THE MADRAS PORT DEPARTMENT

CONSTRUCTION

OF

SLIPWAY

AT

NAGAPATTINAM PORT

PROJECT REPORT

GOVERNMENT OF MADRAS

CONSTRUCTION

OF

SLIPWAY

AT

NAGAPATTINAM PORT

SECTION—I.

1. **GENERAL :**

The construction of a slipway for the Port of Nagapattinam was included in the list of schemes recommended by the Intermediate Ports Development Committee for execution during the 3rd Five Year Plan. It was not taken up as an approved scheme by the Government of India during the third plan due to the overall restriction of funds provided for the development of Minor Ports.

2. This was however recommended by the Madras Working Group on Minor Ports as an item of work to be taken up during the 4th Plan period and a provision of Rs. 1.5 lakhs was made. This provision was kept at the same level as that provided by the Intermediate Ports Development Committee.

3. When the details of the slipway were discussed with the Naval Architects of the Garden Reach Workshops, Calcutta, they expressed the view that the cost of the slipway and the ancillary facilities is likely to be higher than the provision made and also that the cost of the workshop and workshop machinery were not taken into account. All these items will now have to be provided in a new estimate.

4. Since tenders from three different sources will have to be obtained it is proposed that the main estimate may be split up as stated below :

(*a*) Estimate for Civil Engineering Works ;

(*b*) Estimate for Mechanical Engineering Working for the construction of the cradle and other items for hauling up the vessel ;

(*c*) Estimate for Mechanical Engineering Works for the procurement of machinery for the workshop.

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SECTION—II.

CIVIL ENGINEERING WORKS

5. GENERAL:

The slipway is to be designed for hauling up a vessel of 120 tons, plus a cradle of about 24 tons, the total load being 144 tons. Vessels with a length of 60 feet, width of 20 feet with a draft of 5 feet should be able to use the slipway.

6. DIMENSIONS OF THE SLIPWAY:

Total length	...	270 feet.
Length projecting into water	...	120 feet.
Length available for repairs above H.W.O.S.T.	...	75 feet.
Width of the slipway	...	40 feet.
Top of rail at waters edge	...	– 6 feet.
Top of Buffer	...	– 4 feet.
Slope of the Slipway	...	1 in 20
TIDAL DATA:		
L.W.O.S.T.	...	0.00
H.W.O.S.T.	...	+ 3.50

7. The slipway consists of two portions:

(*a*) A length of 150 feet is on solid ground and along this length of the slipway it is proposed to have two retaining walls of brick masonry construction with necessary concrete foundation and 40 feet inner clearance between the walls. The area between the walls will be paved with 6" thick 1:2:4 cement concrete on granite soling. The rails will be supported on longitudinal reinforced cement concrete beams which will be cast on the concrete bed with necessary reinforcements as shown in the drawing. On the river end of this length, it is proposed to build a R.C. sheet pile wall with necessary returns. The top of the R.C. pile wall along the slipway portions will be kept below the rail level but the adjoining portions of the wall will be kept at + 6.00 feet. The R.C. sheet pile wall may be of the same design as that adopted usually for the construction of Wharf walls with necessary tie beams and anchor beams.

(*b*) A length of 120 feet of the slipway will be projecting into the river. The extreme end of the slipway should be kept in the same alignment as that of the newly extended portion of the south wharf. This is necessary in order to avoid loaded boats coming in contact with the submerged portion of the slipway while navigating in the river. This portion of slipway should be of R.C. piles driven at 10 feet centres to sufficient depth to withstand the expected load. The piles should be connected with the two longitudinal beams and cross ties. Rails at 10′ centres should be fixed on the two longitudinal beams. A buffer end should be provided at the river end of the rails in order to restrict the movement of the cradle beyond slipway. Necessary dolphins and bollards should be provided as shown in the plan.

8. WINCH HOUSE.

A room of required dimensions to accommodate the electric winch, with R.C. roof should be constructed at the western end of the slipway.

9. WORKSHOP.

It is proposed to construct a workshop on the northern side of the slipway as shown in the site plan. The dimensions of the workshop will be 100 feet × 30 feet which includes accommodation for (*a*) Machine shop, (*b*) Shearing and punching machine shed, (*c*) Welding, (*d*) Blacksmih shop (*e*) Foundry and (*f*) Stores with an opening of 12′ 4½″ between main shop and foundry and blacksmithshop. It is proposed to build this workshop on latest modern design with north lights.

SECTION—III.

MECHANICAL ENGINEERING WORKS FOR CRADLE AND FITTINGS

10. CRADLE:

The rigid wheel-and-bearing type of cradle will be 60′ × 20′ providing a working clearance of about 4′ 0″ below the underside of the slipped vessel. The cradle and its assemblies will be designed and constructed in such a manner that they could be prefabricated by a ship-building yard for easy transportation by rail/road or sea for re-assembly at site. Two, or if necessary three, sets of main longitudinal girders will be fitted continuously along the length of the cradle, stiffened suitably by transverse girders. The longitudinal and transverse girders will be of rolled mild steel sections and will be stiffened by gusset plates, and provided with sliding bilge blocks for slipping both flat bottomed and ship-shaped vessels upto a length of sixty feet. The whole structure will be mounted over numerous cast iron rollers, working in carriages of the same metal.

The rails will be of cast iron so as to ensure longer life and higher resistence to corrosion and will be made in suitable lengths complete with joining and grouting arrangements with the longitudinal concrete beams as shown in the drawing. The rails will be laid 10 feet apart. Two pawl racks will be provided outside of each rail to prevent the vessel slipping back.

The wheels, bushes and bearings will be of cast iron or other suitable metal and will be machine-finished on the surfaces required.

11. WINCH.

ONE—ELECTRICALLY DRIVEN WORM AND SPUR GEARED SLIPWAY HAULAGE WINCH with all-steel welded bed frame complete with holding down bolts suitable for working on 3 phase, 50 C/s. 440 V, electric supply and having a pull of 6¼ tons at an average speed of 50 feet per minute, which when used in conjunction with a two-fold purchase will be capable of hauling up a vessel of 120 tons plus a cradle of about 24 tons, i.e., a total weight of 144 tons up a slipway having a gradient of 1 in 20 at an average speed of 25 feet per minute.

The Electric Motor should be arranged to drive the barrel through worm and spur gearing. The worm gearing should have a phosphor-bronze worm wheel rim of high tensile steel, worm forged solid and a shaft mounted on ball and roller bearings.

Spur gearing with a cast steel wheel should have steel pinion forged solid with the intersbaft mounted on ball bearings.

All teeth should be accurately machine-cut and the whole of the reduction gear, running in oil, should be totally enclosed in a fabricated steel gear-case.

The barrel should be of cast iron, 20″ diameter by 24″ wide, free to rotate on gunmetal alloy bushes on the mainshaft, grooved and capable of accommodating 450 feet of 1″ diameter wire in 3½″ layers.

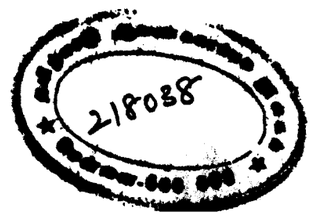
The barrel should be engaged by hand operated jaw-type cast steel clutch, for free running of rope.

A suitably lined band-type brake should be provided to work on a turned path on one flange of the barrel and operated by foot pedal and screw down handwheel.

The pedestal bearing supporting the outboard end of the barrel shaft should be of fabricated steel with gunmetal alloy bush.

One cast iron warpend should be keyed to an extension of the barrel shaft overhanging the pedestal bearing so as to be capable of being used independently of the main barrel for downhaul and/or general purpose duties.

A combined magnetic brake sheave and pin-type flexible coupling should be fitted between the motor and the reduction gearing.



12. MOTOR.

The Winch should be driven by a motor of the totally enclosed weather proof slip ring induction type capable of 35 H.P. at 1400 R.P.M. fitted with two endshield bearings, one hour rated in accordance with B.S.S./2613/1957 or equivalent Indian Specifications. A direct current magnetic brake fed from a rectifier should be fitted.

The control Equipment should comprise of a hand operated reversing drum controller providing rotor resistance control in each direction with triple pole line contactor having inherent undervoltage releases, three over load releases, and triple pole hand operated isolating switch all in weatherproof sheet steel case and mounted on the winch.

Separate ten minute rated main resistance should be provided to pass 75% full load current on the first step on the controller and housed in a watertight compartment, formed-in Winch Motor Mound.

13. ESTIMATE.

The estimate for the work specified in Section III will be prepared hy the Madras Port Department.

SECTION—IV.

MACHINERY FOR WORKSHOP

The estimate for the workshop equipment will include the following items of machinery. This estimate will be prepared by the Port Department.

(1) All geared head, self-acting, sliding, surfacing, screw- cutting heavy duty Lathe, driven by a 3 phase 440 volts motor, V-gap bed, 3600 mm. between centres, 650 mm. swing over bed, hole through spindle about 100 mm., with chip tray, coolant pump and fittings, square tool post, quick change gear box for inch thread-cutting and gear wheels for metric thread-cutting, supplied with all standard accessories required for carrying out general type of work. Lathe should be of Grade 1 ... 1 No.

(2) All geared head, self-acting, sliding, surfacing, screw-cutting light duty Lathe, driven by motor (A.C.) 3 phase, flat gap bed 900 mm. to 1100 mm. between centres, 250 mm. swing over bed, hole through head stock 40 mm., with chip tray, coolant pump and fittings, square tool post, quick change gear box for inch thread-cutting and gear wheels for metric thread-cutting, with all standard accessories required for normal operation and for general type of work. Lathe should be of Grade 1 ... 1 No.

(3) Heavy duty pillar Drilling machine with 3 phase 440 volts A.C. motor, capable of drilling steel upto 50 mm., with coolant pump and complete fittings:

Column to centre of drill	450 mm.
Drill end to surface of table	1,200 mm.
Drill end to base	1,500 mm.
Working surface of table	600 mm.

Provided with sliding and locking arrangements on the pillar—Number of speeds 3 to 4, with standard accessories such as double tang tapered shank sleeves and sockets for fixing the drill bits, drifts, and 150 mm. Universal machine vice (Grade 1 required) ... 1 No.

(4) Motorised 3 phase 440 volts A.C. Hacksawing machine, capable of cutting square M.S. bars upto 150 mm. maximum, with coolant pump attachment, with automatic lift on the non-cutting stroke to avoid breaking of saw blades, complete with standard accessories (Grade 1 required) ... 1 No.

(5) Arc welding, oil cooled Transformer set conforming to B.S. specifications, portable wheel mounted, two operator type, capable of supplying maximum current of 600 amps down to 25 amps., suitable for 400 to 440 volts, 3 phase, 50 cycles supply, with all standard fittings, such as electrode holders, earth clamps, welding and earthing cables of 10 metres each, helmets with glasses, hand shields with glasses, chipping hammers, steel wire brushes, leather aprons, leather gloves, leather sleeves, leather leg guards, all for two operators. ... 1 Set.

(6) Motorised 3 phase 440 volts, A.C. Universal Wood Working Machine, for sawing, planing, boring, mortising and thicknessing, capable of sawing 300 mm. broad to a depth of 150 mm. and planing 300 mm. wide plank. 1 No.

(7) Motorised 3 phase 440 volts A.C. double-ended Grinding Machine mounted on C.I. pedestal stand, fitted with one rough and one smooth grinding stone of size 300 mm. × 38 mm. × 38 mm, with coolant tray, tank and piping for wet grinding on one side, provided with twist drill grinding attachment for drills from 6 mm. to 40 mm. ... 1 No.

(8) Motorised forge blower having 125 to 130 mm. discharge opening, with water gauge 75 mm. to 100 mm. ... 1 No.

TOOLS AND INSTRUMENTS.

(1) Combination bevel protractor with 150 mm. blade ... 1 No.

(2) Scribing block with 300 mm. post-magnetic base ... 2 Nos.

		Precision grade	*Commercial quality*
(3) Try squares :	(*a*) 300 mm.	... 1 No.	1 No.
	(*b*) 200 mm.	... 1 No.	1 No.
	(*c*) 150 mm.	... 2 Nos.	4 Nos.
(4) C.I. Surface Table :	(*a*) 450 mm. × 300 mm.	... 1 No.	
	(*b*) 750 mm. × 600 mm.	... 1 No.	
(5) Thread guages :	(*a*) Metric	... 1 No.	
	(*b*) Whitworth	... 1 No.	
(6) Vee blocks with clamps :	(*a*) 50 mm.	... 2 Nos.	
	(*b*) 75 mm.	... 2 Nos.	
	(*c*) 100 mm.	... 2 Nos.	

(7) Dial micrometer 50 mm. dial 0″ to 0.100″, to read .0001″ ... 1 No.

(8) Feeler guage to read 0″ to 0.040″ with equivalent metric graduations on reverse side. (*a*) 100 mm. long ... 1 No. (*b*) 300 mm. long ... 1 No.

(9) Outside Micrometer, to read .001″, with box. (*a*) 0—1″ ... 1 No. (*b*) 0—2″ ... 1 No.

(10) Outside nicrometer with detachable spindles, reading from 0″ to 6″ in .001″, and set rods and metal box ... 1 No.

(11) Vernier callipers with screw adjustment, to read 0 to 300 mm. (inside, outside and depth), with box. ... 2 Nos.

(12) Inside Micrometer with detachable spindle, reading from 2″ to 12″ in .001″, for cylinder bore gauging, with box ... 1 No.

(13) Depth gauge with 300 mm. blade and micrometer attachment, with box ... 1 No.

(14) Spirit level : (*a*) 150 mm. long, precision ... 1 No.

(*b*) 300 mm. long, precision ... 1 No.

(15) Outside, inside and hemophrodite spring callipers and spring dividers :

(*a*) 300 mm. ... 2 Nos. each

(*b*) 200 mm. ... 2 Nos. each

(*c*) 100 mm. ... 2 Nos. each

(16) Taps and square or rectangular die sets, enclosed in a wooden box, with stocks and wrenches, taps being 3 Nos. in each size, sizes 1/8″ to 1½″ rising in 1/16″ steps to 3/4″ and thereafter in 1/8″ steps, B.S.W. threads ... 1 Box.

(17) Taps and square or rectangular die sets, enclosed in wooden box, with stocks and wrenches, sizes 3/16″ to 1½″ rising in 1/16″ steps upto 3/4″ and 1/8″ steps thereafter, B.S.F. threads ... 1 Box.

(18) **LATHE MACHINE CUTTING TOOLS :**

(15 mm. × 15 mm. × 200 mm—shank)

Inserted carbide-tipped cutting tools :

(*a*) Right-hand ... 12 Nos.

(*b*) Left-hand ... 12 Nos.

H.S.S. TOOLS :

Cutting : (*a*) Right-hand ... 12 Nos.

(*b*) Left-hand ... 12 Nos.

Parting tools ... 6 Nos.

Rounding or nosing tools ... 6 Nos.

Thread cutting tools ... 6 Nos.

KNURLING TOOLS :

(*a*) Rough ... 2 Nos.

(*b*) Medium ... 2 Nos.

(19) **ENGINE DIVIDED STEEL SCALES (NON-FOLDING), METRIC AND INCH :**

(*a*) 600 mm. ... 2 Nos.

(*b*) 300 mm. ... 4 Nos.

(*c*) 150 mm. ... 6 Nos.

(20) Drill bits : (*a*) 1″ to 2″ taper shank, rising in 1/8″ steps ... 1 Set.

(*b*) 1/16″ to 1″ straight shank, rising in 1/16″ steps ... 3 Sets.

(*c*) Centre drills 1/8″, 3/16″, 1/4″ ... 3 Each.

(21) (*a*) Bench vice, 150 mm., hard steel jaws ... 4 Nos.

(*b*) Leg vice, 150 mm., hard steel jaws ... 2 Nos.

(22) Pipe vice, 15 mm. to 100 mm. capacity, chain type ... 2 Nos.

(23) Chain pipe wrench : (*a*) 50 mm. ... 2 Nos.

(*b*) 100 mm. ... 2 Nos.

(*c*) 150 mm. ... 2 Nos.

(24) Hammers :

(*A*) Light and heavy, ball pane, with handles :

(*a*) 0.25 Kg. ... 3 Nos.

(*b*) 0.5 Kg. ... 12 Nos.

(*c*) 1 Kg. ... 12 Nos.

(*d*) 2 Kg. ... 3 Nos.

(*B*) Rivetting hammers ... 6 Nos.

(*C*) Sledge hammers, with handles :

(*a*) 3 Kg. ... 3 Nos.

(*b*) 6 Kg. ... 3 Nos.

(*c*) 12 Kg. ... 3 Nos.

(25) Pistol-grip, adjustable hacksaw frames, 300 mm. ... 6 Nos.

(26) Portable forges with blowers ... 2 Nos.

(27) Anvils : (*a*) 50 Kg. ... 2 Nos.

(*b*) 75 Kg. ... 1 No.

(28) Hand saws for wood : (*a*) 300 mm. ... 2 Nos.

(*b*) 600 mm. ... 2 Nos.

(*c*) 900 mm. ... 2 Nos.

(29) Fish mark wood chisels : (*a*) 25 mm. ... 3 Nos.

(*b*) 50 mm. ... 3 Nos.

(*c*) 75 mm. ... 3 Nos.

(*d*) 100 mm. ... 3 Nos.

(30) Jack planes, wooden, with metal reinforcement : (*a*) 38 mm. ... 2 Nos.

(*b*) 50 mm. ... 2 Nos.

(*c*) 62 mm. ... 2 Nos.

(31) Augers, 10 mm. to 30 mm. in 3 mm. steps ... 2 Sets.

(32) **SPANNER SETS** :

(*a*) D.E. Ring spanners, 3/16″ to 1-1/4″ W.W., in 1/16″ and 1/8″ steps ... 2 Sets.

(*b*) D.E. Spanners, 3/16″ to 1-1/4″ W.W., in 1/16″ and 1/8″ steps ... 2 Sets.

(*c*) Tubular box spanners, 1/4″ to 1-1/4″ W.W., in 1/8″ steps ... 2 Sets.

(*d*) Bihexagon socket spanners with ratchet, handle, universal joint, and extension rod, 3/16″ to 1-1/4″ W.W., in 1/16″ and 1/8″ steps ... 1 Set.

(*e*) Allen key spanners, 1/8″ to 3/4″, in 1/16″ steps ... 1 Set.

(33) Stilson wrenches and screw spanners :

(*a*) 150 mm. ... 2 Nos. each.

(*b*) 300 mm. ... 2 Nos. each.

(*c*) 600 mm. ... 2 Nos. each.

(34) Footprint wrench 300 mm. ... 2 Nos.

(35) Portable heavy duty grinder, 1 H.P. 230 volts, A.C., single phase, with spare flexible shaft and 12 Nos. of grinding stones ... 2 Nos.

(36) Portable heavy duty drilling machine, A.C., of maximum capacity 25 mm. steel, with stand and machine vice 150 mm. jaw ... 2 Nos.

(37) Chain blocks : (*a*) 1/2 tonne capacity ... 2 Nos.

(*b*) 1 tonne capacity ... 2 Nos.

(*c*) 3 tonnes capacity ... 2 Nos.

(38) Hand shearing machine :

Capable of cutting upto 10 mm. M.S. plates ... 1 No.

(39) Loco Type Screw Jack—5 tonnes capacity ... 2 Nos.

(40) Hydraulic jack 10 Tons capacity ... 2 Nos.

(41) Pull-lift jack : (*a*) 0.5 tonne ... 2 Nos.

(*b*) 1.5 tonnes ... 2 Nos.

(42) Stillage truck—500 Kg. ... 1 No.

(43) Hydraulic trolley jack—10 tonnes ... 1 No.

(44) Ratchet type, pipe thread cutting stock and dies—Capacity B.S.P. 12 to 75 m.m. ... 1 No.

(45) Swage blocks :

(*a*) 450 mm. × 450 mm. ... 1 No.

(*b*) 600 mm. × 600 mm. ... 1 No.

(46) Garage crane with wheels, capacity 3 tonnes ... 1 No.

(47) B.S.P. taps and dies set with hox, sockets, guides, wrench, etc., 1/8″ to 1″ in 1/8″ steps ... 1 Set.

(48) Drill sleeves, MT., 4-3, 3-2, 2-1 ... 2 each.

(49) Jacobs chuck with arbor and key, 3/4″ cap. ... 2 Nos.

(50) Hand chisels : (*a*) flat 1/2″, 3/4″, 1″ ... 12 Nos. each.

(*b*) Cross cut 1/4″, 3/8″, 1/2″. ... 6 Nos. each.

(*c*) Asstd. groove cutting ... 2 Sets.

(51) Portable electric drill, 3/8″ capacity ... 1 No.

(52) Blacksmiths flatteners and swages ... 2 Sets each.

(53) Tinshears—(*a*) 200 mm. (*b*) 300 mm. ... 3 Nos. each.

(54) Cutting pliers—(*a*) 150 mm. (*b*) 225 mm. ... 3 Nos. each.

(55) Adjustable straight reamers, with box, size 6 mm. to 40 mm. ... 1 Set.