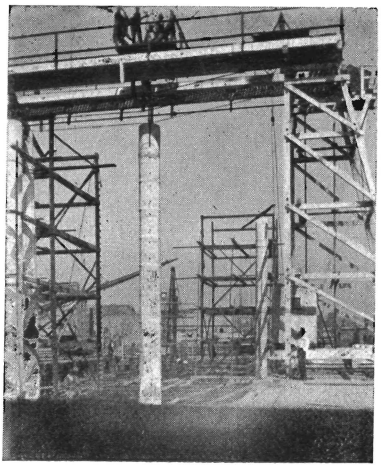
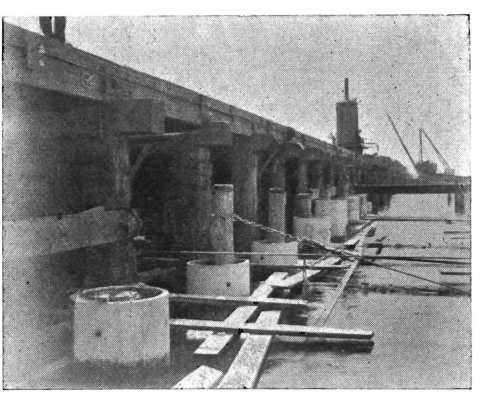
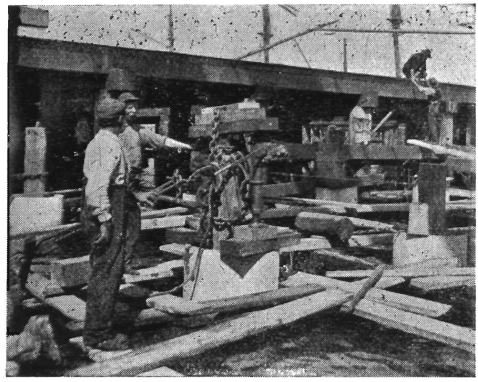


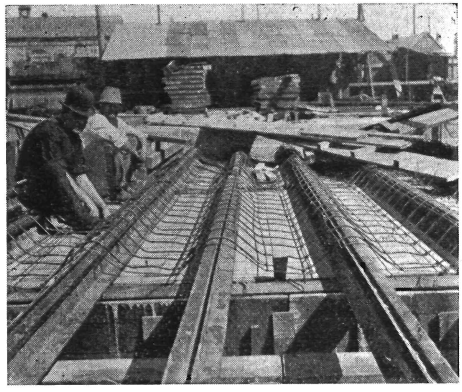
TRAVELLING GANTRY FOR HANDLING RE-INFORCED CONCRETE CYLINDERS.



SHOWING CYLINDERS IN PLACE.



FORCING CYLINDERS INTO CLAY WITH HYDRAULIC JACKS.



RE-INFORCEMENT OF ROADWAY.

which they are connected by 3 inches x 7/8 inch bolts. These flats are mainly necessary for lifting and lowering the completed colmun. The actual joints of pipes are bedded in cement mortar, and a wrapping of wire netting four inches wide placed round the outside circumference. Over this cement mortar is plastered, so as to make a neat finish.

The jointed column is allowed to set for three days before being placed in position. When ready, it is lifted by a hand winch on traveller, travelled out (electrically) to its position, and lowered down over the pile by the hand brake of winch. It is then straightened up, centred, and forced some two feet into the clay bottom by means of 2-8 ton hydraulic jacks.

The sludge at bottom of column is next washed out by means of a force pump, and the water pumped out to within six feet of the bottom and finally dried out with an 1½ inch steam ejector. The space between pile and cylinder is filled up with 5, 2 and 1 concrete, and the column built up to finished level by means of circular forms. Sixteen 3/8 inch vertical reinforcing rods, and four 3/8 inch hoops, are bedded in this topping concrete to prevent any shear at the joint. This concrete contains 3/4 inch broken basalt as aggregates, and is mixed in proportion of 4, 2 and 1.

Holding down bolts 3/4 inch diameter are placed in this concrete, and also 24 inches x 12 inches x ½ inch bearing plates on top of same, to receive the cross girders.

The centres of columns are 10 feet longitudinally, and 15 feet 8 inches transversely.

The cross girders (14 inches x 6 inches steel joists) are next placed in position on the columns and bolted down. These joists are 10 feet centres, and on them are laid old tramway rails (83lb. per yard) 2 feet centres to carry the roadway.

Reinforced rods 3/8 inch diameter are laid across the rails and bent so as to reach within ½ inch of the bottom surface of the concrete. These rods run transversely, and are 8 inches apart longitudinally. They are held in position by four ¼ inch rods wired to them between each pair of adjacent rails. About one inch below the top surface of concrete ¼ inch steel rods are placed eight inch centres and staggered with those of bottom reinforcing system. These are intended to prevent any surface-cracking.

All junctions of rods in both top and bottom reinforcements are hooked and bound with 16 gauge iron wire.

The concrete is fininished 16 inches thick at the crown of road, and 12 inches thick at sides, ready to receive the wood blocks, which form the wearing surface of the roadway.

Three bays of 10 feet length each by the full width of roadway are concreted at a time. After setting three days, the forms are struck and re-erected for the next length. The forms consist of panels 9 feet 6 inches long by 5 feet wide of 6 inches x 1½ inches T. and G. dressed oregon nailed to 3 inches x 2 inches battens. Pudlocks (9 inches x 4 inches) are wedged on bottom flange of steel joists and support the forms. The steel joists are bedded in concrete on both sides.

The plant for handling the completed cylinders (which weigh about 4½ tons) and steel girders consists of a traveller constructed of oregon well braced and mounted on 18 inches diameter cast steel wheels. The clear height of traveller is 40 feet and clear span 56 feet.

It is propelled along wharf by 10 B.H.P. slip ring motor, which is geared into a horizontal shaft 2½ inches diameter, carried in hanger bearings on the outside top girder. Two 2¼ inch vertical shafts pass down each pier, and are geared on top with the horizontal shaft by cast steel bevel wheels, and at the bottom with the axles of road wheels.

A travelling speed of 160 feet per minute can be obtained if desired.

The columns are lifted and lowered by a three-ton crab winch, the fall being reeved through a double block. This winch is mounted on a truck, and can be traversed from side to side of the traveller by hand gear.

The scaffolding for pipe jointing is about 38 feet high, and has five platforms suitably placed to permit of the rapid building up of these columns. It is made in two sections, and each is mounted on wheels, so as to allow of easy transport as the work advances.

This plant is a most efficient one, and allows of rapid construction.

Chicago cube concrete mixers of 11 cubic feet capacity are employed, and are working satisfactorily.

A large wharfage scheme for Jones' Bay and another large jetty west of Dawes' Point have been put in hand, which, when completed, will provide additional first-class over-sea berths. These works are not yet sufficiently advanced to warrant any detailed description being given in this paper, and are only mentioned to show that the activity now in evidence in connection with wharf construction in other large ports is not lacking in Sydney.

LIGHTING.—In connection with the lighting of ports to facilitate navigation at night time, two methods are almost universally adopted. In narrow waters and in rivers with many bends,

it is necessary to provide leading lights to define the centre of the deep water channels, while in ports with expansive deep water, the universal custom is to mark danger spots only, thus giving greater freedom for navigating. The port of Sydney, with its expansive deep water between the eastern and western shores has been lighted in accordance with the usual practice. The entrance between the Heads is marked by leading lights visible for several miles out at sea. A powerful red light has been installed on the Spit Road, and an equally powerful sector light on Grotto Point. The latter is equipped with a fourth order dioptric lens, and shows 16 degrees white in the centre, 10 degrees green to the northward, and 10 degrees red to the southward. The illuminant is acetylene gas, generated in Colts' automatic generators which, when charged, provide a steady light for 60 days continuously without much attention. The Eastern Channel, which carries 35 feet of water for a width of 700 feet, is also marked by leading lights erected on Vaucluse. With these exceptions lights are provided in the Harbour to mark danger spots only. The shoal west of Hornby Light and at Shark Point and also the entrance to the Western Channel are marked by International Marine Signal Company's acetylene gas buoys. These buoys are automatic and generate their own gas under low pressure of 6lbs. per square inch, and with one full charge of calcium carbide give a continuous light for from six to nine months, during which time they require no attention. The buoy, which is made of steel, contains a gas generator, with a tube leading through a counterweight, fastened to the bottom of the shell to give the necessary stability. On the upper surface of the buoy is secured a lantern support, in which the lantern is fixed, with its fresnel lens. The operation of the buoy is as follows: The generator, having been charged with carbide, the opening of a valve allows water to enter the generator tube through a hole in the centre of the counterweight. The contact of the water with the carbide immediately produces gas, which passes into a purifier chamber, where all impurities and dust are removed. The gas then proceeds through a small valve and pipe to the lantern. When gas is produced faster than it is consumed in the lantern it accumulates in the generator, and its pressure being greater than that of the water forces the water away from the carbide, thus arresting generation. As soon as the surplus gas is consumed, the gas pressure is, of course, released, and the water again comes in contact with the carbide, and generation is resumed. In this way, the buoy is absolutely automatic in operation. The lantern is equipped with an occulting apparatus, which is regulated to give various periods of light and dark. The pressure of the gas is used to operate this mechanism. At the southern entrance to the Eastern Channel, Bradley's Head, Shark Island and Robertson's

Point lights are also provided for the guidance of shipping. The structures at Bradley's Head and Robertson's Point are perhaps worthy of a short description. The substructures consist of a number of reinforced concrete cylinders which, with the superstructures, were built ashore in sections. In the case of the tower at Bradley's Head, where the bottom was found to be sand, piles were driven to test in the first instance, and the bottom cone of reinforced concrete was placed over these piles by means of a floating crane. The inside was then filled up with concrete, and the remaining portions of the tower built on top. This formed a very stable structure, and the cost of carrying the concrete structure down to the rock, through some 20 feet of sand, was saved. The light is supplied from a Colt's automatic acetylene generator, housed in a suitable concrete building ashore at Bradley's Head. In the case of Robertson's Point Light Tower, which is of similar design to that at Bradley's Head, bare rock bottom was met, and a level bench was cut out to receive the bottom cone; rails were dowelled into the rock to form a bond, and the concrete filled in as before. A somewhat similar tower is now being erected at Shark Island; but on a slightly larger scale, as sufficient space has to be provided below the light for the accommodation of an acetylene generator, the tower being too far from the shore to admit of its being housed on the island. Other lights, marking Fort Denison, the Western Entrance to Sydney Cove and Miller's Point, are lighted by electricity. In addition, two green lights in line on Goat Island serve to indicate the intersection of the inward and outward channels for vessels navigating in the upper harbour.

Although Sydney is only a little over a hundred years old it now ranks as the fifth port in the British Empire, in so far as its trade and tonnage are concerned. The first jetty erected in Sydney Harbour was in 1788, and was situated at the outlet of the old Tank Stream, practically on the site of the present Harbour Trust offices. At the present time the approximate length of berthing space, exclusive of ferry wharves, jetties, etc., and of privately owned wharves, is 46,900 feet. The available berths are as follows:—

15 berths with 32 feet of water at L.W.S.T.

17 berths with 28 feet of water at L.W.S.T.

22 berths with 26 feet of water at L.W.S.T.

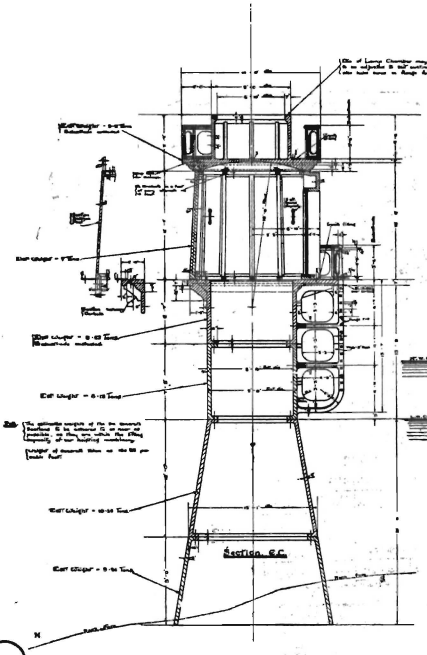
28 berths with 22 feet of water at L.W.S.T.

33 berths with 14 to 22 feet of water at L.W.S.T.

115 cargo sheds have been erected in connection with these berths.

FERRO-CONCRETE LIGHT TOWER FOR SHARK ISLAND. * *

PROPOSED CONSTRUCTION. REINFORCEMENT OMITTED.



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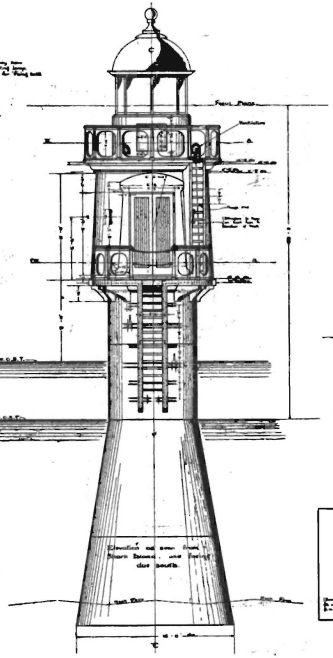

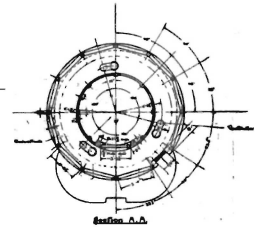

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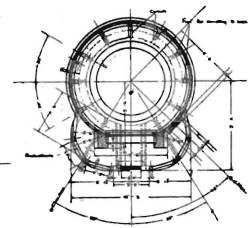

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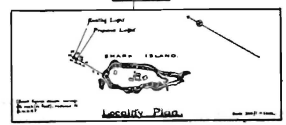


Locality Plan.

PRINCIPAL ASSISTANT ENGR.

DESCRIPTION.

No 6 JETTY WOOLLOOMOOLOO BAY. PORT JACKSON BERTHING FOR 4-500 FT SHIPS AND 1-200 = 26000 TONS OF CARGO.

BERTHS		OPEN DECK SPACE IN FRONT OF SHEDS exclusive of Entrances to Cart Ramps						FLOOR SPACE WHARF DECK IN SHEDS						FLOOR SPACE UPPER DECK IN SHEDS						TONS OF CARGO per Berth	
				AREA		CAPACITY				AREA		CAPACITY				AREA		CAPACITY			
Position	Length	Length	Width	Gross	Available	40 C.F.=1 T	400 lbs/ft²	Length	Width	Gross	Available	40 C.F.=1 T	400 lbs/ft²	Length	Width	Gross	Available	40 C.F.=1 T	200 lbs/ft²	[illegible]	[illegible]
EAST Inner	570'	500'	40'	20000	8640	1728	1534	580'	40'	22200	18400	3680	3280	550'	40'	22200	18400	3680	1647	9088	6461
EAST Outer	570'	530'	40'	21200'	9180	1838	1640	630'	40'	21200	17200	3456	3086	530	40	21200	17280	3456	1543	8750	6268.
NORTH	208'	208'	30'	6240	2475	496	443													496	443
WEST Inner	590'	500'	36'	17500	5760	1152	1028	580'	40'	22200	18400	3680	3280	550	40	22200	18400	3680	1647	8512	5955
WEST Outer	590'	530'	35'	18550	6120	1224	1093	630	40'	21200	17280	3456	3085	530	40	21200	17280	3456	1543	8316	5721
TOTAL	2258'			83490	32175	6438 Tons	5738 Tons			86800	71360	14272 Tons	12730 Tons			86800	71360	14272 Tons	6380 Tons	34982 Tons	28848 Tons

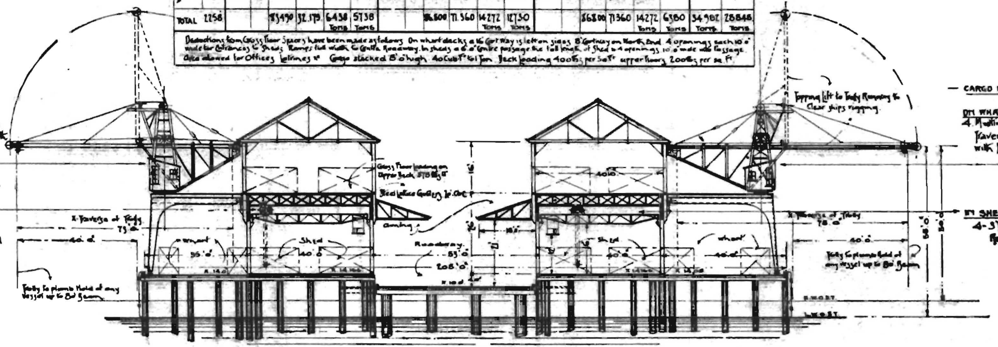
Deductions from Gross Floor Spaces have been made as follows. On wharf decks a 16' Cart Way is left on sides 8' Cartway on North End. 4 openings each 10'0" wide for Entrances to Sheds. Ramps full width to Centre Roadway. In sheds a 6'0" Centre passage the full length of Shed & 4 openings 10'0" wide into Passage. Area allowed for Offices Latrines &c. Cargo stacked 8'0" high. 40 Cub. Ft to 1 Ton. Deck loading 400 lbs per Sq Ft upper floors 200 lbs per sq Ft.

H. W. Walsh 3/10/11
Eng in chief

– CARGO HANDLING APPLIANCES –

ON WHARF DECK.
4 Multimotor, 3 Ton, Electric Radial Traversing & Topping Trolley Hoists with Landing Platforms to Upper Deck.

IN SHEDS.
4 3 Ton. 3 Motor. Bridge Cranes on Runways the full length of Each Shed



– CARGO HANDLING APPLIANCES –

ON WHARF DECK.
4 Multimotor, 3 Ton Electric Radial Traversing and Topping Trolley Hoists with Landing Platforms to Upper Deck

IN SHEDS.
4-3 Ton. 3 Motor Bridge Cranes on Runways the full length of Sheds

– WEST –

– EAST –

NO. 6 JETTY WOOLLOOMOOLOO BAY

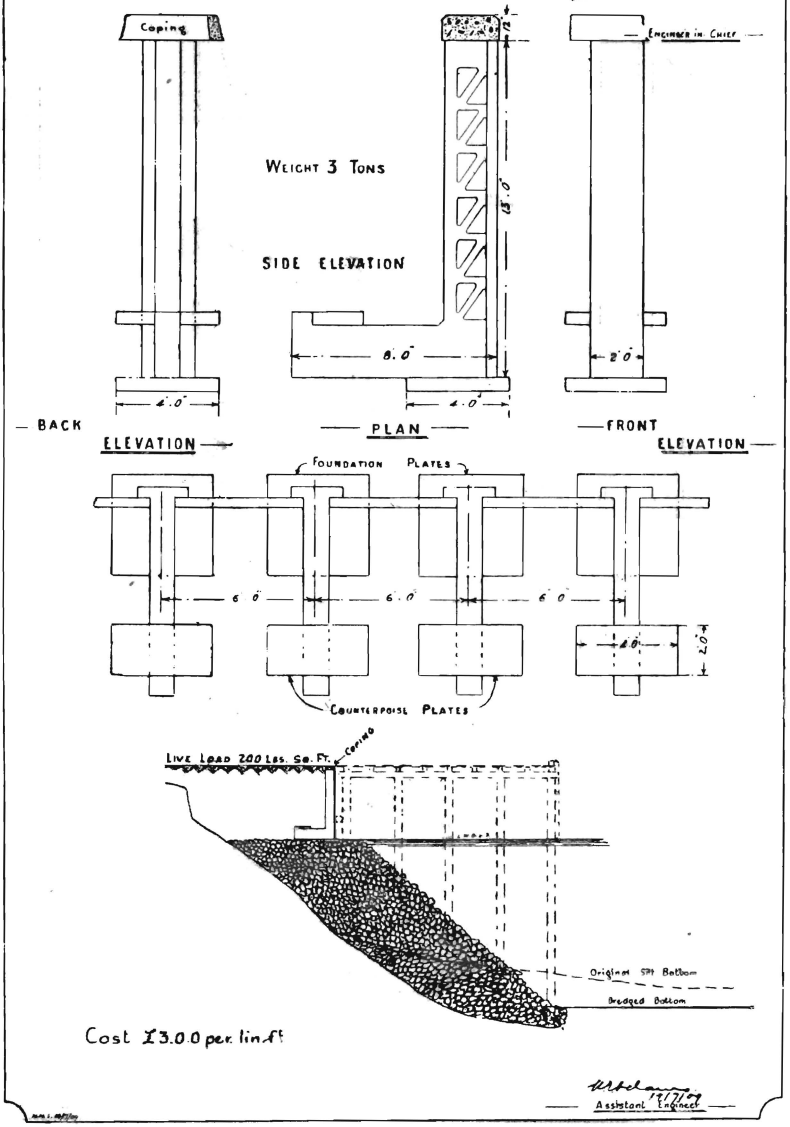
TYPICAL CROSS SECTION. LOOKING NORTH.

PRINCIPAL ASSISTANT ENGR 3/10/11

— N°1 —

TYPE OF MONIER TRESTLE & PLATE WALL

MILLERS POINT



Cost £3.0.0 per lin.ft

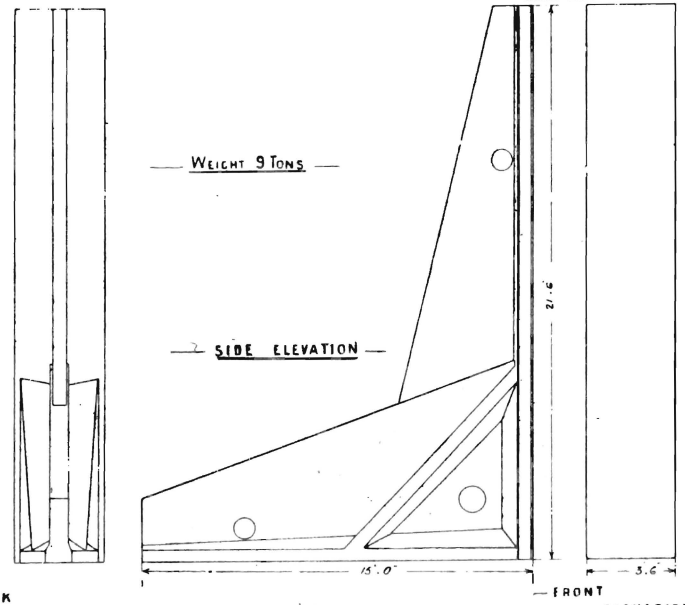
Assistant Engineer

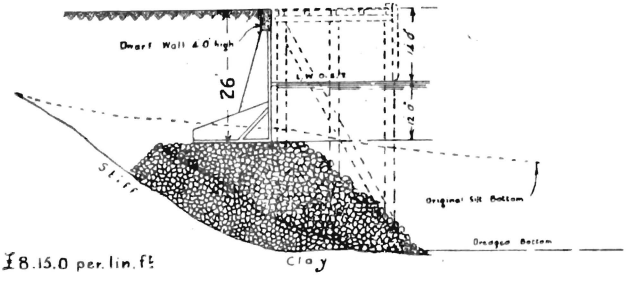
— No 2 —

— TYPE OF MONIER TRESTLE SEAWALL —

— MILLERS POINT —

— ENGINEER-IN-CHIEF —





Cost £8.15.0 per lin. ft

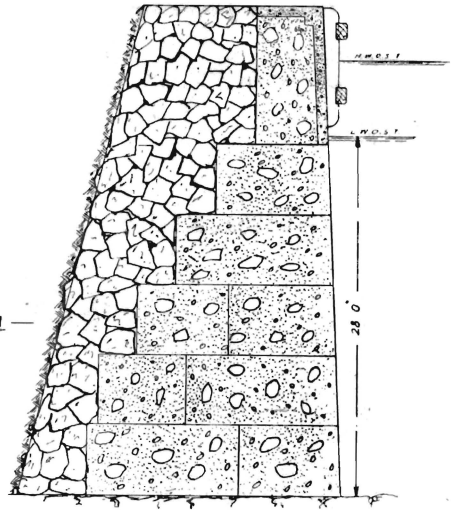
— ASSISTANT ENGINEER —

No 5

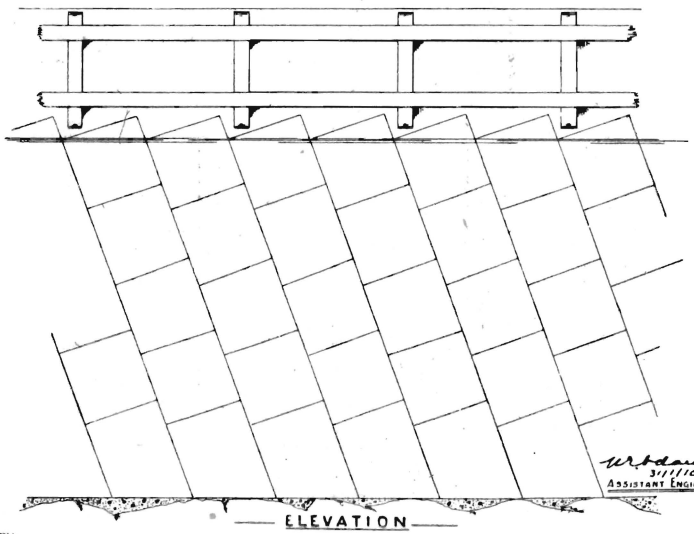
TYPE OF CONCRETE BLOCK SEAWALL

DARLING ISLAND

Engineer-in-Chief 21/4/13



CROSS SECTION



W.R.Adam 3/11/10
Assistant Engineer

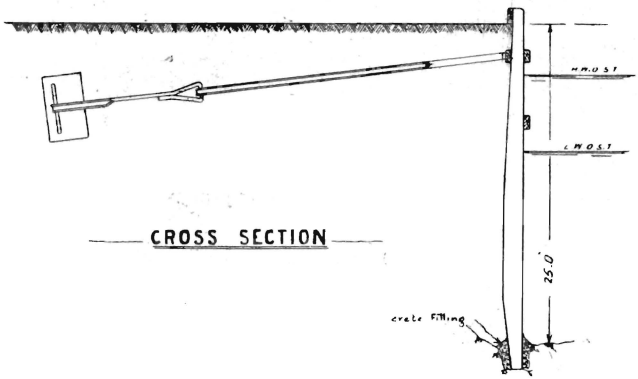
ELEVATION

- No 4 -

REINFORCED CONCRETE SHEET PILE WALL

FOOT OF MARKET STREET

ENGINEER IN CHIEF 3/4/10



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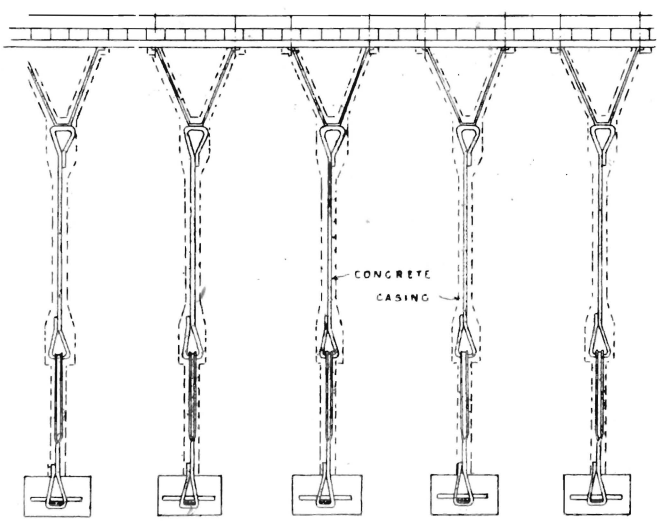
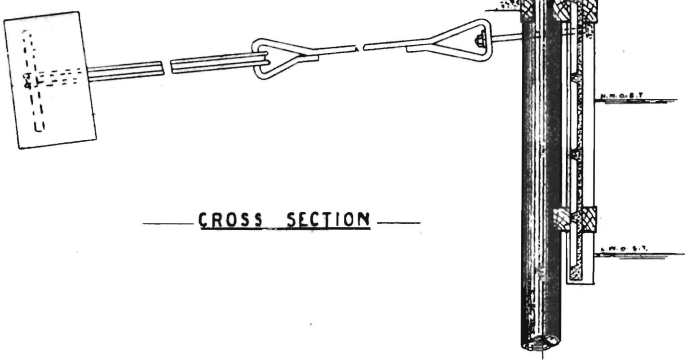


PLAN

ASSISTANT ENGINEER

No 2

TYPE OF TURPENTINE SHEET PILING FACED WITH MONIER PLATES



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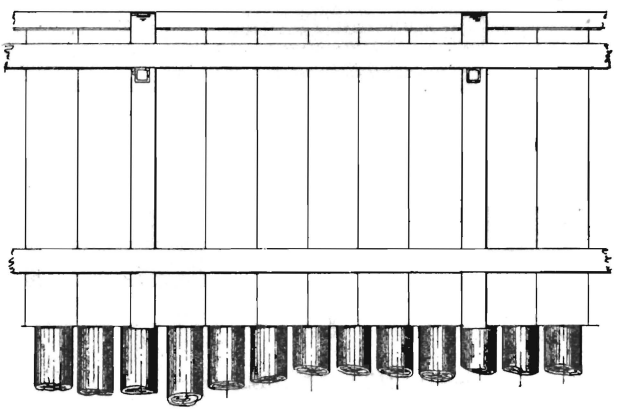
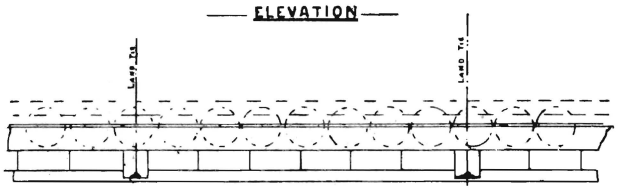


ELEVATION



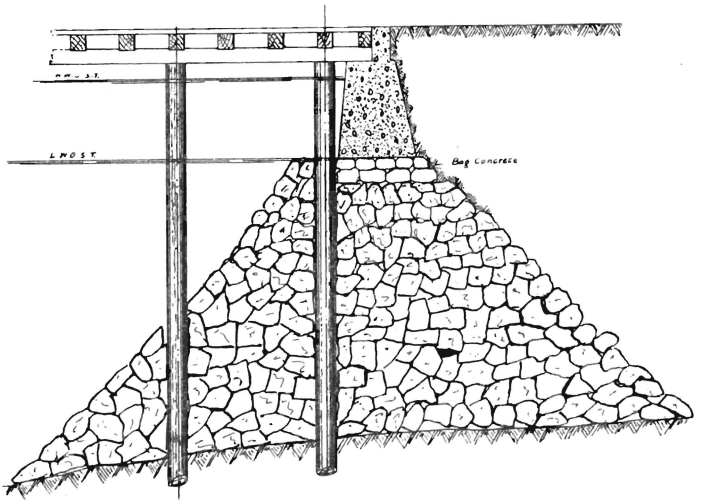
PLAN

— No 6 —

MASSWORK CONCRETE WALL

NORTH END DARLING ISLAND

4/2/10
ENGINEER-IN-CHIEF



CROSS SECTION

31/1/10
ASSISTANT ENGINEER

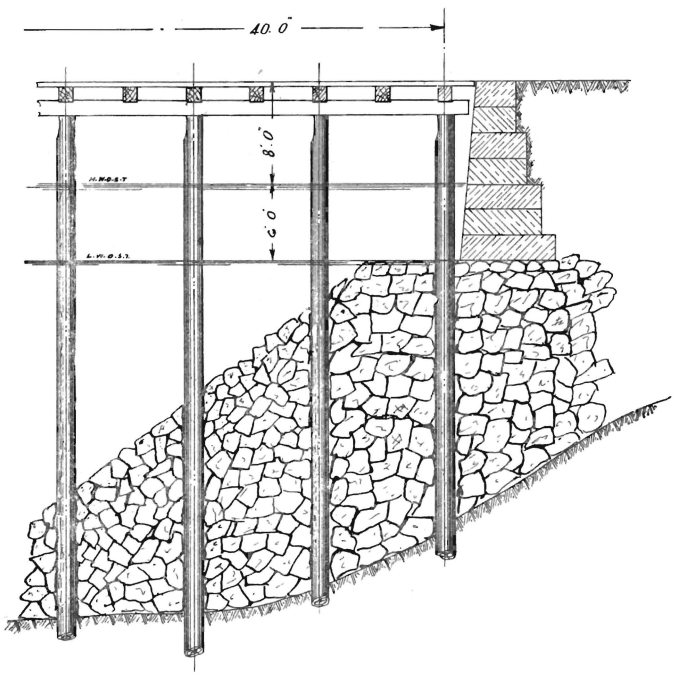
MWS 3/1.

— № 7 —

COURSED STONE SEA WALLING

BACK DALGETYS WHARF MILLERS POINT

Engineer-in Chief 1/2/10



CROSS SECTION

3/11/10
Assistant Engineer

W.H.S. 1911.