel out of the fair way, the *Aphrasia* came down upon her, paying no attention to my orders to stop, the consequence was, she ran into the vessel, by which a man fell overboard, and but for our timely aid, this poor fellow would in all probability have lost his life.
387. Q. What is your opinion respecting the Wharves necessary at Williams Town? A. There should be Jetties run out at once for the steamers; but a Circular Wharf will be required then for the shipping.
388. Q. Then you recommend a Circular Wharf as the permanent improvements? A. Yes, if deepening the River is found impracticable.
389. Q. Do you think that vessels would be safe if they were to anchor on the north side of the Bay? A. Yes, but they would require to have good ground tackle.
390. *By Mr. Strachan.*—Q. If a breakwater were made at Gellibrand's Point, do you think that a second Harbour might be made between the Mud flat and the Beach at Liardet's? A. Yes, it is possible.
391. Q. Without the breakwater? A. Yes, at present; it is perfectly safe for a distance of 50 chains from the eastern point of the Mud flat.
392. Q. Do you think that by a Breakwater, a Harbour could be made at this spot, equal in extent to that at Williams' Town? A. No, I do not.

TUESDAY, AUGUST 24, 1852.

PRESENT :—Dr. Thomson, Chairman, Mr. Strachan, and Mr. Miller.

Archibald Campbell, Esq., called in and further examined.

Archibald Campbell, Esq., 24th August, 1852.

393. *By Mr. Strachan.*—Q. I believe you approve of a light at Point Lonsdale? A. I do.
394. Q. And you think that there should be a beacon or light at Swan Point? A. Yes, as that marks the fair way straight in.

Archibald Campbell,  
Esq.,  
continued,  
24th August, 1852.

395. Q. If there was a light on the high ground in a line with Shortland's Bluff, do you think it would be better? A. I do not think so myself. A light on Point Lonsdale would be the safest, because if a vessel keeps her own length from the Bluff, she is quite safe.

396. Q. In thick weather, do you consider it would be prudent to effect an entrance? A. No master should attempt it, unless he is obliged when it is blowing hard.

397. Q. Is there anything else you could suggest? A. No, without it is that there should be a light at the black buoy.

398. Q. You approve then of a Light Ship at this buoy? A. Yes, because a master otherwise does not know where to bring up at night.

399. Q. Is a light required on Point Nepean? A. Not in my opinion.

400. Q. Do you consider it to be dangerous to attempt to enter the Heads at night? A. Yes, especially at the ebb tide, which runs out very strong. It will require a good eight knot breeze to take a vessel in as the tide runs out a good five knots, and if the sea is at all heavy it is hazardous.

401. Q. You have already I think recommended a light on Cape Schanck? A. Such a light would be of great service.

402. Q. Are you aware whether there are sufficient buoys laid down? A. Yes; when I frequented the port I found enough.

403. *By the Chairman.*—Q. You say it would not be prudent for a master to run his vessel into port at night, would not an obelisk on Swan Point obviate any danger? A. Not at night, because it would not be seen. A master would only be obliged to run in to save his vessel when it was blowing hard, and this is the only time that there is any danger. The passage is easy enough in fair weather; but when it is blowing hard and the vessel will not keep to windward, then is the time that the shelter of the port is required and that the port is most difficult of access.

FRIDAY, 3rd SEPTEMBER, 1852.

MEMBERS PRESENT.—Dr. Thomson, Chairman, Mr. Johnston, and Mr. Strachan.

Mr. John McLean, called in and examined.

404. *By the Chairman.*—Q. You have command of the *Victoria* Steamer, trading to Geelong? A. I have

405. Q. And, from your occupation, are, I presume, acquainted with the currents and channels of the Geelong Bay? A. I am.

406. Q. Which, in your opinion, would be the best channel to be deepened, for general purposes? A. I consider that the easiest and best for all purposes would be the present ship channel; that is the one that ought to be deepened, as I have found the current run the strongest through there: the whole sweep of the tide takes that direction.

407. Q. If a cut were made through the centre of the Bar, would the sand be apt to reform? A. Not where I have mentioned, if proper steps are taken to keep it clear. The tide, running down, runs right across the bar, and the force of the tidal current would in a great measure help to keep the channel clear. The distance that would have to be cut is very trifling. The entrance to it is very good, with the exception of a small knoll, upon which a small buoy could be put, and there is never less than 11 feet, until you come to the white buoy, when the water shoals to 7 and 8 feet; the 7 feet shoal extends only for about 200 yards, and then there is about half-a-cable's length of 8 feet.

408. Q. What depth would it require to be dredged to? A. A depth of 14 feet would be quite sufficient for all purposes. That would give you 19 feet at high water; the chief part of the channel has already a depth of 14 feet.

409. Q. How much of it averages 11 feet? A. About a cable's length.

410. Q. And 12 feet? A. About half-a-cable's length; the remainder is all 14 feet at least.

411. Q. Then there is not much work to be done? A. Very little; the water is very deep after passing the buoys.

412. Q. Very little cutting would be required? A. Not till after you pass the first two buoys.

413. Q. And this, in your opinion, is all that would be required to make the entrance into the Bay completely serviceable? A. Yes, to enable large ships to go into the Bay to load; once past the bar and there is plenty of water in the Bay.

414. Q. There is another channel across the Bar besides the one you have mentioned? A. There is, but the tide does not run so rapidly through it, and I do not think, therefore, that it would be as good as the present ship channel.

415. If it were deepened might not the tide draw through it? A. No; Point Henry throws the tidal current down towards the other channel, and will always serve to keep it clear.

416. Q. Are any lights required in this part of the Harbour? A. Yes, there should be a light on the Bird Rock, with a light at the jetty, so as to enable steamers to go in at any time on a dark night, and if there were also a small light on the first buoy, the entrance would be easy enough on the darkest night.

Mr. John McLean,  
3rd September,  
1852.



417. Q. What description of lights would you recommend? A. That on the Bird Rock should be a bright fixed light, and the light on the Pier should be a red one, so that it might be easily distinguished from the house lights.

Mr. John McLean,  
continued,  
3rd. September,  
1852.

418. Q. Are any buoys required? A. Yes, one should be laid down on the eight-foot knoll, outside the Bird Rock.

419. Q. Have you often visited this Port, coming in at the Heads? A. I have come in through the Heads only twice; once in a Ship, and this last time when I came in with the "Victoria."

420. Q. Have you any suggestions to offer for the improvement of the harbour generally? A. Only that more wharfage accommodation is required; they want to be run out to about twice their present depth, and to be made of double their present extent.

421. Q. How far would they require to go out? A. So as to have a depth of 12 feet, at least, at low water.

422. Q. Are any other improvements wanted? A. I think if a steamboat wharf were made entirely distinct from the present jetty, it would be of very great advantage, and be a great accommodation to the public. The passengers by the steamers all come down Moorabool street from the town, and I think that at the foot of this street, would be the best place for such a wharf. This would be of very great service, as the steamboats require more accommodation just now than any other kind of vessels, and that a wharf be carried from the east wharf, to the wharf run out at Moorabool street, into deeper water than the present one, so as all the small craft could haul alongside and discharge; also levelled up at the back so as there could be access from all places; also sheds built. Mooring buoys should be placed outside of the wharves, so as vessels could haul out or in by them, the best place would be about the centre of each entrance and one abreast of the end of each pier.



## APPENDIX A.

## CITY COUNCIL OF MELBOURNE.

*Report of the City Surveyor on the proposed improvement in the mode of  
Communication between Hobson's Bay and Melbourne.*

21ST NOVEMBER, 1851.

IN obedience to the directions of the Council, I have made a survey with a view to the determination of the best means of communication between Hobson's Bay and Melbourne.

Although these points are, in a direct line, little more than two miles asunder, the distance between them, following the Yarra Yarra, is about seven miles; and, owing to the want of depth in a considerable part of that River, it is available to vessels of small tonnage only. The larger vessels are constrained to discharge and receive cargoes at anchorage off Williamstown, by means of lighters, which ply for the purpose. The many evils which result from this state of things have come home to the experience of nearly every inhabitant, and have created an almost universal opinion that the prosperity of the Port and City depend greatly on the early application of a sufficient remedy.

As in all cases of the kind, there have been many remedies proposed—These may be classed under three heads: 1. Those which propose to connect the two points by a Railway: 2. Those which propose to improve the Yarra: and 3. Those which propose to connect the two points by a Ship Canal.

By some it has been proposed to begin the railway at a jetty, to be built at Williamstown, and keeping the western bank of Hobson's Bay and the Yarra, to terminate it near Raleigh's warehouses in Flinders-street. By others it is proposed to commence the rail in the same way and at the same place, to keep the western bank of Hobson's Bay until it reaches the mouth of the Yarra, there to cross the same on piles driven into the mud flat and shoals, having a swing bridge in one of the channels, and thence to proceed in nearly a direct line to a terminus on the southern side of the Yarra, opposite to the Custom House. A third plan is to form a jetty in the head of Hobson's Bay on the eastern side, at which vessels may unload, and to lay down a railway thence to a terminus either on the north or south side of the Yarra near Prince's Bridge.

A Railway would, doubtless, afford a more rapid means of communication than we at present possess, the cost of transit by it would be less than by lighters, and, in the hands of a well-ordered establishment, the safety of the goods conveyed would be greater; but with all deference to the judgment of those who have projected the above schemes, I am constrained to adopt the conclusion that no railway communication whatever would sufficiently meet the case, and that if adopted, it must be regarded as a temporary expedient only. Necessity alone, I conceive, should compel us to this means of improvement; and this necessity will not, in my opinion, be established until it be clearly proved that the capital requisite for a superior project cannot be procured. Meanwhile we may fairly aim at the only really economical mode of connecting the Port and City, which is the combining of them by obtaining the ability to float up into the City vessels of the largest size, and to place them and their cargoes under the safeguard of lock and key, by the modern system of docks.

The second class of remedies proposed contemplates these objects, if not wholly, yet in part. With a view to the improvement of the Yarra, a survey of that River, under order of the Government, was made by Mr. Garrard in 1848, and a copy of his map and sections was furnished to the Corporation. The data which these supply have been adopted by me in the calculations I have made, and so far as I have had an opportunity of testing them, I have found them to be correct. On studying these interesting documents we at once perceive that the want of depth in the Yarra is caused by the confluence of the Yarra and the Saltwater River, within reach of the most energetic portion of the tidal movements. In descending the Yarra from Melbourne, we find that, for some distance the channel is compressed, and there is a great depth of water; but, on approaching Humbug Reach, the channel widens, and true to the hydrostatic law, the depth decreases. Thence to the Bay, the channel, now common to both Rivers, is wider still, and irregular, and the depths are correspondingly irregular, and generally shallow.

I have satisfied myself that the ascending tidal waters convey little or no silt or sand when

they leave the Bay; they are generally too feeble to hold much, if any, matter, in suspension. The continuance of westerly gales has a decided influence in the augmentation of the flow, and then, but only then, it is charged with detritus. The shoals and shallows of the River are nearly entirely brought from the uplands; chiefly by freshets, and in the winter season. It is obvious that the power of the effluent waters to hold matter in suspension will depend on their velocity; and, all other things being the same, the distance to which the detritus will be carried out to sea, will also depend on the velocity of the descending column: anything which diminishes this velocity will cause it to deposit its detritus at a nearer point. Keeping this principle in mind, it will be seen that the construction of the dam across the Yarra, at Melbourne, by which the tide is prevented from flowing up for several miles into the interior, has increased the disposition of the River to form shoals and shallows, and at the same time decreased its power to scour its channel. I have not been able to ascertain the extent to which this cause has operated, but that it has been in operation, and continues to operate prejudicially on the outfall, I have not the least doubt.

If, then, the improvement of the Yarra were decided on, it would, first of all, be desirable to remove the dam, and thus restore to the tide its former range into the interior. In addition to this, it would be necessary to deepen the whole of the channel, where not already deep enough, to at least eighteen feet below spring tide low water mark. A new channel for some distance, so as to avoid Humbug Reach, would render the course more direct, effect a saving of nearly one mile, and be attended with only a small additional expense over and above the perfecting of the old channel. The existence of rock in the channel in Hobson's Bay, approaching Williamstown, would render it desirable to dredge a new channel through the shoal, which would be best accomplished on the line commonly known as the boat channel.

But these works, followed by no other, would not make the River permanently navigable, in the manner proposed. This would lead us much further in first expenditure, or impose on us the necessity of a fixed and constant expenditure for keeping a dredger afloat and at work. The causes which have produced the shoals and shallows would still be in operation, and would most certainly reproduce them. To prevent such a result, it would be proper, not only to remove the dam and deepen the channel, as already proposed, but to compress the banks for at least four miles, in order to give the River the width due to its depth and velocity. This width would of course be different above the junction of the Saltwater River and below it. And it would be still further proper to confine by banks the new channel to be dredged through the shoal in Hobson's Bay, so as to deliver the effluent waters into the deep sub-bay, which the chart shows to exist there; for, until they reach this sub-bay, there can be no certainty that they will not form shoals.

The magnitude of these works, would, I fear, put them out of reach of present means; but they are nevertheless essential to the establishing for the River a permanent regimen of power to maintain its equilibrium, without assistance from the dredger. In consideration, therefore, of their great cost, I should, in the event of the improvement of the River being finally adopted, recommend that the works be first restricted to the removal of the dam, the deepening of the channel, the making of the new channel near Humbug Reach, and the opening the new outfall through the shoal in Hobson's Bay. In order to determine the probable cost of these works, I have measured on Mr. Garrard's map and sections the dredging and excavation necessary to be done, and I find that the former amounts to 764,309 cubic yards, and the latter to 440,000 cubic yards, making, in the whole, 1,204,309 yards. Taking these quantities at 1s. 3d. per yard, at which, I believe, they could be done, the cost would be £75,269. If to this be added the cost of removing the dam, the whole would, in round numbers, amount to £78,000. It will presently be seen that a new cut or canal, from Hobson's Bay to Melbourne, can be executed for £113,365.

The third class of means proposed for the improvement of the port, is the formation of a canal from Hobson's Bay to Melbourne. This has been generally recommended; but I have not been able to ascertain whether the canal was to be a still water canal, connected with the bay by a lock; or a tidal channel or inlet (a kind of marine *cul de sac*); or a new outfall for the Yarra.

Whatever may have been intended, I have arrived at the conclusion that the last-named work is that which will be most strictly economical.

In the plan which accompanies this Report, there is shown the whole course of the Yarra from Prince's Bridge to Hobson's Bay, and I have laid down on it the line which is, in my humble opinion, the best for the new cut. It will be perceived this commences at the Prince's Bridge, and describes one straight line until it terminates at Hobson's Bay, at about a quarter of a mile to the northward of the present jetty at Sandridge, in soundings twenty feet deep at ordinary low tides, and in the sub-bay, already referred to, as being connected with all the deep water channels and currents.

The entire length of the cut is 4,928 yards, of which 792 yards are through the shallow flat which margins the Bay. This portion would require to be dredged, and to be restricted by parallel banks, for the purpose of compelling the tidal waters to act on the line of cut, and thus to prevent, by the scour of the effluent waters, the formation of deposits within or near the mouth of the cut. But, for the reasons already explained, this would not, I believe, be effectually accomplished without superseding the dam at Melbourne; and, partly on this account, I have been induced to connect the cut with the River at a point above the dam. The effect of so doing would be to cause the tide to flow up the River, probably as high as Alderman Hodgson's Point, to which spot, I understand, it originally ascended, notwithstanding a small natural dam which existed on the site of the present artificial one. Assuming that point to have been reached, the quantity of water which would have ascended the River every tide (or be penned back; in effect the same thing), would be 8,441,000 cubic feet; a quantity capable of increasing the velocity of the discharge by at least 42 feet per minute.

The removal of the dam would be attended with the disturbance of the present arrange-

ments for supplying the City with water; but it is to be hoped that before the execution of the works for the improvement of the Port are completed, proper water works will be established. Should this, however, not be the case, then I would suggest the formation of a small basin, adjoining the River, say between St. Paul's Church and Prince's Bridge, into which, at the last quarter of the ebb tide, a sufficient quantity of water could be taken from the River by gates or valves, and thence distributed as at present. I am aware that the removal of the dam would not, generally, be regarded with favour; there would not be the same degree of confidence in the water taken at ebb tide as in the present water, and the necessity under which the lands above the bridge would be to procure fresh water intermittently, would, doubtless, be found to be inconvenient, especially to manufactories. The ebb tide would expose more of the bed of the River than is now seen, and thus the beauty of the River would be diminished. If these objections should be deemed sufficiently important to justify further expense, the end I have in view may be attained by erecting a dam so contrived as to pen back 8,441,000 cubic feet of the fresh waters which descend during the flood tide, and to discharge the same with the ebb. I believe the dam could be made self-acting, but on this point I am not now prepared to give a decided opinion. In the event of my proposal being approved, it would be best to place the dam at the lower side of the Bridge, and to have its overfall by a slope extending to a point sufficiently distant from the foundations.

I have consulted several gentlemen acquainted with nautical affairs, and chiefly ship-masters, on the suitableness of the proposed cut for navigation, or rather for the safe reception of vessels, and they agree in opinion that it will fully answer the purpose intended. It appears that vessels making the port come to anchor off Williamstown, where they are quite safe in any weather, there being good holding ground. They can, however, proceed no further without the assistance of the tug, and this could as safely lead them eastward to the mouth of the new cut, as northward to the mouth of the River. Their opinion is, that in any weather, vessels would be safe in any part of the Bay, at which it is proposed to enter.

I may here observe that the execution of the cut, would, in my humble opinion, restore the Yarra to an outfall which it has before possessed. The position of the shoals in Hobson's Bay, as they are laid down in the survey made by H.M. Ship Rattlesnake, 1838, supports this view of the subject, and the state and form of the flats between Melbourne and Sandridge tend to the same conclusion. That such a change of course should take place, may be accounted for by supposing a concurrence of a high spring tide accompanied by strong winds from the westward and southward, and by a flood in the Yarra, without, at the same time, a flood in the Saltwater River. These conditions would naturally tend to the formation of a new channel in the present course. Be this as it may, the effect of the new cut would be to facilitate the discharge of the upland waters of the Yarra, and they would be so completely cut off from all escape towards the lowlands, that it may reasonably be concluded the back water floods, which, for several months during the winter half of the year, cover the marshes near Melbourne, would be much diminished; and, as the lowlands more immediately adjoining the City, in Flinders-street near Prince's Bridge, and about the Abattoirs, as well as on the southern side, could be raised by the stuff procured in the excavations, the injury which the floods in the Yarra inflict upon these parts would no longer be experienced. A further effect of the work would be to supersede the present channel of the Yarra, from Prince's Bridge to near Cole's wharf, and the converting the remainder, thence to Hobson's Bay, into a tidal inlet only. The objection which may be urged against this is, that in times of the descent of the upland waters of the Saltwater River, there would be more or less silt deposited in this channel or inlet, beyond the power of the ebb tide to remove. I do not attach much importance to the objection, for I regard the channel as obsolete whenever a new outfall is made, and as likely to be but little used. However, to guard against such a result, it would, under my plan, be practicable to discharge into the channel, at any time, a sufficient quantity of water to remove all deposit which might accumulate. This would be best accomplished by connecting the old and new channels by gates and culverts laid in below the floor of the Dock yet to be described.

I have not prepared any detailed drawings of the works proposed to be executed, for I have not thought it requisite, in the present stage of business, to do so. It will therefore be desirable for me to state, that I have based the estimate of the cost of the cut on the assumption that it would be made one hundred feet wide at the bottom, and 192 feet wide at the level of high water mark spring tide, 23 feet deep from the same level, or 21 feet from ordinary high water, as far eastward as the entrance of the dock, above which, up to Prince's Bridge, it would be but twelve feet and ten feet; the alteration of depth being secured by a masonry sill. I have also assumed that the surface of the banks should in no place be less than 10 feet above the upper level of the water, and that they should be 100 feet wide, so as to form a road or street on either side of the cut, excepting on the north side above the entrance to the dock, where they should be 150 at the least. As to that part of the cut which would be formed in Hobson's Bay, I have assumed that the banks should be formed by earth assisted by fascines of tea-tree if necessary, the banks having the same height and width on top as the others, and having a slope of 4 to 1 on the outer surface. Further, that their ends should be protected by piles and masonry returned on both their faces northward, and connected with a coat of rubble stones, three feet thick, laid on the faces of the inner and outer slopes for a distance, measured from the mouth, of at least 250 feet.

Under these conditions, I find that the probable cost of the work, that is, the cut, banks, pier-heads, and sill, would be £113,365, in which I have included the usual allowance for contingencies.

I have deemed it desirable to shew on my plan the means by which shipping would be best accommodated, and I have accordingly marked the best site for a wet dock, having an

entrance from the new cut by a bay and lock of large dimensions. It will be perceived that this dock would occupy the site of the present basin, dam, and wharf, and would extend, on its longest side, from near Elizabeth-street to near King-street. It would have a water area of 15a. 2r. 28p., and have a frontage of 3531 feet. Thus it would be capable of accommodating at one time, alongside the wharves, 25 vessels, supposing each to occupy, on an average, 140 feet; or nearly double that number if lying two deep: besides which, it would give comfortable room for several more not requiring the use of wharves. I believe this is not more accommodation than should be at once provided, nor do I see how it can be so conveniently provided as by this means. The dock should have a permanent depth of 21 feet, so as to prevent any vessel, even the largest, from grounding. If it were thought essential, it might be connected with the old channel of the River by a lock on the western side. I propose that the dock should be surrounded by a wall, entered at three points, one opposite the Custom-house, and one at either end, west and east. Against the wall should be erected sheds, and in front of these, between them and the basin, there should be a quay or wharf 120 feet wide at the least.

With a view to keep down the first cost, I would propose that the banks of the dock basin should be formed to a slope of  $1\frac{1}{2}$  to 1, and covered by a coating of rubble 18 inches thick, and that timber platforms on piles should be extended from the top of the banks to the perpendicular of their bottom. These platforms might be done progressively out of the earnings of the establishment; so likewise might the sheds, and even the walls.

The large quantity of earth which the excavations would furnish, would enable the Corporation to procure the raising of the whole of the reserve which has lately been granted to them on the north bank of the River, east of Prince's Bridge; also to raise the area which would lie west of the Bridge, bounded by Flinders-street, by the eastern wall of the proposed dock, by the new cut, and the Bridge; and this area, when so raised, containing as it would about nine acres, should, I conceive, be converted into an open wharf or quay, for timber, lime, and other articles of inter-colonial or home trade, which are generally brought to Melbourne by water carriage. The craft engaged in these trades, and steamers, could be conveniently accommodated at timber platform wharves on the frontage of the new cut, and at the return basin, above the sill at the dock entrance.

The effect of the dock arrangements now described would be, to bring all shipping as high up the Yarra as is practicable; and this, I conceive, is the desideratum. As the City extends, other docks might be made on the line of the old channel farther west, and extended ultimately, if necessary, into the swamp under Batman's Hill, but the present opportunity of leading the ships into the heart of the City ought not to be lost. I may here mention that the last made of the numerous splendid docks of London, was made farther into the midst of the City than any other, and it has proved to be the most profitable and useful of the whole. I have estimated the probable expense of the docks, including the wall, sheds, platforms, and two locks, and I am of opinion that they can be constructed for £62,500. Thus, the entire works projected could be completed for £176,000. As tending to illustrate the economy of the measure, it may be stated that the present cost to the public of lighterage of goods, conveyance of passengers, and supplies to and from the anchorage at Hobson's Bay (altogether independently of the damage done to goods and loss by theft), has been computed by a competent person at £25,000 per annum, which, at 14 years' purchase, is equal to a capital of £350,000.

Before concluding this report, I would submit to the Council the importance of taking some steps to observe and register, from time to time, the condition of the shoals which lie immediately within the heads of Port Phillip Bay. Their extent, position, and relation to each other, satisfy me that they owe their existence to the upland waters. The cause is therefore still in operation, and what effects it may yet develop, is a most important question. I conceive it to be certain that it has already deprived Melbourne of nearly two-fifths of the tidal range found outside the Heads in Bass's Straits, and I can see no reason why, if not interrupted, it may not proceed to raise the outfalls above the reach of the remainder, and thus alter the general level of the Bay, convert it into a tideless fresh-water lake, and submerge the low lands. These effects, however, may, of course, be prevented by timely remedies, but these remedies must be preceded by a precise acquaintance with the evil, which can be obtained only by continuous and systematic observations. It is desirable that these observations should be made also as a preliminary towards the determination of a problem of great importance to the navigation of the ports of Geelong and Melbourne—namely, whether it is not possible to contrive works which would approximate the range of the tide *within* the Heads to its range *without*.

JAMES BLACKBURN,  
City Surveyor.

## APPENDIX B.

## MEMORANDUM

*Drawn up in accordance with the request of the Chairman of the Committee sitting on "The Melbourne and Geelong Harbors."*

Colonial Architect's Office,  
Melbourne, 13th August, 1852.

## RELATIVE TO THE FORMATION OF DOCKS OR BASINS.

1. The short period allowed for the preparation of this minute, in connection with an unusual press of other urgent business, has prevented my giving this subject that due consideration which, from its great importance, it should have.

2. I may first remark on the extent of the Public Docks in London, and find, that the West India Docks have basins of the following dimensions: The Import Dock, about 890 yards long by 170 yards wide, containing about 30 acres; the Export Dock the same length and 400 feet wide, covering 25 acres, making a total of some 55 acres.

3. The East India Import Dock has a basin about 1410 feet long by 560 feet wide, containing 19 acres; and the Export basin is 780 feet by 520, or not quite 10 acres. The docks have entrance basins  $2\frac{3}{4}$  acres in extent. The lock to the East India Docks is some 210 feet by 48 feet in width, with an average depth of water, at spring tides, of 24 feet.

4. The principal basin of the London Docks is about 420 yards by 320 yards, covering an area of 20 acres; the second basin is 170 yards by 110, and the third 150 yards by 60. These docks have three entrance locks.

5. The St. Katherine Dock basin is about 300 yards by 200, covering, in all,  $12\frac{1}{2}$  acres.

6. I am of opinion, that it would be inadvisable to form any docks between Cole's Wharf and Elizabeth-street, as the unoccupied area between Flinders-street and a roadway of sufficient width along the line of the wharf, would be utterly inadequate for a dock of any serviceable dimensions; and I consider that the wharf already formed should be increased to three times its present width; that the roadway adjoining should be not less than 90 feet wide; and that after the erection of the necessary sheds for goods, the intervening space left would be exceedingly small.

7. I consider that basins might be advisedly formed in Batman's swamp, in preference to any portion of the south side of the River; the general level of the swamp being lower on the north than on the south side, less excavation would be required; and with the soil excavated, good and sufficient roads or approaches could be easily made to the basins.

8. On looking forward to the extent to which the mercantile interests of this city must increase, I cannot but consider that all the available space for docks on the north side of the river will be found eventually not too much, but I do not think it requires much consideration to arrive at the conclusion that the first formation of docks or basins for discharging cargo should be on the north or *occupied* side of the river, and that it will be a work for future times to construct others on the opposite side; and I am borne out in this view by the fact of all the principal docks in London being on the side of the river most convenient for the mercantile community, whereas they might have been formed on the opposite shore at a cost considerably less, from the lower value of the land there; and I may also quote the Birkenhead Docks as another instance in support of my view. They were made on the south side of the Mersey, on account of the comparative cheapness of the land there, but all the business of Liverpool being on the other side of the river, they were found not to pay.

9. The superficial area required by a ship of average tonnage in a dock may be estimated at 600 square yards; and, allowing a fourth more (or 150 yards) for moving, in entering and going out of the basin, we have a total of some 750 square yards, requiring an excavation for each ship of say 6000 cubic yards, at an estimated cost of eleven hundred pounds (£1100), which sum I consider ample.

10. I believe that in a period of three years, with sufficient funds placed at the disposal of the party in charge of such work, the canal might be cut and basins might be formed, which would be of incalculable service.

## RELATIVE TO THE NEW CHANNEL FOR THE RIVER.

11. With regard to the New Channel to the Yarra Yarra, from Melbourne to the Bay, I consider that a width of (150) one hundred and fifty feet at low water would be ample, not only for ships to discharge cargo on each side if required, but also for vessels to be towed up and down between those lying alongside the embankments.

12. I may here remark, that in the examination of a professional man before a Committee, where important questions are asked, it would be much more satisfactory if he could have previous notice of the questions about to be put to him, as, from his having so many to reply to on the instant, he has not time sufficiently to consider their practical bearing.

HENRY GINN, C A.