

the foot taps, the head is inclined, the shoulders and the hips sway, the eyes are expressive, the lips—not a portion of the body but enters into the movements. As different songs are sung, one is astonished at the variety of the gestures, and the difference of the gestures accompanying the different songs, at the unison of the performers. They give whole-hearted expression to their feelings, whatever they may be, and the listener-observer is continually tempted to join in, so powerful is the effect of the rhythm and the movements and the expression of the music.

I have to thank Mr. George Graham, of Auckland, and Te Rangi Hiroa for much information used in this paper; the Hon. A. T. Ngata and the people of Ngati-Porou for details regarding singing; Mr. Elsdon Best for continual assistance and advice; the Directors of the Auckland, Dunedin, and Wellington Museums for permission to test instruments in their collections; and Mr. H. Hamilton for the extreme trouble taken in making the illustration of the *tohetoke* and the *rorua*.

The Early Reclamations and Harbour-works of Wellington.

By HERBERT BAILLIE, Librarian, Wellington Municipal Library.

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Plate 71.

THE story of the discovery, rediscovery, and settlement of Port Nicholson has been fully told by Mr. Elsdon Best and others. It is proposed here to record what was done in the way of introducing shipping facilities and creating the port as at present existing.

The first official mention of Port Nicholson was in a parliamentary paper laid before the House of Commons on the 31st August, 1835, in connection with the recovery of British subjects who had been detained by the Maoris when the barque "Harriet" was wrecked near Cape Egmont on the 29th April, 1834. Captain Guard, of that vessel, with part of his crew and some Maori friends, was allowed to leave the locality to obtain assistance on the 20th June, arriving at Port Nicholson by way of Blind Bay and Queen Charlotte Sound on the 30th June. Here he found the schooner "Joseph Weller," on which he secured a passage to Sydney, where he laid his case before the Governor, Sir Richard Bourke. This resulted in H.M.S. "Alligator" being sent to New Zealand to recover the prisoners. Wellington, or Port Nicholson, only bears on the subject by providing a means for Guard reaching Sydney, but the episode gave Port Nicholson its first advertisement in the British Parliament.

Captain Hobson, later Governor of the colony, visited Cook Strait in H.M.S. "Rattlesnake" during 1837, but he does not even mention the port.

Port Nicholson thus took an insignificant part in the story of New Zealand until 1840; but with the advent of the New Zealand Company the Cook Strait districts and the port showed promise of future

importance. In the Company's prospectus it is stated (1, p. 31) "that Cook Strait, between the two Islands, forms part of the direct track of vessels homeward-bound from the Australian colonies; that many vessels go through Cook Strait, while others at present pass New Zealand at either its southern or northern extremity, but that all would prefer the midway of Cook Strait if that channel were properly surveyed, lighted, and furnished with pilots; and that, consequently, settlements in Cook Strait, at Port Hardy, in D'Urville Island, Queen Charlotte's Sound, Cloudy Bay, and Port Nicholson would obtain stock cattle and other supplies from New South Wales with peculiar facility and cheapness, since homeward-bound vessels would naturally load in part, or sometimes entirely, with stock cattle for New Zealand (and especially on deck in favourable weather, which prevails during nine months of the year), discharging that cargo at New Zealand and reloading there with water and provisions for the homeward voyage, as well as with a New Zealand cargo for Europe, of fish-oil, flax, timber, and other productions of the country." It was also mentioned in the prospectus that New South Wales received part of its supply of flour from the New England States in North America, which New Zealand would be able to supply, taking in exchange British manufactured goods; these the Australian merchants had obtained by the sale of their wool in London and Liverpool.

At this time Colonel Wakefield, with a small party, was on his way to Cook Strait on the "Tory," with specific instructions (1, p. 23) that he was to select the location of the first colony, to purchase lands, to acquire general information as to the country, and to make preparations for the formation of settlements. The price paid for the land in those days is often held up to ridicule when compared with the present-day value of the same land; but that is the oft-repeated story of the present looking back on the past and envying its bargains. It is repeated even in the story of the early reclamations. What would be thought of land in Willis Street, opposite the *Evening Post* office, being sold at £6 per foot frontage? The speculator of those days did not see any bargain about it; the land—there was only 360 ft. of it—could not be sold; half of it had to be given away; and Sir George Grey did a good turn to the Wellington College when he granted 182 ft. as an endowment to that institution.

The rivalry between Auckland and Wellington, now usually of a fairly friendly nature, is a mystery to many people. It is generally ascribed to the removal of the seat of Government in 1863, but it was in existence long before that. It originated as far back as 1840, when Governor Hobson, without visiting Wellington, selected Auckland as the capital. All sorts and conditions of men, both here and in the Old Country, joined in the discussion of pros and cons. Perhaps one of the most amusing of these was a letter to Lord Stanley from a firm of English lawyers who had been commissioned by several settlers of Auckland to protest against the proposed removal to Wellington (2, p. 68). They state that it would be easy to connect Manukau Bay with the Waikato River, and at a trifling expense. "Taranaki is a fine agricultural district, but it is distant 100 miles from Port Nicholson, and is easier approached from Auckland by means of the River Waikato and Lake Taupo and the River Wanganui than from Wellington. As regards internal communication, there is none at Port Nicholson, which is blocked in on all sides by enormous and

precipitous mountains." There is no doubt that at the time Hobson made his choice North Auckland was the most important part of New Zealand, and the Waitemata district, with its double harbour, was considered a strategical position.

When Captain Hobson and the Colonial Secretary did visit Port Nicholson, although they were badly received, they gauged the position very fairly. Willoughby Shortland, Colonial Secretary, who came to Wellington to suppress "a rumoured rebellion, in a report to Governor Hobson (10th October, 1840) says (3, p. 119): "A beautiful and extensive harbour, in which there are no dangers of any consequence; the anchorage in Lambton Harbour is extremely good; but the one off the beach of Petone is by no means safe. A lighthouse and good pilots would in a great measure obviate any difficulties in entering the harbour." During the next year Governor Hobson paid his long-expected visit to Port Nicholson. He had written to the Secretary of State for the Colonies (10th November, 1840) (3, p. 127): "The port is certainly most spacious, and is free from danger within its heads, but its very great extent, and the tremendous violence of the prevailing winds, generate so heavy a sea within itself as to suspend for many days together all operations connected with the shipping. The reports of Mr. Shortland and of other authorities rank Port Nicholson, as a commercial port, second both to the Bay of Islands and the Waitemata (Auckland)." After his visit to the port he reported (13th December, 1841) to the Secretary of State (4, p. 183): "As to the capabilities of the port, I am of opinion that few places can surpass it, but the entrance is rather difficult to distinguish, and appears very dangerous to a stranger. A more general knowledge of the coast, however, and a lighthouse on one of the heads, will obviate these difficulties. If any objection to the harbour exists, it is that the estuary is too extended, and the violent winds which prevail occasion a most turbulent sea at the anchorage. Owing to the approach to the shores being shallow, rather long wharves would be necessary." Felton Matthews, Surveyor-General, who came with Hobson, forecasted (4, p. 185) that the best situation for the Customhouse would be between Pipitea and Te Aro, and in front of Lambton Quay, which must be recovered from the water. There it was placed in 1862, twenty-two years after.

The violent winds were regarded from quite a different viewpoint by Bishop Selwyn, who in 1848 wrote (5, p. 46): "No one can speak of the healthfulness of New Zealand till he has been ventilated by the restless breezes of Port Nicholson, where malaria is no more to be feared than on the top of Chimborazo, and where active habits of industry and enterprise are evidently favoured by the elastic tone and perpetual motion of the atmosphere. If I am not mistaken, no fog can ever linger long over Wellington to deaden the intellectual faculties of its inhabitants. They will not always reason right or be unanimous in opinion; but there will always be activity of thought and promptness of action in this battlefield of the north-west and south-east winds."

Lieutenant Wood, late of the Indian Navy, who wrote a rather disgruntled book on early Wellington, has nothing to say against the harbour, but records (6) that "when a beacon is erected on the outermost rock of Barrett's Reef and a lighthouse built upon the Heads nothing more could be desired." He also suggested a "circular wharf abreast the town where vessels of large tonnage might discharge." As will be seen by the harbour-plan, a practically circular wharf, with projections, has been built.

In 1842 the Lords Commissioners of Her Majesty's Treasury approved of Wellington, Auckland, and Russell being constituted free ports in conformity with the provision of Act 3 and 4 William IV. Perhaps this may account for the following Proclamation, dated 1st October, 1844. (7): "On and after this day neither light dues, port charges, nor harbour dues of any kind will be demanded from any vessel whatever in or near any part of New Zealand. Taking a pilot will be optional with the master or commander of any vessel; if used, the charge will be 3s. per foot, into or out of any harbour. There are no duties of Customs or public charges of any kind payable by vessels in New Zealand.—ANDREW SINCLAIR, Colonial Secretary."

BEACONS.

Heaphy in his book (8) says that "much inconvenience has been experienced from the want of lights and beacons." Owing to wrecks in the vicinity of the Heads, the settlers became anxious that beacons should be erected. It may be of interest to show that even then the settlers did not get things on the first asking. The local newspaper of the 16th January, 1841, stated that beacons were to be erected on both sides of the Heads. On the 24th July complaints were made that the work had not been started. On the 4th September another complaint was made. On the 18th December plans and estimates were called for, but nothing was done by the Government until nearly three years later. E. J. Wakefield mentions that in 1842 "two landmarks had been put up at the Heads." One, a three-sided wooden pyramid with open sides about 70 ft. high, on Pencarrow Head, was blown down by a gale of wind soon after. This had been put up by public subscription. Another, on the highest peak of the western side of the entrance, Beacon Hill, was more securely fixed, by Colonel Wakefield's orders. It consisted of four tun butts, then three, then one, piled above each other, filled with stones and painted white, with a flagstaff on the top. Tenders were called by the Government in January, 1843, but again there was delay, for it was not until the 20th June, 1844, that it was notified that a beacon had been "erected on Pencarrow Head, at the eastern side of the entrance to the harbour, bearing, from observations taken on board H.M. colonial brig "Victoria," S.E. by E. $\frac{1}{2}$ E. from the outer rock of Barrett's Reef, 37 ft. high, painted white and surmounted by a red flag." On the 17th February, 1854, the Provincial Council's Harbour Light Committee reported that it had visited Pencarrow and had found that the beacon was quite unsafe, the bottoms of all the upright planking having become quite rotten. There was danger of it being blown on to the light-keeper's cottage during a southerly gale. "It ought to be whitewashed to render it more conspicuous, and generally, whatever improvements are contemplated, ought to be effected directly while the weather is fine, and finished before the winter." Also, in 1854 the House of Representatives set up a Committee to consider the matter of erecting beacons and lighthouses. It suggested that a beacon be erected on the outer rock of Barrett's Reef, with a reflector so placed, if possible, as to catch the light from the lighthouse on Pencarrow. While the permanent lighthouse was being erected in 1858 it was found necessary to remove the beacon. A temporary flagstaff was raised, carrying a white flag with a red ball above it. The lighthouse was painted white, and thus became a beacon by day as well as by night. The *Wellington Almanac* of 1845 does not mention the beacon, although it mentions the signal-station on Mount Albert. In Grimstone's *Southern Settlements* (1847) the

sailing directions by Captain Richards, of the "Victoria," note the white beacon on Pencarrow and the landmark on Beacon Hill. The *Cook Strait Almanac* of 1851 mentions that the Pencarrow beacon is not visible at a distance of five miles, except in clear weather. The *New Zealand Pilot* of 1856 mentions the barrel beacon, also the Pencarrow beacon, but not the red flag. In the *New Zealand Pilot*, 1856, the Government House flagstaff is noted as a leading-mark, also the "Waterloo Inn," a large white building on the extreme of Kaiwarra Point.

SIGNAL-STATIONS.

The first signal-station was erected on Mount Albert, the peak to the south of Newtown Park, in 1844. The first signalman was Robert Houghton, a master mariner, who was also gazetted as keeper of the powder-magazine. The signals used in those days were the same as now used at the Mount Victoria Signal-station, though some of them have fallen into disuse. One that would be frequently used in the "forties" and "fifties"—the circle, for a brig—has probably not been used for many years. Until the days of regular steam communication with the Home-country the square, the signal for a ship, was an important signal to those who were expecting friends or important cargo, and they anxiously awaited the hoist of flags denoting the particular ship signalled. Cases were known, however, of vessels, though signalled, being delayed for days by adverse winds and weather. From the 13th September, 1849, the signals from Mount Albert were repeated on the flagstaff* which had been erected in front of the old Government House at a cost of about £100. In February, 1863, Mr. John T. Platt offered to repeat the signals on a flagstaff that he had erected at the foot of Tory Street. His letter, published in the *Provincial Gazette*, stated that the staff was erected on his premises known as the "Brick House," and that "the signals would be repeated with accuracy and regularity. The signals would be of sufficient size and would be placed at sufficient height as to enable them to be seen clearly by the greater portion of the inhabitants of Te Aro." Apparently the service was not satisfactory, as a petition was presented asking the Council to provide a station for Te Aro, or improve Platt's. The change to Mount Victoria rendered any repeating within the town unnecessary.

While the signal-station was on Mount Albert the outside pilot-station was in a small cove a little to the west of Palmer Head, Tarakena Bay. On the 26th December, 1858, the Consulting Engineer, Mr. Carter, reported that the signal-station was in such a bad state as to remind one of the celebrated gun that needed a new lock, stock, and barrel. In 1866 it was decided that the pilot service should be located within the Heads, Worser Bay being the position selected. Land was purchased and buildings erected, some of which are still in existence. A signal-station and a dwelling for the signalman were erected on Beacon Hill, and the signal staff was removed from Mount Albert to Mount Victoria, to which the signals were repeated from the outer station. Code-flags, both Commercial Code and Marryatt's, had been supplied, and by their means messages could be sent from town to vessels, the pilot-station, or the light-house at Pencarrow, or *vice versa*, by way of Mount Victoria. Later,

* An illustration of the first Government House, with flagstaff before it, appears at p. 21 of the *Cyclopedia of New Zealand*, Wellington Provincial District, 1897.

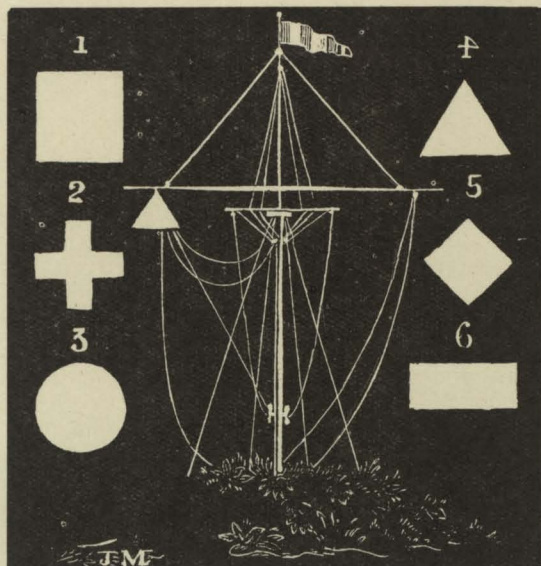


FIG. 1.—Signal-station on Mount Albert (from print in Alexander Turnbull Library). No. 1 denotes a ship, 2 a barque, 3 a brig, 4 a schooner, 5 a cutter, 6 a steamer.

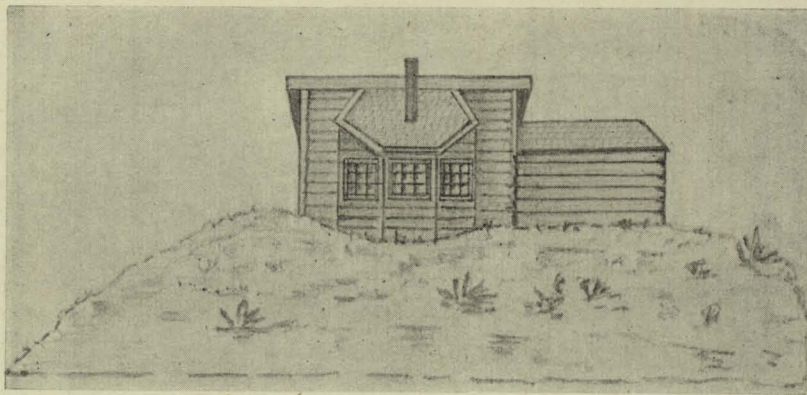


FIG. 2.—First lighthouse at Pencarrow Head. (Original sketch in possession of Mr. F. J. Halse.)

Beacon Hill became what was known as a learners' station, with a Morse telegraph-set connection with the Wellington Telegraph Office, a cadet being stationed there. Still later, a telephone was installed between the pilot-station and Beacon Hill, one of the first telephone circuits in New Zealand.

The first pilot appointed by the Government, in 1842, was D. McCarthy. James Hebblerley had been appointed by the New Zealand Company in 1840. McCarthy was succeeded by R. Calder, who retired in 1848. He was succeeded by James Ames (father of the present City Valuer), who filled the position temporarily. In 1849 Captain Daniel Dougherty, an American whaling captain, was appointed, and he held the position until his death in 1856.

It should be mentioned that Heaphy records (8) that "E'Warri, one of the young chiefs of Port Nicholson, had, with a boat's crew of Natives, gone off to the "Olympus," immigrant ship, in the strait during a gale, and piloted her with safety into the harbour, and to an anchorage, for which service the company awarded him £5.

Time-signals were given daily from H.M. Surveying Ship "Acheron," Captain J. L. Stokes, while in port towards the end of 1849. On the 9th March, 1864, a time-ball service was instituted. A mast was raised above the Customhouse, on which a large black ball was raised daily, half-mast at ten minutes to 12, mast-head at five minutes to 12, and dropped at noon, Wellington mean time. The cost of the astronomical clock ordered in connection with the time-ball, with the other necessary apparatus and fittings, amounted to £941 12s. 7d. The first observer was the Rev. Arthur Stock, of St. Peter's Church.

LIGHTHOUSES.

The first mention of a proposed light was the offer of the New Zealand Company, on the 5th November, 1841, to erect a lighthouse on Pencarrow Head, at a cost of £1,500, provided that such sum should be a charge against future dues (2, p. 31). The Colonial Office referred the matter to the New Zealand officials. Whatever the reply may have been, there was no lighthouse erected by the company. Perhaps the following extract from Wakefield's *Adventure* (9) should have been the first paragraph of this section although the lights referred to were hardly what is known as a lighthouse: "The frigate sailed away on her return to the Bay of Islands the same evening, beating out in the dark against a fresh breeze with her boats holding lights on the extremities of the reefs." The frigate was H.M.S. "Herald," Captain Nias, which had called at Port Nicholson on the 20th July, 1840, on her return from a mission to declare British sovereignty over the South Island, and also to secure signatures to the Treaty of Waitangi. When the beacon was erected in 1844, the question of a lighthouse was left in abeyance until 1852, although public opinion had frequently called for one as a necessity. The necessity was emphasized by the wreck, on the 23rd July, 1851, of the barque "Maria," Captain Plank, from Port Cooper, which ran ashore near the mouth of the Karori Stream and became a total wreck, twenty-nine lives being lost. The absence of a lighthouse was held as being chiefly responsible, and a strong appeal was made to Sir George Grey that one should be erected at once. He agreed, and proposed that the duty on spirits should be increased by 1s. 6d. per gallon for the purpose of raising the means to do so. The proposal was carried, but still no lighthouse—no real lighthouse. Mr. C. R. Carter, in his *Life*,

says: "Instead of a proper lighthouse being erected a miserable shed with a bow-window in it was constructed, in which was placed an indifferent lamp-light." In 1853, Carter had occasion to visit Wairarapa, which he did by walking to the old pilot-station by way of Lyall Bay and crossing to Pencarrow in the pilot-boat. He ascended the hill on which the "lighthouse" stood (10). "From here I saw the lighthouse-keeper (Mr. G. W. Bennett) coming up the hill with a load of drift-wood on his back which he had collected on the beach, and looking like another 'Robinson Crusoe.' This Government officer or servant had his habitation—I cannot say it was a comfortable one, many would call it a wretched place; but, Lord bless me! man is an animal that accommodates himself to all sorts of odd things and contrarieties, from the peer in his palace to the savage in his hut. Here was a case in point: Governor Grey lived in Government House, built on a nice green mound; the lighthouse-keeper also lived on top of a hill, and, with his wife and three children, and the lighthouse apparatus, were all stowed away in two little rooms each about 10 ft. square and without a fireplace. The interior of this building, a lighthouse and dwelling combined, was accessible to wind and rain on all sides, and in heavy gales it rocked and shook so much as to frighten the keeper and his family out of it, who in that case took refuge in a sort of cave or cabin which he had scooped out of the side of the hill, over which he had fixed a rude thatched roof and in which he had built a rude stone chimney. This cabin was his house of refuge and his cooking-place." Mr. Carter, in a note, states that Mr. Bennett was drowned some time afterward, he thinks by the upsetting in a storm of the pilot-boat which was about to land him at Pencarrow.

One of the first Committees to be set up by the House of Representatives was one appointed (22nd June, 1854) to report on the lighthouses and beacons required on the coast. It reported on the 8th August, 1854. Pencarrow is mentioned as being only a temporary light of an extremely inferior description, even considered by an authority as being likely to mislead navigators. The Committee recommended that a permanent lighthouse be erected as planned by Mr. Edward Roberts, of the Royal Engineer Staff, then stationed in Wellington, the estimated cost to be £3,400. Captain Drury, of H.M. Surveying Ship "Pandora," in giving evidence before the Committee, recommended that the light be placed on Point Dorset. The Provincial Council had during its first session appointed (23rd December, 1853) a Harbour-light Committee, which reported (17th February, 1854), in part, as follows:—

"The establishment (Pencarrow) was visited 4th February, 1854, and all things found clean and in order, and very creditable to the person in charge. The situation is considered the best that could be chosen for the first harbour-light, answering at the same time the useful purpose of assisting the navigation of that part of the strait adjacent to the Heads. The apparatus for producing the light is not very powerful, but with some slight modification might be made far more effective.

"The great complaint is that towards morning the light gets so dim and discoloured as to become scarcely visible. This arises, in the first place, from the inferior quality of the oil, by which the lamp gets clogged up before morning and the quantity of light greatly lessened; and, secondly, from the position of the smoke-conductor, which is thereby rendered useless, and the room, being kept constantly full of dense smoke, the windows become completely blackened in a few hours, thereby producing that glimmering red appearance which all have observed a few hours after the lamps have been

lighted. By using a better oil a superior light would be produced and kept up till morning; and by removing the present conductor, which is placed far too low, and making two apertures in the highest part of the ceiling, one at each corner, to act alternatively in case of a change of wind, the smoke would be got rid of, and the same or nearly the same brilliancy kept up till morning which is now seen only in the early part of the night. There is no doubt but that the conflicting testimony respecting the light has arisen from the different appearances presented to individuals in those different hours of the night in which they have had an opportunity of seeing it. The only other alteration the Committee recommend would be to place the present apparatus for producing the light upon a revolver which might be erected and worked in the present building at a small additional expense, thereby giving the light a distinctive character and preventing its being mistaken for a casual fire, without diminishing its force by the intervention of any coloured medium.

"The Committee also recommend that a supply of oil, &c., for the light, equal to one month's consumption, should be always kept on hand, as they are sometimes, under present arrangements, without oil, and, should the weather be tempestuous, might be so for weeks, to the great danger of ships frequenting the harbour.

"The house appears to be strongly built but quite unfinished, being neither wind or water-tight, and, as it is so exposed, something should be done to make it more habitable before the winter."

In the *Wellington and Coast Almanac* of 1855 it is stated that at night a light is shown but it is not seen at more than two or three miles. The *New Zealand Pilot* of 1856 ignores the light.

During the fourth session of the Provincial Council, 1856-57, it was decided to erect a permanent light. The sum of £10,000 was voted for the purpose, being part of a loan to be raised. Previous to the vote being passed the Superintendent wrote to the Colonial Secretary requesting a copy of all correspondence, with the plans and specifications prepared by Mr. Roberts. These contain much interesting information about the proposed lighthouse. On the 26th March, 1857, the Superintendent wrote to Mr. Edward Roberts, who had by then returned to England, forwarding plans and specifications as prepared by him in 1853, asking him, with Mr. James Smith, a Wellington citizen then in England, to obtain and send out the building with all its fitments, light-apparatus, &c., all mechanism to be duplicated. The sum of £3,500 was fixed as a limit to cost. The contractor was to erect the building and fix apparatus, and if the person sent out was a lightkeeper he could be appointed to take charge of the light. The tenders received ranged from £2,435 to £2,823, the successful contractors being Messrs. Cochrane and Co. In opening the fifth session (2nd June, 1857) the Superintendent stated that the General Government had objected to the Provincial Council constructing the lighthouse, as the 19th section of the Constitution Act prohibited any Provincial Council from making any law for the erection and maintenance of lighthouses. The Superintendent questioned the ruling—it only applied to lighthouses on the coast. He reminded the Council that they had maintained a light at Pencarrow for several years. In any case, he had ordered the lighthouse, and he hoped that it would be landed during the course of the next six months.

Though out of chronological order, it may be noted that one of the reasons for the disallowance of the Municipal Corporations Act, 1842, by the Colonial Office was, "by the sixth clause the Corporations are authorized to erect

beacons and lighthouses, a power which properly belongs solely to the Crown." The directors of the New Zealand Company protested against the disallowance, and, in respect to the above objection, submitted that there did not seem to be any objection, upon principle, to allowing the representatives of the community to execute public works of that nature respecting the call for which, the proper sites of their erection, and the best means for compassing that end, the representative of the Sovereign, residing at a distance, must be comparatively ill-informed.

Also out of chronological order, but very interesting and opportune, is the following extract from the *Evening Post* of the 13th July, 1923 :—

PARLIAMENT.—TO-DAY'S PROCEEDINGS.

Legislative Council.

In the Legislative Council to-day Sir Thomas Mackenzie asked the Attorney-General whether the time had not arrived for the erection of an automatic light on Barrett's Reef, at the entrance to Wellington Harbour, in order that greater safety may be given to navigation. He said that some forty masters of steamers had petitioned to have a light placed on the reef. The reef was exceedingly dangerous in foggy weather.

In reply, Sir Francis Bell, Attorney-General, said Barrett's Reef was within the limits of Wellington Harbour, and the question of placing a light on the reef was a matter for the Harbour Board to determine.

According to a return dated 15th May, 1858, the total cost up to that date, including the salary and passage of Mr. Edward Wright, who had been sent out to superintend the erection, amounted to £2,554. Mr. Wright reported on the same date that the cost of erecting the lighthouse, if landed at Fitzroy Bay, would be £750; if landed inside the harbour, two miles and three-quarters from Pencarrow, the cost would be £2,000, exclusive of landing the material on the beach at the selected point. In a return to the General Assembly, 1867, the total cost of Pencarrow to date was stated to be £6,422. The light was exhibited from the 1st January, 1859. It was described as being of the second order, catadioptric system, with eclipses at intervals of two minutes. The cause of the change to a fixed light from September of the same year has not been traced; it was probably some trouble with the mechanism. The first keeper of the light was Mrs. Bennett, widow of the first keeper of the temporary light, with W. Lyell as assistant. In the 1865 report of the Marine Board Engineer, Mr. Balfour, Pencarrow is referred to: "While engaged in a survey of the strait we happened to pass Pencarrow at night, and, as the light was very poor, we landed to examine it. We found everything in good order except the light, which, though very white and clear, was miserably low, being only $1\frac{1}{2}$ in. from the burner to the top, whereas the standard height is from $3\frac{1}{2}$ in. to 4 in." He suggested that the services of the trained light-keeper who had been brought out by the Provincial Council of Otago should be secured in order to examine and adjust the apparatus and instruct the keepers. In 1867 the Engineer reported that the roof of the keepers' cottage had been blown off during a gale. He also suggested that a better path to the lighthouse be formed, and that a store be erected on the beach, also one on the hill, which could be used as a workshop. During that year £298 was expended, so probably his suggestions were agreed to. A new set of lamps were installed during the year 1869-70. The Marine Engineer, on the 18th June, 1869, reported that the buildings were much decayed. During the following year new dwellings for the keepers were erected at a cost of £764.

In 1864-66 the Marine Act of 1863, which imposed duties on the provinces in connection with lights and beacons, was amended. The Marine Board was abolished, and the Provincial powers in connection with lights and beacons withdrawn, the powers being vested in the Governor, who was also given authority to purchase any of the lights and beacons from the Provincial Governments. It would probably be at this time that the management of Pencarrow passed to the Marine Department.

In 1864 the Chamber of Commerce urged that a light be placed on Point Gordon, but the President of the Marine Board pointed out that *Somes Island* would be a better position, therefore it had been decided to erect a lighthouse there. It was erected and maintained by the Provincial Council until the abolition of the provinces, in 1875, when the Marine Department took over the responsibility and expense until a few years ago, when they were passed on to the Harbour Board. The light was first shown on the 17th February, 1866. It was manufactured by Messrs Chance Bros. and Co., and described as being catadioptric, of the fourth order, showing a fixed white light in mid-channel, a fixed red light on the western and a fixed green light on the eastern shore. Keepers' dwellings were erected in October, 1865, at a cost of £695. Some trouble was caused at the outset owing to the divisional lights not working satisfactorily. Mr. W. Lyell, transferred from Pencarrow, was the first keeper, with D. Susans as assistant.

Colza-oil was used by New Zealand lighthouses until 1872. The Marine Department report of that year suggested a change to kerosene, which would result in more brilliant lighting at a reduced cost. In 1876 the report gave details of the illuminating-power of kerosene. In 1877 Pencarrow and Tiritiri were the only lights using colza. In 1881 kerosene lighting was completely installed. In 1878 Pencarrow consumed 510 gallons of colza, in 1881 734 gallons of kerosene. During the financial year 1921-22 867 gallons were used. It may be of interest to note that the cost of oils and wicks in 1857 was: Lamp-oil, 10s. per gallon; sperm, 5s. 10d. per gallon; cotton wick, 10s. per pound.

According to a return, the Government secured the freehold of the lighthouse reserve, consisting of 69 acres, from the Maori in 1873, although in 1841 it was notified that the Government has reserved land at Pencarrow for public service.

THE "INCONSTANT."

Towards the end of 1849 the ship "Inconstant," 588 tons, of London, missed stays in entering the harbour and drifted on to the rocks at the point near Pencarrow named after her. Fortunately, H.M. Surveying Steamer "Acheron" was in port at the time and towed her off. Apparently the damage was too extensive for repairs to be effected, for Messrs. Bethune and Hunter sold the vessel to a local shipwright, who in turn sold it to Mr. John Plimmer in 1850 for £80. Mr. Plimmer received permission from Sir George Grey to remove the vessel from *Te Aro*, where she was beached, to a short distance north of Clay Point, in front of Barrett's Hotel, by that time removed to its present site. He cut down the upper works, shored up the hull, connected it with Lambton Quay by means of a bridge, and constructed over part of it a large building, 68 ft. by 30 ft., comprising two floors, while the lower part of the ship formed a basement measuring 80 ft. by 25 ft. The building was fitted as a warehouse and auction-room for Messrs. James Smith and Co., who opened it for business on the 14th May, 1851. As usual in those days, the occasion was celebrated by a lunch. The building was generally known as "Noah's Ark," although it was often

called "Plimmer's Wharf." There was an open platform at each end of the hull. The fore part of the vessel is said to have rested in 10 ft. of water, the platform being used as a wharf. The earthquake of 1855 caused some damage by throwing the vessel on its side, but with difficulty it was replaced firmly and safely in its old position. After the shake Mr. Plimmer built a retaining-wall to the north of the "Ark" and filled in around it. Mr. C. R. Carter, in reporting on Mr. Plimmer's claim in 1862 for the pre-emptive right to purchase the adjacent land, stated that Mr. Plimmer had constructed a timber breastwork 136 ft. long, valued at £95, and had filled in 3,601 cubic feet of spoil, valued at £450. The Provincial Council allowed Mr. Plimmer's claim to two sections. These sections together comprised an irregularly-shaped block with a frontage of 50 ft. to Hunter Street, 130 ft. to Customhouse Quay, and 130 ft. to Lambton Quay. The price of the Hunter Street corner section was to be fixed by the price obtained for the section opposite—that is, the present Australian Mutual Provident Society's site. The second section, with 70 ft. frontage to Customhouse Quay and 130 ft. to Lambton Quay, was to be sold on the Customhouse Quay frontage at a price per foot averaging the price received from the sections on the opposite side. This land brought £15 per foot. He was also to be allowed the amount stated above for the work done by him. After the 1861 reclamation was completed Mr. Plimmer constructed another wharf from the breastwork. This wharf was generally known as Plimmer and Reeves's Wharf. It was the last private wharf in Wellington Harbour to go, which it did when the Te Aro reclamation was undertaken.

HARBOUR-LIGHTS.

The first official harbour-light was a red light shown from the end of "Noah's Ark" on and after the 6th November, 1858, "for the guidance of vessels coming in to an anchorage in Lambton Harbour." At this time the Harbourmaster had his office at Plimmer's Wharf—"Noah's Ark." A white light was shown from the deep-water wharf on the 19th October, 1863, but it was placed so low that complaint was made that it was hidden by any vessel that might be lying at the end of the cross-head. In 1866 the Harbourmaster reported that a better light should be shown on the wharf, one that could be seen at a distance of four miles in ordinary weather, the present light being visible only half a mile. On the completion of the extensions in 1867 a powerful red lamp was placed at the end of the wharf.

The 1858 Harbour Regulations provided that all vessels should have buoys and buoy-ropes to their anchors to show their position; also that all vessels should hoist a conspicuous light at their peak-end from dark to daylight. This latter regulation came into force on the 23rd December, 1858. One of the local papers of the following day remarked on the picturesque and novel sight.

RECLAMATIONS AND SEA-WALLS.

In 1847 tenders were called by the General Government for the construction of a timber breastwork along part of Lambton Quay. Tenders were to be marked "Tenders for repairing Beach Road." In the early days of the settlement the waterside road was known as "Thorndon Quay" from the Hutt Road to Charlotte Street, and "Lambton Quay," from thence to Section 205, where Willis Street

commenced. Locally, the full stretch was known as "The Beach." Along the quays the water at high tides in many places covered part of the roadway, and probably it would be to form the roadway in one of these bad places that the breastwork was required. Even in 1850, Carter tells us, there was not room in some parts for two carts to pass. In 1854 Carter constructed for the Provincial Government another breastwork, 600 ft. long. It was constructed of brick, and, he says, was built with the object of widening the beach to a width of 60 ft. This contract, which also included the formation of a footpath and cross wood drains, cost £832. Mr. Edward Roberts was instructed in 1851 to prepare a scheme of reclamation. The *Spectator* proposed that it should extend from Pipitea to Clay Point.

In 1852 the Government of New Munster, which comprised the southern half of the North Island and the whole of the South Island, called for tenders for reclaiming a part of Lambton Harbour. This reclamation is generally known in legal circles as "Sir George Grey's reclamation." It ran from Customhouse Street (now usually known as "Old Customhouse Street") 360 ft. north, with a depth towards the harbour of 100 ft., the frontage being to Willis Street. Mr. Roberts was Engineer, and C. R. Carter secured the contract, his tender amounting to £1,036. Work was commenced early in April, and was completed early in October. Apparently the land was offered for sale as it became available, for a block was put up for sale by public auction on the 21st July, when a 50 ft. frontage was sold to John Harding at the upset price of £6 per foot. On the 11th September another block, of 60 ft., was sold at the same price to S. Cimino. There was to be another sale on the 30th October. I can find no record of the sales on that day, but, through the kindness of Mr. Maurice Smith (Chief Draughtsman of the Survey Department), I learn that the total sales to the public amounted to £900. This accounts for 150 ft.; 182 ft., with an area of 1 rood 25 perches, was granted by Sir George Grey as an endowment for the Wellington College. There was a cross-street from Willis Street to the waterfront (now part of Mercer Street), of a width of, say, 28 ft., which would account for the full frontage of 360 ft. as per contract. The value of the College Reserve would be £1,092, making a total value of £1,992 against an expenditure of £1,036. The cross-street was officially known as "College Passage," although later it was known as "College Lane"—now Mercer Street. Carter records that during the progress of the work a heavy sea carried away part of the wooden wall; he also records that his profit amounted to £212, although the Engineer assured him before he signed the contract that he had underestimated the work. During low tides the water would probably not be near the wall.

By the Public Reserves Act, 1854, the Provincial Government was granted the right to reclaim part of the harbour below high-water mark from the "reclaimed land" to the foot of Tinakori Road. "Reclaimed land" would, of course, refer to the 1852 reclamation. A definite scheme of reclaiming land from the harbour was asked for, when the Committee on the Harbour Reserves Bill reported to the Provincial Council (1st February, 1856), as follows:—

"Your Committee has been unable to obtain sufficient information to enable it to propose any specific plan for the management of the harbour reserves. It therefore contents itself with recommending that the Superintendent should invite, by competition, plans and specifications for the reclaiming of the land and building retaining-walls, and having especial reference to the practicability of carrying out the works in separate blocks,

such plans to be accompanied by a plan for laying off the reclaimed land in streets, and for drainage. That in all plans a continuation of Willis Street and a quay on the water side be made main features. That the Superintendent should offer a premium for the plan which he may consider the most practicable. That blocks of the land be sold unreclaimed under a condition that the purchaser shall reclaim within a certain period, according to the adopted plan, or the Superintendent should contract with persons willing to do so. To reclaim any block or blocks, the contractor receiving payment for so doing on sale of the land, the amount of the contract being added to the purchase-money as for improvements thereon or, if the block be sold in lots, apportioned among the purchasers accordingly. That sufficient reserves be made for public purposes. That all land alienated, except that hereafter referred to, be absolutely sold, and that by public auction. That those persons who have erected wharves along the beach, extending unto the reserved land, should have the right of pre-emption over the allotments comprising such wharves, at the average price of the adjoining land."

An Act was passed during that session enabling the Superintendent to act as suggested, also giving him authority to grant a lease of a section with 80 ft. frontage to Willis Street, at such rent and on such terms as he might consider expedient, to the Tradesmen's Club, which appears to have been an institution of the nature of a Chamber of Commerce. It proposed to build a public hall, and also to erect and maintain an inner harbour-light, "the water frontage admitting of so useful an appendage," there being no harbour-light at the time. The suggestion to have a quay on the water side was not adopted, thus giving purchasers the water rights at the rear of their sections as far as the Willis Street and Customhouse Quay sections were concerned. To extinguish these rights the City Council had to grant compensation to the owners at the time of the Te Aro reclamation. Apparently it was proposed to erect a stone wall, for tenders were called during 1856 for the conveyance of 2,000 tons of stone from Somes Island to where they might be required between Bowler's Wharf and "Noah's Ark." "The stone will be put on a jetty at Somes Island, alongside of which there will be a depth of 5 ft. at high water. Deliveries to be of not less than 200 tons per week, to commence 18th December, 1856." Engineers may be interested in the subject of Somes Island stone, though this scheme was not proceeded with. Carter writes: "Towards the end of 1857 I succeeded in getting a contract for building a long length of brick-in-cement sea-wall, which commenced at the north end of the wood retaining-wall I had previously built (Chew's Lane), and extending into water 3 ft. deep at low water to near Clay Point at 'Noah's Ark.' My contract for this (which included 172 ft. of brick sewer) was £3,343. In the year 1861 I obtained another contract for continuing this sea-wall on to a point in a line with the northern side of the block of land on which the Oddfellows' Hall is built. Both of these contracts, though very difficult to execute, proved to me very remunerative. The 'gossipers' said I would have to go to the expense of coffer-dams in order to lay the foundations under water. They were mistaken. I devised a plan of building (out of water, but over their sites) large blocks of brickwork loosely keyed together, and then lowered them into their position or site under water. I then keyed them with large bricks, and as at low water the tops of the blocks were about 6 in. out of water, I built upon them without much difficulty except when the water was rough." The filling-in of this space was carried out by day

labour at a cost for the first part of £2,237, totalling £5,580 for that block. The first sale of sections was advertised for the 14th May, 1858. It covered twenty-five sections with frontages to Willis Street, Harbour Street, Customhouse Quay, and what is now known as the Bank of New Zealand corner. The total frontage offered was 844 ft., costing approximately £6 10s. per foot frontage. Sections in Willis Street were priced at an upset value of £12 per foot, Harbour Street at £4, corner sections £8, Customhouse Quay £15, while the Bank of New Zealand corner was fixed at £8, totalling £9,712. Nine out of the ten Willis Street sections were sold, three out of the eight Harbour Street sections, while none of the Customhouse Quay sections, nor the corner, were disposed of. The unsold sections were offered again on the 1st September, 1858, but apparently none were sold, for they were offered yet again on the 5th March, 1862. The size of the Bank of New Zealand section had been increased to 70 ft. or 71 ft. to Lambton Quay with 100 ft. to Customhouse Quay. The upset price was £8 per foot, Lambton Quay frontage, at which price the Bank of New Zealand was the purchaser. It should be noted that the law provided for the sale of the reclaimed land by the Provincial Council only by auction and for cash. It should also be noted that in the March, 1858, session of the Council Mr. Richard Barry, a member for the City of Wellington, proposed that the land should be leased, but he received no support.

In February, 1866, Mr. W. Tonks, who had secured the contract to reclaim 13 acres of land from Panama Street to the north of Waring Taylor Street, including the construction of a sea-wall, for the sum of £24,792, commenced the work, which was to be completed in June, 1867. The area of the 1857-63 reclamation to Panama Street was 7 acres 3 roods 34 perches, the total cost was £15,443, and the proceeds of sales amounted to £37,529. The area of the 1866-67 reclamation was 12 acres 3 roods 29 perches, the cost £25,028, while the proceeds were only £8,923, but to this should be added the amount paid by the City Council for the unsold sections.

Soil for filling in the different reclamations was obtained from the hillside at the rear of the Quay sections, Kumutoto (Woodward Street) to Boulcott Street. Mr. Tonks even proposed to lay a tramway by way of Manners Street and Cuba Street to Webb Street to bring spoil from there. Permission was granted by the Town Board, but he only used the tramway from Willis and Boulcott Streets, also a tramway from Kumutoto. The 1857-61 reclamation was filled in with spoil brought in carts. In the original plan there was no street running parallel with Customhouse Quay, but in July, 1864, the Council decided that such a street should be formed, opening in front of the Supreme Court, Lambton Quay, to be known as Featherston Street, in honour of the Superintendent.

In addition to the public reclamations, permission was granted to the Oddfellows to reclaim a section fronting Lambton Quay. This section was recently sold by that body. The foundation-stone of the Oddfellows' Hall on the reclaimed land was laid on the 21st May, 1859. The Foresters were also granted a site in 1864—the next section to that now occupied by the Government Fire Insurance Building, which, by the way, stands on a section, 100 ft. by 100 ft., reclaimed by Messrs. Joseph and Co. in 1865, at a cost to the firm of over £300. The Freemasons were also granted a site for reclamation, but apparently they did not take advantage of the grant.

In 1864 it was decided that in future all streets should be 100 ft. wide, which accounts for the extra width of a part of Lambton Quay.

In 1871 the Provincial Council agreed to sell all of the unsold sections of reclaimed land to the City Council for £12,000. Needless to say, it was a bargain for the city, and the City Councillors of that date are entitled to the gratitude of subsequent generations. The Council was wise, and did not attempt to part with the freeholds, excepting some taken over by the General Government.

In 1873 the Provincial Council agreed to convey to the General Government nearly 3 acres of unreclaimed lands for the purpose of erecting Government Buildings and for railway purposes at Pipitea.

During the same session, on the motion of Mr. Edward Pearce, it was resolved that the Council recommend that the tract of land covered with water, extending from Te Aro Flat to Lambton Harbour, comprising 70 acres or thereabouts, be granted to the City of Wellington to be reclaimed from the sea. The resolution was approved by the Superintendent. This is the block known later as the Te Aro reclamation.

On the 5th March, 1875, the Provincial Government entered into an agreement with the Wellington City Council to sell to the latter body its rights in connection with another block of land then being reclaimed under contract with Edmund O'Malley, containing an area of 36 acres, for the sum of £30,000 with outstanding liabilities on the block, and also cost of work from date till taken over by the Corporation, less moneys due from the General Government on account of land acquired from the Provincial Government. The signatories on behalf of the City Council were Joe Dransfield and E. T. Gillon (Councillors). This agreement was never carried out, and apparently the General Government took over the whole contract, and the City Council lost a bargain. For this reclamation jarrah piles were used as a breastwork, and the spoil was brought from the foot of the Wadestown hill, where the oil-stores are now situated. Ballast-trains were used. The spoil for the Te Aro reclamation came from FitzGerald Point and the Roseneath Hill. Particulars of the Te Aro reclamation are easily obtainable, and, with those of the Kaiwarra reclamation, now in hand, are left to the future historian.

WHARVES.

General.

In the Wellington Harbour Board *Year-book* issued in December, 1921, there is recorded a list of the piers or jetties, including Brown's, Rhodes's, Moore's, and others, constructed during the early years of settlement, which may be accepted as substantially correct. The following notes are supplementary to those in the *Year-book*, which were compiled by Mr. Elsdon Best.

The Commercial Wharf, unlike the other early wharves, was constructed by a public company with a capital of £250 in £2 shares. The wharf was completed in December, 1841. It accommodated vessels up to 30 and 40 tons.

A wharf that is not mentioned in the *Year-book* is Tod's. Tod was a speculator who arrived from Sydney in 1839, and acquired land in the neighbourhood of what is now Charlotte Street. Probably the jetty shown in Brees' illustration of Barrett's Hotel, and next to the Commercial Wharf, is Tod's Wharf.

No. 7, Bowler's Wharf, later named after Edward Pearce, who had taken over Bowler's business, was also known as Lyttelton Wharf. This wharf is described as running from Willis Street to Old Customhouse Quay. It ran out from Willis Street virtually parallel to Customhouse Street (or Old Customhouse Street, as it is now called).

No. 9, Waitt's Wharf, was not off Willis Street: it stood out from Customhouse Street. Its present location would be through the vacant section opposite the Public Library, owned, I believe, by Burns, Philp, and Co. This wharf (sometimes called Customhouse Wharf) was never public property. It was a frequently changing property, and with the change of ownership there would usually be a change of name. Of course, in those days Farish Street terminated at Customhouse Street. In 1858 the property was advertised for sale by public auction. The frontage, as advertised, was 147 ft. to Customhouse Street, extending to low-water mark. Part of the frontage faced Farish Street. The wharf, of about 200 ft., extended from a platform on which were erected two iron stores. There was a tramway laid on the wharf, with a crane, nearly new. The price obtained was stated to be £1,500, but apparently the sale fell through, for the property was advertised again in a few weeks. No further sale is recorded until 1860, when Waring Taylor purchased it for £800.

David Robertson's Wharf would probably be known earlier as "Seager's." It, with Greenfield and Stewart's (if there was such a wharf), are of a much later date, and hardly come within the name of "old-timers."

I have found references to Mills' (Lambton Quay, 1846), Tankersley's (Willis Street, 1847), and Turnbull's (Willis Street, 1862).

Queen's Wharf.

Although not agreeing with the *Year-book* that "the history of the port as a shipping-centre really dates from 1862," when the first pile of what is now known as the Queen's Wharf was driven, it may be agreed that 1862 marked a decided move forward. Prior to that date mercantile people could not be expected to be satisfied with the shipping facilities for the larger vessels visiting the port.

Many suggestions were made as to how improvements could be effected. The first move towards something being done took place during the 1852 session of the Legislative Council of New Munster (a nominated body), when the Collector of Customs and the Harbourmaster reported relative to a "deep-water wharf." In their opinion the only suitable site would be near Clay Point, between the Customhouse (then in Customhouse Street) and Pipitea Point; but owing to the shallow water a wharf 800 ft. long would be necessary. The Queen's Wharf is now probably over 800 ft. in length from the original breastwork opposite the Pier Hotel. Two other probable sites were in the Kaiwarra Bight: on the town side of the stream a wharf 60 ft. or 70 ft. long would run out to 21 ft. at low water, spring tides; on the other side of the stream it would be necessary to construct a wharf about 120 ft. long to secure the same advantage; but both of these sites were much exposed to south-easterly gales. It was rather unfortunate that the Province of New Munster was dissolved in 1853, for this body during 1852 had taken definite steps to reclaim land from the harbour, construct a deep-water wharf, and to erect a lighthouse at Pencarrow. Under the Provincial Council of Wellington the town waited five years until another block was reclaimed; waited ten years for the wharf; and waited six years until a modern lighthouse was erected at the heads.

Early in 1857 the Provincial Council appointed a Wharf Committee to consider the "necessity for immediately constructing a wharf in Lambton Harbour that will admit of the largest class of vessel likely to resort to Wellington lying alongside of it; the most suitable spot for its location;

the material of which it had best be constructed; the probable cost; finance; probable income; the cheapest and most efficient system of management should the Council erect and retain the wharf as public property." The Committee took evidence from seven or eight men connected with the local shipping trade, and then decided nothing, but presented the evidence, as it might "be useful when inquiry on the subject shall hereafter be resumed." The answers to the set questions contain many points of interest. The first question read, "Can you state the average delay occasioned by high winds to vessels discharging by lighter?" One man replied, "Two days in three weeks"; two replied, "One day out of six"; while another thought it would be two days out of six. Two who should have had the most practical knowledge, the Collector of Customs and the Harbourmaster, could not say. As to the average time taken to discharge a ship of 500 tons, the general opinion was that it would be one month, although here again the Harbourmaster kept on the careful side: "Depends on state of weather, nature of cargo, the discipline of vessel." It was generally considered that a similar vessel would discharge at a wharf in a week. On the question of site, the general opinion favoured a spot between Clay Point and Kumutoto (Woodward Street). The cost of landing goods by lighter was stated to be about 3s. 6d. per ton, while the charges on the existing wharves amounted to 1s. per ton.

During the same session (1857) another Committee was appointed to inquire as to the advisability of constructing a wharf between Korokoro (Petone) and Lowry Bay. The Committee reported that there were two suitable sites, both near Point Howard. It was also suggested that a tramway to the Wairarapa could be formed by way of the coast. Nothing further was heard of either project.

The deep-water wharf was not mentioned again until 1861, when the site was decided. By this time the land had been reclaimed towards what is now Panama Street. A Provincial Act was passed that year authorizing the Superintendent to construct a deep-water wharf. Complaints were also made that year that Swinburne's Wharf, which was perhaps the most important wharf of the day, was in a bad state and should be repaired or removed.

Tenders were called for on the 21st October, 1861, for the construction of a wharf 35 ft. wide to extend 500 ft. from the sea-wall to a cross-head 50 ft. wide, making a total length of 550 ft. At 300 ft. from the sea-wall tees would extend on both sides, 35 ft. wide and 75 ft. long. Totara piles for the first 250 ft. were to be driven 9 ft. in the ground, for the remainder of the main pier and the inner tees to the depth of 10 ft., and for the cross-head to the depth of 11 ft. Piles were to be sheathed from 1 ft. 6 in. under the surface of the ground to 6 in. above high-water mark, the contractors to provide the timber and labour, the Government providing the necessary sheathing-material, copper, felt, and nails. The piles were to be not less than 12 in. square with all sap-wood removed up to and including the inner tees, while for the remainder and the cross-head 14 in. piles were required. The flooring was to be 6 in. by 3 in. heart of rimu, placed 1 in. apart. Full details of the specification may be found in the *Provincial Gazette*, 26th October, 1861. The depth of water at the end of the wharf was 18 ft., low water. Four tenders were received. That of McLaggan and Thompson (£15,420) was accepted. The other tenders were—Charles Mills, £15,500; Plimmer, Wallace, and Seager, £18,500; James Smith, £18,955. Extras amounted to £884 by the time the wharf

was completed. The first pile was to have been driven on the 18th April, 1862, but owing to a mishap with the pile-driver or the engine, and, after a wait of two hours in a cold south-easter, the ceremony was postponed, taking place on the 28th, when the Superintendent satisfactorily assisted in driving the pile.

The contractors claimed that work was commenced on the 1st April. The totara piles were ordered from the Wairarapa district, but owing to floods the roads and bridges to that district were damaged and heavy goods traffic prohibited, thereby causing delay while arrangements were being made to procure the timber elsewhere. The delay was a serious matter for the contractors, as it landed them in penalties amounting to £800 for non-completion within the specified time—one year from time of signing the contract (4th December, 1861). In 1863 the contractors applied for a remission of the penalties, but the Petitions Committee decided against them. They petitioned again in 1865, when they were granted £65.

The first interprovincial steamer to berth at the wharf was the "Airedale" (286 tons), which berthed at the inner side of the first tee on the 11th March, 1863. The local steamers "Wonga Wonga" and "Storm-bird" had berthed previously. The contractor, John McLaggan, in his evidence on the petition, stated that he had allowed vessels to berth from Christmas, 1862. The first overseas vessel to be berthed was the barque "Queen of the Avon" (460 tons, Captain John Jones), on the 12th August. Wooden rails for a tramway were laid on the wharf in June: this had not been provided for in the contract. The wharf was not level with the Quay, but judging by the wording of the contract was 26 in. higher. No sheds or stores were erected on the wharf. Mr. W. Spinks was appointed wharfinger in June, 1863.

For some years the wharf was known as the "deep-water wharf," or the "Government Wharf," and probably the name "Queen's Wharf" grew from the bonded store, which had been always known as the "Queen's Bond" or "Queen's Warehouse." This was a building erected in 1862-63, on a reclaimed site where Bannatyne and Co.'s offices stand. It was a building, 100 ft. by 46 ft., of three floors, costing £2,700. It was opened 1st May, 1863.

According to a return presented May, 1863, the equipment of the wharf at that time, and the cost, was—

	£	s.	d.	£	s.	d.
Three 2-ton cranes, one 2-ton crane (travelling), and one 5-ton crane	312	10	0			
Six trucks on oak frames	50	0	0			
Freight and charges	51	7	1			
				413	17	1
Eight chains, 22 tons	297	16	6			
Eight mushroom anchors, 23 tons	368	9	0			
Eight buoys, 26 tons	521	4	3			
	1,187	9	9			
Less discount	29	13	9			
	1,157	16	0			
Railway bars, switches, crossings, screws, nails, &c., complete	133	0	0			
Freight and charges	506	12	8			
				1,797	8	8
Charges, including lighterage, exchange, commission, &c. ..				179	15	1
				£2,391	0	10

Complaints were soon made about the berthing regulations. Vessels had to moor to buoys placed seaward, and at times might have 200 fathoms of cable out. These moorings naturally interfered with the moorings of other vessels. For a time ship-agents preferred to continue to use the lightering service, while other vessels still used the older wharves. The wharfage charged at this time was 2s. per ton, weight or measurement; horses, 5s. each; sheep, 4s. per score; goods for transhipment, 1s. per ton. No berthage charge was made until a specified time allowance, according to tonnage, had expired. A vessel of, say, 400 tons was allowed up to fifteen days for discharging cargo. There appears to have been no regulation in the matter of loading cargo.

The Clerk of Works from the 1st May to the 23rd December, 1862, was Mr. Henry Bragg; from that time to the completion of the contract Mr. W. H. Hales was in charge. Mr. Bragg was also in charge of the Queen's Bond contract.

In July, 1864, the Council decided to lengthen the southern end of the inner tee and the cross-head, and also to lengthen the main wharf and add another cross-head. The Wharf Committee recommended that the moorings and buoys should be placed not more than 10 to 15 fathoms from the bow of a vessel; that the wharf should be let by public auction; and also that the wharf should be lighted for the safety of passengers, and that the white light at the end of the wharf should be replaced by a red light (the standard for the same to be raised about 8 ft., as there had been complaints that the light had been obscured by the vessel that might be moored at the cross-head). Much technical detail is given in a report on the management of the wharf laid before the Council on the 21st January, 1864. In accordance with the decision to extend the wharf, John Morrison, agent for the Council in London, was requested to invite plans and specifications for the work. Two firms of engineers—Messrs. Kennard Bros., of Westminster, and Crumlin, Wales, and Messrs. Thomson and Browning, London—responded. The scheme of Messrs. Kennard was accepted, with a few alterations suggested by Mr. C. R. Carter, of this town, who was then in England, and who had been asked by the Council to assist in the wharf and patent-slip negotiations.

The contract with Messrs. Kennard, which was dated 25th January, 1865, provided that the wharf should be erected within two years, the contract price to be £31,813, including cost and carriage of plant and material, freight, labour, and all other expenses, but exclusive of Customs duties, the tools and plant required for the construction to be admitted free of duty. The structure was to consist of a framing of wrought-iron plate girders, property bolted together, and resting on twenty-five cast-iron cylinders of 4 ft. diameter each and ninety-five cast-iron screw piles of 1 ft. diameter; the piles and cylinders to be sunk at least 15 ft., and the cylinders to be filled with concrete composed of four parts clean gravel and sand to one part of fresh Roman cement. Two lines of railway and four turntables for the trucks were to be provided and fixed; a 5-ton steam-crane to be provided; also four mooring-screws, with buoys, and 40 ft. of chain to each to be provided and fixed. All of the timber required was to be provided by the Provincial Government to the exact dimensions required, ready for fixing. The timber required for scaffolding, &c., was to be provided by the contractors. The planking was to be 8 in. by 4 in. heart of totara, fixed with their edges $\frac{1}{2}$ in. apart.

Messrs. Thomson and Browning did not make an estimate of the total cost, as they did not propose to erect the wharf. Mr. C. R. Carter, who

was associated with Mr. Morrison in considering the tenders, estimated that it would be about £40,000. Their estimate for material and freight was £20,600.

The extension of the pier was to consist of a jetty 160 ft. long and 35 ft. wide, and a cross-head of 300 ft. long and 50 ft. wide. There was a depth of 26 ft. at low water at end of cross-head.

Messrs. Kennard Bros., who had secured the contract to extend the wharf, sent a staff for the work under Mr. J. R. George, who later became manager of the Wellington Gas Company and the Wellington Patent Slip Company. There were fitters, riveters, divers, carpenters, and labourers. The first detachment arrived in Wellington on the 13th March, 1865, and next day two carpenters commenced work on the erection of a store on the reclaimed land. Arrangements were made for the material to be stored on reclaimed land in Customhouse Quay owned by A. P. Stuart and Co. A. P. Stuart and Co. built a store on the site during the following year, which is still standing, being occupied by the Colonial Carrying Company. The divers effected repairs to the existing wharf. The manager was fortunate enough to secure the contract to rebuild a bridge over the Kaiwarra Stream, thus giving work to some of his men while waiting until required at the wharf. Others worked temporarily at Mills's foundry or at lightering-work.

The first pile of the staging for the main wharf-extension was driven on the 25th October, and the first screw-pile was started on the 5th November. On the 18th December the contractors had secured the contract to extend the two tees of the existing wharf to the southward, the inner tee by 50 ft. and the outer by 100 ft. Work on these extensions (the contract price of which was £2,250) was commenced on the 4th January, 1866. The Provincial Council provided the timber, which had cost £1,550. The first pile of the inner tee was driven on the 6th January, and the work completed on the 14th March. The first pile of the outer tee was driven on the 23rd February, and the work completed on the 1st June. Many divers were engaged on these works; some of the names may be familiar to old watersiders—Goff, Kendall, Hepworth, Poulton, Burton, Hughes, Hawkins, and Lake. The last screw pile of the main extension was driven on the 20th October, 1866. The extensions to the tees were designed by Mr. J. T. Stewart, who had designed the main structure in 1861. New South Wales ironbark sheathed with 18 oz. Muntz metal was used for the piles, which were driven 14 ft. into the ground. Mr. McLeod, recently appointed, was Provincial Engineer of the period. Mr. W. H. Hales was Inspector of Works. The completed work was ready to be handed over to the Government on the 10th January, 1867.

In September one of the Panama steamers ran into the wharf, which was damaged to the extent of £5,000. It was decided to effect repairs in wood at a cost of £2,000, the charge against the company to be £1,000.

In 1868 the Wharf Committee reported that it was advisable that the wharf and warehouse be let; but, before doing so, recommended that the approaches to the wharf should be widened and altered so that carts could take goods direct to or from vessels, and that sheds should be erected for cargo that had to be transhipped. The Committee also recommended improved lighting. W. B. Rhodes was chairman of the Committee. An Act was passed that year empowering the Superintendent to lease the wharf for periods not exceeding three years. Power was given to the Superintendent on the 28th June, 1871, to cause a Bill to be introduced into the General Assembly to authorize him to transfer unsold sections of the reclaimed land

and Queen's Wharf and the Queen's Bond on payment of the amount of £31,000; £19,000 being the amount asked for the wharf and bond. The Bill became law during the same year, under the title "Wellington Reclaimed Land Act."

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The Chemistry of Bush Sickness, or Iron Starvation, in Ruminants.

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[ABSTRACT.]

IN 1911 the writer published (*Trans. N.Z. Inst.*, vol. 44, p. 288) some preliminary results of his work on bush sickness, a wasting, non-transmissible disease in ruminants, characterized by excessive anaemia, which ultimately proves fatal if the animal be not removed to healthy country. The disease occurs over a large area of country in the thermal district of the North Island. The iron-starvation theory was first published as an hypothesis by the writer in the August, 1912, *Journal of the Department of Agriculture*, p. 124. Since then the work has been continued, the evidence becoming stronger every year, until now it is thought that iron deficiency as a causative agent has been fully proved. (See the series of articles, *Journ. Dept. of Agric.*, April to August, 1924.) The matter is of great economic importance, as not only is the area affected very large (at least a million acres, and probably much more, being affected), but doubts are cast on all pumice lands, the settlement of which is thereby retarded. The soil in the affected area is always derived from an air-borne coarse pumice several feet in depth, resting on rhyolitic country rock. Apparently pumice soils which have been sorted out, compacted, and weathered by water are not bush-sick, since river-terraces and lake-terraces, unless overlain by recent aerial deposits, are free from the disease. Topographical and soil surveys, which are now being carried out, may be expected to throw considerable light on the distribution of bush sickness. The analysis of the blood of sick animals published in 1911 showed a great deficiency of iron, although the grass-ash failed to show any such deficiency. Grass is, however, easily contaminated by soil, and this pumice soil would yield about ten times more iron to the hydrochloric acid than would the grass-ash. Hence, unless