



MAZAGON DOCK SHIPBUILDERS LIMITED

(Formerly known as Mazagon Dock Ltd.)

CIN : U35100MH1934GOI002079

(A Government of India Undertaking)

Shipbuilders to the Nation

Dockyard Road, Mazagon,

Mumbai 400 010.

INDIA

**Strengthening of RCC Structures below Deck
Slab of Workshop 'C' including removal of
accumulated sludge and repair of Dry Dock
Wall at East Yard, MDL, Mumbai**

VOLUME-III

**Scope of Work
List of Tender Drawings
Price Bid (Part-II)**

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1. कार्य का ब्योरा / SCOPE OF WORK:

1.1. Scope of Work in brief is as under.

1.1.1. Rerouting of Drainage line: Rerouting of existing drainage line of D2 building backside and Workshop 'C' Toilet block by laying new S.W. drain pipes along with chambers. Connection of new drain along with existing drainage of CAS by crossing over Mazagon Pier Road (concrete Road).

1.1.2. Sludge removal: Making opening by carefully dismantling the existing deck slab behind 'D2' building for providing alternative access for workmen, material movement and also for emergency exit in case required. Removal of sludge from underneath of Deck slab of Workshop 'C' & 'D2' building by using suitable suction pump including dewatering in case required, manually, loading the sludge into the dump barge, toeing the barge with harbour tug and unloading the sludge into deep sea at MBPT notified location .The contractor will arrange for safety arrangement of exhaust fans, light, ventilation, oxygen cylinders, oxygen masks,torch etc.

This also includes provision of skilled manpower including supervision, supply of all necessary equipment machineries providing instrumentation, tools for physical /by pump removal of sludge if any and after sludge removal and transportation and dumping of the same.

- i. All the works shall conform to specification and technical requirement called for of the tender and to application codes and practices, and shall be carried out in an approved manner acceptable to owner.
- ii. The contractor shall check the site 'as is where is' condition and carry out any preparatory work. Standby safety measures like keeping running water hoses; firefighting extinguisher shall be kept ready nearby and as per IS11972-1987(Code of practice for safety precautions to be taken when entering a sewage system)
- iii. Any other additional requirements which is required for job completion and the same is not figuring elsewhere in this tender document shall form part of the Contractor Scope of supply within their quoted price.
- iv. The vendor has to ensure that the sludge-cleaning job is carried out as per the standard safety practice.
- v. Final disposal of sludge & water wash will be the responsibility of contractor.
- vi. Fine cleaning to make the site ready is the responsibility of the contractor.
- vii. Removing of material such as floating materials, garbage, muck, debris, silt, night soil, sludge or slurry etc. present underside of deck structure of Workshop 'C' by using suction equipment or manually or by any equivalent means.
- viii. Removing slurry or sludge & water till hard rock or concrete layer appears at bottom, including cleaning of existing pile structure, concrete ceiling etc. by water jet.
- ix. Removal and taking out of all the materials from underside of deck structure of Workshop 'C' and debris generated during repair , out of MDL premises by truck or equivalent, including loading, unloading manually or

by mechanical means, to approved municipal dumping ground or equivalent at all lifts and leads etc.

- x. Full high end vacuum cleaning and drying.
- xi. Air ventilation arrangement if required.
- xii. All relevant statutory approvals to be taken from Mbpt/BMC or statutory authority for this job, if any.
- xiii. All safety measures to be taken while removing slurry or sludge due to generation of hazardous gases or odor.
- xiv. All equipment, accessories, safety equipment, tools and tackles etc required for said work.
- xv. Spraying of disinfectisides as and when require as directed by Engineer in charge.

1.1.3. Preparation of base: After removal of sludge, levelling the ground area by manual excavation/ filling with, lying of rubble soling, laying PCC to create firm and levelled ground surface necessary for erection of scaffolding, working platforms and to arrest/ control the sea water seepage from bottom side during repair work.

1.1.4. Restorative repair:

- i. Chipping/ breaking & removal of dilapidated Concrete
- ii. Crack Injection with low viscous grout using injection packers.
- iii. Rust removal from existing corroded reinforcement.
- iv. Anti corrosive coating on reinforcement.
- v. Providing & fixing zinc based galvanic disk type anodes.
- vi. Providing & fixing shear connectors and new reinforcement.
- vii. Providing & applying bond coat, application of Polymer Modified Mortar (PMM) with hand application and with spray technology.
- viii. Jacketing work with Micro concrete.
- ix. Curing with self priming curing compound.
- x. Providing & applying concrete penetrating hi-tech corrosion inhabitation coating.
- xi. Structural strengthening using Carbon Laminate System.
- xii. Structural strengthening using Fibre Wrapping System.
- xiii. Application of Anti-carbonation coating on entire surface after repair.
- xiv. After completion of inside marine repair work, duct made in deck slab for access is to be closed by fixing new reinforcement, shuttering, staging and Concreting.
- xv. Any other item which is not mentioned but is available in BOQ will have to be executed by the contractor.

1.1.5. WORK TIMING: All jobs shall be performed within regular working hours of the installation. However in the case of round the clock job nature permit will be issued accordingly at the discretion of the Engineer –In Charge. Contractor shall deploy adequate manpower in all the shifts while carrying out emergency work.

The detailed scope of work has been indicated in the Bill of Quantities (BOQ) Price Bid Part-II at Enclosure-1.

2. निविदा हेतु चित्रकारी की सूची / LIST OF TENDER DRAWINGS

SR. No.	DRG. REF.	DESCRIPTION
1	MDL/EY/WORKSHOP-C/01	Re-routing of Drain lines D2 Bldg.-workshop-C

Enclosure-1

PRICE BID (PART-II)
BILL OF QUANTITIES
(To be submitted online)

Sub: Strengthening of RCC Structures below Deck Slab of Workshop 'C' including removal of accumulated sludge and repair of Dry Dock Wall at East Yard, MDL, Mumbai.

Ref: MDL Tender No. 1800000040

INSTRUCTION TO THE BIDDER:

1. The Goods & Service Tax **IS NOT INCLUDED** in the rates indicated below for this section. Bidder is required to quote Goods & Service Tax **SEPERATELY** in Percentage which will be added to the rate quoted for this section.
2. Bidder to note Clause No. 2 (Defect Liability Period), Clause No 3 (Performance bank Guarantee), Clause No 5 (Safety and Training), Clause No 6 (Terms of Payment), Clause No 7 (Prices and Taxes), Clause No 12 (Housekeeping), Clause No 15 (Insurance), Clause No 11.10 (Availability of sand/ other construction material) of Volume II before quoting.
3. MDL reserves the right to increase the quantity of any item in the BOQ to 100 % in individual quantity of item provided the increase in the total Estimated Amount due to this change in the quantity over BOQ quantity multiplied by specified rate for all the items put together do not exceed 25% of the Accepted Contract Value. Bidder to note Clause No 13.1 of Volume II before quoting.
4. Bidder should also note Clause No 27 (Integrity Pact Bank Guarantee), Enclosure- 6 (Safety Officer) and Enclosure- 6 (Solvency Certificate) of Volume I before quoting.

SR. NO	Service Accounting Code (SAC)	ITEM DESCRIPTION	UNIT	QTY	RATE in ₹	AMOUNT
A		Removal of dilapidated concrete :				
1		CHIPPING OF RCC : Breaking carefully the loose concrete of distressed member without damaging existing strong concrete by means of sharp chissle which should tempred regulary of high frequancy low impact hammeris used, cleaning the surface by water jet pressure pump at 4 to 5 kg / sq cm pressure to remove chlorides and loose particals, air drying the surface etc. The work should be carried out with all the safety measures like helmet, safety belt and adequate labour insurance under the supervision of	Sqm	6500.00	107.78	700570.00

		qualified supervisor. (The surface area before chipping shall be measured & paid for.)				
2		BREAKING OF RCC : Dismantling R.C.C. Work including breaking concrete by chiseling, wedging etc., cutting the reinforcement, stacking the serviceable materials and stacking the debris up to a distance of 50 meters or spreading etc. complete.	Cum	30.00	1905.88	57176.40
B		Repair of cracks, porous concrete:				
3		DRILLING and fixing Teflon perforated nozzles in RCC members, including drilling 14mm dia. 50 to 100mm deep holes in structural members at the intervals of 600mm in staggered manner as directed by the consultants in RCC structural elements. Clean the holes by hand operated air blower / compressor prior to fixing nozzles, fixing of nozzle in cleaned holes. external end of nozzles to be machined to receive outlet of grouting gun. nozzle is fixed by means of epoxy sealant to ensure complete sealing. Cure the system for. min. 12 hours. The work should be carried out with all the safety measures like helmet, safety belt and adequate labour insurance under the supervision of qualified supervisor etc. complete.	Nos	2675.00	57.34	153384.50
4		Injecting low viscosity grade epoxy by pressure by epoxy or grouting pump and compressor. Mixing : - Material components DR BECK 505C + EH 411	Kg	1200.00	1164.52	1397424.00

		<p>HARDNER + SOLVENT 100:50:50 weight batching or equivalent make. Grouting : Fill the grouting gun with resinmix, maintain desired pressure at exit (7 to 10kg / Cm2) by monitoring pressure gauge at exit. Grout the material through prefixed nozzles in the structural elements till its refusal, seal the nozzle with epoxy sealent (EPCO 1010) after the refusal. Monitor lakages through other nozzles while grouting and seal them as per the requirement. Repeat the process all the nozzles. Compelte the poeration at pot life of material, grouting is continued to all the nozzles from bottom to top and not from top to bottom. Clean the gun and the accessories (Valves, pipes and other fixtures) with T-60 thinner / or equivalent of dr. fixit, krishna chemical, sunanda etc. after the operation to avavoid jamming of gun. The work should be carried out with all the safety measures under the supervision of qualified supervisor etc. complete.</p>				
C		Reinforcement Treatment, Surface preparation :				
5		<p>Providing and applying Anticorrosive treatment to exposed Reinforcement portion with one coat of alkaline Rust Converter "feovert/ Rusticide or equivalent on exposed reinforcement after cleaning the surface by wire brushing, chipping</p>			0.00	0.00

		to remove loose rust, followed by two coats of Rust preventive coating of IPNETRB (CBRI)/ POLYALK FLXOPRIME or equivalent make and penetrationg corrosion inhibitor EPCO KP-100/POLYALK CP113 or equivalent over adjoining concrete surface.				
i		Slab	Sqm	1000.00	268.27	268270.00
ii		Beam/column/piles/wall	Sqm	2250.00	334.83	753367.50
6		Providing and applying two coats of concrete penetrating hi-tech corrosion inhibition mechanism inhibits corossion of steel in concrte at the poles, cathode & anodic simultaneously on concrete surface and steel surface. This is applied by paint brush throughly on concrete surface which is prepared earlier. The work should be carried out with all the safety measures like helmet, safety belt and adequate labour insuarncce under the supervision of qualified supervisor. etc. complete.	Sqm	6500.00	496.81	3229265.00
7		Providing and Fixing zinc based galvanic disk type anodes (SUNANODE - SUNANDA MAKE) or Canode of Krishna make or equivalent to the reinforcement on column / beam as directed. The anode shall be connected to the reinforcement steel by connectors provided with the anode application area is at the junction of repair. One anode per meter including tying to bar etc. compelte work shall	NOS	1300.00	954.41	1240733.00

		be executed by certified applicator only and work shall be executed by certified applicator only.				
8		Replenishment / Making up lost area of reinforcement due to corrossion providing additional steel reinforcement. The steel shall be confirm to IS 1786 grade Fe 500 . Anchor the steel rebar in sound concrete body upto desire depth by structural grade Adhessive Anchor Fasteners of HILTI HY 150 or equivalent make, shear connectors of requied length including drilling holes, cleaning holes, injecting expoxy in holes, placing shear connectors in position and allowing to remain undisturbed till epoxy is set etc.as approved by Engineer In-charge. Fixing of rebar is to be welded or binded by binding wires to existing steel at regular grid as in compatibility to original design. Any additional space bar welded to keep main reinforcement in perfect vertical position to keep the bar equidistance from the cetre of gravity and the centre of the mass . Minimum diameter of stirrups should be 8 mm dia. fo column and 10 mm dia. for beams and maximum spacing should by 0.15 m c/c as directed by Engineer Incharge, aligning be carried out with all safety measures etc. complete	Kg	52000.00	174.07	9051640.00
D		Concrete volume replacement/ patch repair of RCC:			0.00	0.00

9	Providing & applying approved epoxy resin bond coat EPIBOND of M/s. Krishna Conchem or equivalent approved make before Polymer mortar/ concrete to have the perfect bond between old exposed concrete and new concrete/ polymer plaster surface using nylon brushes scaffolding labour etc. all complete as directed.	Sqm	6500.00	367.59	2389335.00
10	Providing and applying average 15mm thick POLYMER MODIFIED MORTAR (PMM) in proportion of 1 (Polymer) : 5 (Cement): 15 (Quartz sand) by weight with water cement ratio of 0.35 after application of bonding coat of approved make including cleaning of surface with air mixed with water under pressure, and in two layers and including curing after initial setting time etc. as per manufacturers specification etc. complete as directed. (Polymer manufactured by Krishna Conchem, Sunanda, Pidilite, BASF, BECK BOND, Fosroc or equivalent as approved by Engineer In-charge.)	Sqm	325.00	885.71	287855.75
11	Providing and applying average 30mm thick POLYMER MODIFIED MORTAR (PMM) in proportion of 1 (Polymer) : 5 (Cement): 15 (Quartz sand) by weight with water cement ratio of 0.35 after application of bonding coat of approved make including cleaning of surface with air mixed with water under pressure, and in two layers and including curing after initial setting	Sqm	650.00	1314.22	854243.00

		time etc. as per manufacturers specification etc. complete as directed. (Polymer manufactured by Krishna Conchem, Sunanda, Pidilite, BASF, BECK BOND, Fosroc or equivalent as approved by Engineer In-charge.)				
12		Providing & applying one component pre-packed cement based spray mortar MasterEmaco S 810, Dr. Fixit Polymer Mortor HB or equivalent, using spraying equipment, including providing and applying bonding / priming coat as specified by the manufacturer etc. Cost includes material, manpower, shuttering etc. complete as specified and as directed.	Kg	410000.00	54.93	22521300.00
13		Providing and laying MICRO CONCRETE : Replacing distressed / loose / cracked / porous carbonated, loose part of concrete with free flow, high strength, non shrink fibrous micro concrete of approved make including fixing slurry tight form work / shuttering across the profile of damaged structural element, pour the free flow ready mix micro concrete after mixing with water as per manufacturers specification in the form work. Micro concrete should be mixed in steel tray homogeneously makeup concrete is based on type of structural element and its location. The work should be carried out with all the safety measures like helmet, safety belt and adequate	KG	87750.00	90.11	7907152.50

		labour insurance under the supervision of qualified supervisor etc. complete. (Micro concrete manufactured by Krishna Conchem, Sunanda, Pidilite, BASF, BECK BOND, Fosroc or equivalent as approved by Engineer In-charge.)				
14		Providing and repairing the damaged concrete portion with thixotropic repair mortar is one component thixotropic dual shrinkage compensated fibre reinforcement formulation for structural members build up section by hand packing as per manufacturers specification applied by mean of hand glouse by expert applicator, /the rehabilitated surface should be free from air gaps, voids and should be in line with existing concrete surface inclusive of curing, Manpower, Material and Equipment complete etc as per direction of Engineer in Charge / Consultant.	Kg	30000.00	81.40	2442000.00
15		Providing & applying curing compound MasterKure 185 of BASF or equivalent make having acrylic resin base, multi-role curing, sealing and protective membrane, having self priming property so that the plaster can be done directly over the membrane. The curing compound shall comply to ASTM C309 Type II Class B & ASTM C 1315. The curing compound shall be applied by spray/ roller/ brush on the repaired as per	Litre	1300.00	540.35	702455.00

		manufacturers recommendation etc. complete as specified and as directed by Engineer In-charge.				
E		Strengthening of Concrete after repair:				
16		Providing & applying 940 GSM uni-directional glass fibre sheet , the surface to be applied with is prepared in round or with minimum two dimention, the same is applied with two component epoxy primer by paint brush to fill all the gaps, sents etc and left for curing, the saturant two cvomponent epoxy is applied on the surface liberally and fibre glass sheet is applied /fixed on the structural element, the mat is saturated properly and made with additional mechanical bonding, cleaning surface & the vicinity etc and sprinkling of quartz sand after the final saturant application for giving protection screed on the top as per procedure mentioned. The work should be carried out with all safty measures like helmet , safety belt & adeaquate labour insurance under the supervision of qualified supervisor etc complete. (as directed by Engineer In charge)	Sqm	2800.00	4347.64	12173392.00
17		FIBER SHEAR ANCHOR : Providing & applying 10mm effective dia. Glass Fiber Anchor including drilling holes of 12mm dia. 100mm deep hole across the width and length span to fiber glass treatement, of readymade glass fiber	NOS	6900.00	336.88	2324472.00

		anchor with spread of 100mm. The work should be carried out with all the safety measures like helmet, safety belt and adequate labour insurance under the supervision of qualified supervisor etc. complete.				
18		CARBON LAMINATE : Providing and Fixing Glass laminate (50mm x 2.5mm) on the structural members to take additional bending moment and shear to RCC slab, beams etc. by expert team of fixers with required bonding of high grade epoxy. The work should be carried out with all the safety measures like helmet, safety belt and adequate labour insurance under the supervision of qualified supervisor etc. complete.	RMT	2100.00	2926.41	6145461.00
19		ANTI CARBONATION COATING : Providing high performance Anti carbonation protective coating for repair with mortar and micro concrete for repaired / new surface, by cleaning the surface to remove dirt, loose particles etc. by wire brush or any other suitable method and applying a primer coat of SUNDEKOTE SP by mixing 400-500 ml of potable water in clean container. Apply by brush, roller or spray. After 24 Hrs. apply two more coats of SUNDEKOTE SP without addition of water at an interval of 24 hrs. between each coat (dfor ease of application if required add water not more than 100 ml). After	M2	6500.00	309.38	2010970.00

		final coat / layer is completed allow it to set for 24 hrs. Work shall be executed by certified applicator only.				
F		Removal of sludge, arrangement of light and ventilation				
20		Making necessary arrangement for taking out slush/sludge from bottom of deck area to dump barge /boat tank with the help of suitable type of pump of required capacity, necessary pipeling etc. The work should be carried out with all the safety measures like helmet, safety belt and adequate labour insurance under the supervision of qualified supervisor etc. complete.	Cum	2800.00	2200.00	6160000.00
21		Making necessary arrangement of harbour tug to pull dump barge / boat tank on rental basis of requisite capacity for transporting and unloading sludge from location to dumping/ unloading point given by MBPT inside deep sea at distance approx. 20-25 km and including taking necessary permission from MBPT for disposal of sludge. The work should be carried out with all the safety measures like life jacket helmet, safety belt and adequate labour insurance under the supervision of qualified supervisor etc. complete.	Month	3.00	800000.00	2400000.00
22		Making necessary arrangements of Exhaust Fans/ ventilation system to make the area gas free and safe to work and making lighting arrangement, electrical arrangement etc. The	L.S	1.00	2000000.00	2000000.00

		work should be carried out with all the safety measures like helmet, safety belt and adequate labour insurance under the supervision of qualified supervisor and including taking work permit on daily basis etc. complete.				
23		Making proper arrangement of oxygen cylinder, oxygen masks to maintain the safety keywords of worker during execution of work etc. & disposing off the same. The work should be carried out with all the safety measures like helmet, safety belt and adequate labour insurance under the supervision of qualified supervisor etc. complete.	L.S	1.00	800000.00	800000.00
G		Preparation of Base, working platform, scaffolding:				
24		Excavation in hard rock by chieselling, wedging, including trimming, spreading/ filling the excavated material in the low level areas and levelling the bed, removing the excavated material upto a distance of 50 metres beyond the building area and lift upto 1.50 metres, stacking as directed including dewatering manually, backfilling with available earth, murum, ramming and watering etc. complete.	Cum	300.00	1282.99	384897.00
25		Excavation in earth, soil of all types, sand, gravels and murum inclding, removing the excavated material upto a distance of 50 metres beyond the building area and lift upto 1.50 metres, stacking and spreading as directed including	Cum	300.00	244.72	73416.00

		dewatering unless provided elsewhere, preparing the bed for foundation and necessary backfilling, ramming and watering etc. complete.				
26		Dismantling plain cement concrete work including breaking concrete by chiseling, wedging etc. and filling, levelling the dismantled concrete in the low level areas and levelling the the bed, stacking the serviceable materials etc. complete.	M3	300.00	1078.21	323463.00
27		Providing & laying dry trap/ rubble stone soling upto 200mm thick including transporting, hand packing and compacting etc. complete as per the direction of the Engineer In-Charge.	Sqm	400.00	936.90	374760.00
28		Providing & laying in position ready Mix cement concrete of M-30 grade in foundation like raft, strip, grillage foundation, footing of R.C.C columns, for levelling the area under deck slab etc. as directed by Engineer In-charge including placing/ pumping of concrete upto required location and including bailing out water, centering, shuttering, propping etc. & removal of formwork nessesary compacting ,finishing and curing etc. complete (Excluding reinforcement and structural steel)	Cum	600	7898.65	4739190.00
29		Providing and erecting at site self supported steel H-Frame Scaffolding for all structural repairs of beam, slab, piles/ columns etc. with cross bracings of good quality (without dents &	Sqm	2000.00	244.72	489440.00

		corrosion) to reach place of work including making approaches, extension, working platform, access ladder from new opening, internal ladders, lifting tackles necessary wall anchors for men and material movement till completion of all structural items of work and curing period and removal of the same after completion of work etc. complete. The work should be carried out with all the safety measures like helmet, safety belt and adequate labour insurance under the supervision of qualified supervisor. This item should be used only for structural repair work for entire period (Payment should be only once irrespective of duration of scaffolding) etc. complete.				
H		Miscellaneous Work:				
30		Removing existing surface dirt, girt, sulphate accretion, shell formation on the existing RCC structures piles, pile caps, beams etc. using wire brush, by chiseling hammering, grinding if required and cleaning the surface by using air water jet etc. complete as directed by Engineer In-charge.	Sqm	1650.00	176.99	292033.50
31		Providing and fixing chicken mesh (Ref IS 3150) of 19 size of aperture at the junction of RCC members and brickwork of approved quality including fixing mesh in position by necessary railing in concrete or BB masonry and or tying by binding wire, complete as directed.	Sqm	300.00	408.55	122565.00

32		Providing & laying salt glazed stoneware pipe including fittings such as blends, tees, single junctions, double junctions, laying joint in (excluding excavation and refilling the trenches) etc complete as directed				
		225 mm outer dia	Rmt	250.00	692.18	173045.00
33		Providing and constructing Brick Masonry Intercepting Trap Chamber (sewer Trap) of 90 cm X 45 cm including necessary excavation, cement concrete 1:4:8 foundation, cement concrete 1:2:4 channels/half round glazed stoneware pipe chaneels, salt glazed stoneware intercepting trap with rodding pipe set in cement concrete 1:4:8, brick mesonary, plastering inside and outside as required, cast iron heavy type lid (1.5 CWT weight) with frame fixed in cement concrete 1:2:4 etc complete as directed.	NOS	10.00	11086.17	110861.70
		TOTAL				95,054,137.85
		Goods & Service Tax (in Percentage)				
		GRAND TOTAL				