



KAMARAJAR PORT LIMITED

(A COMPANY OF CHENNAI PORT AUTHORITY)

E-Procurement Mode

TENDER FOR CAPITAL DREDGING FOR CONTAINER TERMINAL PHASE-I STAGE-II (AECTPL) AND ITS ASSOCIATED DREDGING AT KAMARAJAR PORT

TENDER NO: KPL/ PPD/ CD (AECTPL) /2026

VOLUME - I

Technical Bid

Due Date of submission :15 00 hrs on 16.03.2026

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Consultant:

National Technology Centre for Ports Waterways and Coasts

Indian Institute of Technology Madras

Chennai - 600036



PART-I

Technical & Commercial Bid



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**Capital Dredging for Container Terminal Phase-I Stage-II (AECTPL)
Tender No:KPL/ PPD/ CD (AECTPL)/2026**



Section – I

Notice Inviting Tenders



SECTION I
NOTICE INVITING TENDER

Non- Global tenders through e-procurement mode are invited by Kamarajar Port Limited (KPL) (EMPLOYER) for executing the work of “Capital Dredging for Container Terminal phase-I, stage-II (AECTPL) and its associated dredging at Kamarajar Port” under **Single Stage Two Cover System** (Part-1:Technical & Commercial Bid and Part-II: Financial Bid) from the experienced Dredging Contractors with proven Technical and Financial capabilities. The Dredging quantity is about **7,10,497 cubic metres including Dry Excavation**. The details of the bid reference are tabulated below

Tender No:	KPL/ PPD/ CD (AECTPL)/2025
Name of the work	Capital Dredging for Container Terminal phase-I, stage-II (AECTPL) and its associated dredging at Kamarajar Port
Estimated value of work put to tender (in INR)	Rs.73,81,63,458/- (Excluding GST)
Period of contract including mobilisation and demobilisation	4 months
Bid Security / EMD	The Bidder should upload the Bid Security as per the Annexure-5 of Section -7 .
Period of Online issue of tender documents	23.02.2026 to 16.03.2026
Pre-bid Meeting, time and Place	27.02.2026 @1100Hrs at Kamarajar Port Limited, No:17, Jawahar Building, Rajaji salai, Chennai-600001
Last date & time for online submission of Bid	16.03.2026 @ 1500 Hrs
Date, time and Place of opening of Technical Bid	17.03.2026 @ 1530 Hrs at Kamarajar Port Limited, No:17, Jawahar Building, Rajaji salai, Chennai-600001
Date, Time, and Place of opening of Price Bid	Shall be intimated separately to the bidders who are technically qualified.

2.0 General

- 2.1.** The complete tender document including drawings can be downloaded from KPL website: www.kamarajarport.gov.in and e-procurement portal link www.eprocure.gov.in duly filled in and submitted online as tender offer on or before the due date and time of submission specified.
- 2.2.** A Pre-bid meeting will be conducted at the Kamarajar Port Limited, Rajaji Salai, Chennai-600 001 on the date and time indicated in the bid reference table.



- 2.3. The Prospective Bidders, who need clarifications on specific issues, if any, shall address to the General Manager (**Corporate Strategy and Business Development**), **Kamarajar Port Limited, Chennai-600001** highlighting their clarifications, before the date and time indicated in bid reference table. No queries / clarifications will be entertained after the date and time indicated in bid reference table. The bidder's queries will be addressed during the pre-bid meeting and final written notification in this regard will be issued through www.ennoreport.gov.in and e-procurement portal link.
- 2.4. The due date and time of online submission of offers will be as indicated in the bid reference table, unless otherwise notified. In the event of changes in the schedules, the General Manager (Corporate Strategy and Business Development), Kamarajar Port Limited shall notify the same only through www.ennoreport.gov.in and e-procurement portal link.
- 2.5. The tender (offer) should be submitted by the Tenderer, only through e-procurement mode as explained in the Tender Document in the section "INSTRUCTIONS FOR ONLINE BID SUBMISSION".
- 2.6. Tender must be supported by a Bid security as per Annexure-5 and Bid security (EMD) is required to be deposited for this Tender.
- 2.7. The offer (both Techno-Commercial & Price bids) must be valid for a minimum of 180 days from the due date of online submission of offer; Otherwise, the offer shall be rejected as non-responsive.
- 2.8. Generally, preference shall be given to the lowest priced commercial offer subject to clause: 24 of Section III Instruction to bidders. However, the Employer do not bind themselves to accept the lowest or any tender and reserve the right to accept any tender in full or part or to reject any tender without assigning any reason there for.
- 2.9. If Offers not received according to the instructions detailed here above and elsewhere in this document, are liable for rejection.

A. Karuppiah
General Manager (CS&BD)i/c
Kamarajar Port Limited



SECTION – II

INTRODUCTION

SECTION – II INTRODUCTION

1.0. GENERAL INFORMATION

i.1.1. History

The Govt. of India declared Kamarajar Port (Erstwhile Ennore Port) as the 12th Major Port in March 1999 and later, the Port was incorporated as a corporate entity, Kamarajar Port Limited (KPL), under the Indian Companies Act, 1956 on 11th October 1999. **Kamarajar Port Limited (KPL)** is located at Latitude 13° 15' 30" N and Longitude 80° 21' 00" E on the Coromandel coast, as depicted in **Fig: 1.1**



Figure: 1.1 Location of Kamarajar Port

KPL which was looked upon initially as a mono commodity coal port dedicated to handling Thermal Coal requirements of Tamilnadu Generation and Distribution Corporation Limited (TANGEDCO) formerly Tamilnadu Electricity Board (TNEB) from June 2001 and has over the period developed as a Multi Cargo Port. KPL, which is the only corporatized Major Port under Ministry of Shipping, has become a wholly owned subsidiary of Chennai Port Authority, subsequent to Chennai Port Authority acquiring the Government of India share in the Kamarajar Port Limited in March 2020.



1.1.2 Port at a glance

Kamarajar Port is an all-weather port with breakwaters on both northern and southern sides. KPL operates as a Landlord Port limiting its functions to overall planning for development; conservancy of the port, regulatory aspects, environmental monitoring; dredging berth areas, port basin & approach channel; installation of navigational aids/fire-fighting facilities, road and rail connectivity while, Development and operation of cargo handling terminals are being carried out through captive and private sector participation on PPP-BOT model.

1.1.3 Existing Harbour Facilities

Break waters (Rubble mound type)

- North Break water 3080m
- South Break water 1070m

Navigation Channel

- Length 5200 m
- Width 270m to 300m
- Depth (-)19.0m CD /(-) 20 m CD

Turning Basin

- Diameter TC-1-700 m & TC-2- 600m
- Depth (-)18.5 m CD

For safe navigation in and out of the Port, KPL has established a signal tower and navigations aids inter-alia two transit light towers, six channel buoys and one fairway buoy.

1.1.4 Berthing Facilities

Presently the Cargo handling capacity of KPL is 58.44 Million Tonnes with 9 operational berths. Out of the 9 operational berths, three berths are for handling bulk Coal, two berths are for handling Liquid Cargo (POL, LPG & LNG), one berth each to handle Container and Multi Cargo and one berth for Automobile export/import, Project cargo and associated capital goods. The Details of the operational Berth particulars are given in Table – 1.1.

TABLE – 1.1 DETAILS OF THE BERTHS AT KAMARAJAR PORT

Sl. No	Berths	Capacity (MTPA)	Length of Ship (Meters)	Depth (Meters)	Type of Cargo
1	Coal Berth 1	8	240	16	Thermal Coal (for TNEB)
2	Coal Berth 2	8	240	16	Thermal Coal (for TNEB)



Sl. No	Berths	Capacity (MTPA)	Length of Ship (Meters)	Depth (Meters)	Type of Cargo
3	General Cargo Berth 1	3	250	12	Automobiles
4	Marine Liquid Terminal 1	3	300	15	POL / Chemicals
5	Common User Coal Terminal	11	280	18	Coal (other than TNEB)
6	Container Terminal	15.44	340	17	Containers
7	Multi Cargo Terminal	2	230	16	Break bulk
8	LNG Terminal	5	300	15	LNG
9	General Cargo Berth 2	3	270	16	Automobiles/ Project cargo

i.2. PROJECTS UNDER IMPLEMENTATION

The Port continues to invest in infrastructure to increase its ability to provide services to its customers with pro-active and futuristic market sensitivity. Accordingly, KPL has initiated action for development of additional five berths/terminals: - two berths to handle Coal, two berths to handle Liquid Cargo and one berth to handle Container cargoes.

The capacity of the two berths to handle Bulk cargo i.e. Coal is 18 Million Tonnes per annum are:

(a) Coal Berths 3 & 4

Considering the expansion of the existing Thermal Power Plants of new TANGEDCO viz., TANGEDCO - NTPC JV project, TANGEDCO had requested KPL to establish additional Coal Berths. KPL constructed two additional Coal berths (CB3 & CB4) at its own investment of Rs.500 Crore. The proposed Coal Berths will accommodate capsized vessel of 18 m draft and have capacity of 9 MTPA each. KPL has handed over Coal Berth - 4 and Coal Berth - 3 to TANGEDCO during August 2018 and June 2019 respectively, for installation of top loading facilities like Unloaders, Conveyor system etc. Mechanisation of the berths by TANGENDCO is under progress.

(b) Liquid Terminal

Development of IOCL captive terminal with a capacity of 3MTPA to handle POL and LPG etc. the berth construction completed. Laying of pipeline is in progress.



1.3 CONNECTIVITY

The Port is well connected to the National Highways NH 4, NH 5 and NH 45. Kamarajar Port and also connected to the trunk routes of Indian Railways at Attipattu and Attipattu Pudunagar Stations located in the Chennai-Guntur section of the Southern Railway on the Chennai-Delhi/Kolkata routes.

1.3.1 Road Connectivity

The following are the three important National Highways emerging from Chennai/ Ennore:

- NH 16 (formerly NH-5) connecting Chennai and Kolkata and passing through major cities such as Vijayawada, Visakhapatnam and Cuttack.
- NH 48 (formerly NH-4) linking Chennai and Mumbai passing through Bangalore and Pune
- NH 45 linking Chennai and Madurai and connecting the southern parts of Tamil Nadu.

All-important destinations in India whether to the North, West or East can be accessed through any one of these three National Highways.

1.3.2 Rail Connectivity

Presently, Kamarajar Port is connected by rail to the National Railway system at Attipattu and Attipattu Pudunagar stations located on the Chennai - Gudur section of the Southern Railway on the Chennai -Delhi/Kolkata route. The southern connectivity takes off from Attipattu Pudunagar Railway Station. The northern connectivity takes off from Attipattu Railway Station. These two lines merge at the apex point of the Port Railways and run as a single line to the NCTPS Yard. One line branches off to Ennore port premises from the NCTPS line. KPL also developed the railway facilities connecting the stackyards of the coal and Iron ore Terminals near holding yard No.1 & 2 and further railway facilities developed inside the port for container and multi-cargo evacuation to the existing NCTPS Railway line.

1.4 CAPITAL DREDGING WORKS UNDERTAKEN SO FAR

Kamarajar Port Limited (KPL), erstwhile Ennore Port Limited was developed from a green field situation during late 90s. In fulfillment of the obligations with the BOT operators/Captive Users, KPL initiated action for dredging in the berth area of the Terminals, basin, and channel in stage wise. A summary of the Capital dredging works undertaken so far by Port is given in a tabular form and chart below:



Sl No.	Development Phase	Dredging Quantity (mill.cum)
1	First Stage (1999-2000)	14.74
2	Second Stage- Phase-I (2008-09)	4.12
3	Dredging for Beach Nourishment (2008-11)	2.86
4	Phase II Dredging (2010-14)	10.20
5	Coal Berth areas (2015)	1.05
5	Phase III Dredging (2016-17)	10.65
6	LNG Jetty Dredging (2019)	1.074
7	Capital Dredging Phase V (2023)	2.14

CAPITAL DREDGING PHASE VI (Ongoing Dredging Work)

KPL is executing the capital and maintenance dredging to the volume of 14.1cu.m to deepen the navigational channel, turning circles and some of the berths to accommodate the cape size vessels at KPL. This dredging project scheduled to be completed by 03.06.2026. The Capital dredging scope of the work area as follows

- ❖ Dredging of harbor basin from existing levels to (-)20.5m CD
- ❖ Berth Packets
- ❖ Deepening of the inner approach channel from existing levels to (-)22m CD
- ❖ Deepening the outer approach channel from existing levels to (-)23m CD
- ❖ Lengthening the approach channel from (-)20m CD contour as of now to (-)23m CD contour

TABLE – 1.2A summary of the Capital dredging works undertaken so far by Port

Sl. No	Berths	First Stage (1999-2000)	Second Stage Phase-I (2008-2009)	Dredging for Beach Nourishment (2008-11)	Phase II Dredging (2010-14)	Coal Berth areas (2015)	Phase III Dredging (2016-17)	LNG Jetty Dredging (2019)
1	Coal Berth 1							
2	Coal Berth 2							
3	General Cargo Berth 1							
4	Marine Liquid Terminal 1							



5	Common User Coal Terminal							
6	Container Terminal							
7	Coal Berth 3							
8	Coal Berth 4							
9	Multi Cargo Terminal							
10	LNG Terminal							
11	Channel & Basin deepening							

1.5 SITE INFORMATION

1.5.1 METEOROLOGY

The climate in the region is influenced by the two monsoons, viz., the south-west monsoon and the north-east winter monsoon. The summer monsoon starts in the beginning of June and is effective until September. The North-east monsoon is effective from the latter half of October till December. The summer monsoon has a stronger influence on wave climate than the winter monsoon and the interval between both monsoons is characterized by period of calm weather.

1.5.2 TIDES

The tides at Kamarajar Port are very similar to the tides at Chennai, where the tides are semi-diurnal with a tide range, relative to the Chart Datum (CD) as follows:

TABLE 1.3 TIDE RANGE

Highest High Water Level (HHWL)	+ 1.50 m
Mean High Water Springs (MHWS)	+ 1.10 m
Mean High Water Neaps (MHWN)	+ 0.80 m
Mean Sea Level (MSL)	+ 0.65 m
Mean Low Water Neaps (MLWN)	+ 0.40 m



Mean Low Water Springs (MLWS)	+ 0.10 m
Lowest Low Water Level (LLWL)	- 0.10 m

1.5.3 CURRENTS

During the North-east monsoon, the current direction is southwards while during the south-west monsoon, the current runs northwards. The velocity of currents in the coastal zone is approximately 0.15 to 0.20 m/s. NIOT has measured currents at four locations off Ennore Port during March 2002. At two locations with water depths of 15 m and 10 m, measurements were taken at intervals of 1 m depth and the maximum current velocity was 0.35 m/s at the surface and 0.25 m/s near the seabed.

Current data were also collected by NIOT from the NDBP buoy. It has been noted that the maximum current velocity recorded during March to July 1999 was around 0.40 m/s and for a few days it reached 0.60 m/s. The predominant current direction was towards NNE.

1.5.4 WAVES

As the near-shore area of Ennore is sheltered from the westerly winds by the mainland, the strong southerly to westerly winds during the SW monsoon do not cause high waves due to the limited fetch available. Consequently, the wave conditions at Ennore are moderate.

Waves at Ennore, approach predominantly from two directions 135° N during March – September and 90° N during November – January. During the transition period (February and October), waves approach from 115° N. NIOT deployed a wave rider buoy off Chennai Port at a water depth of 16 m. The buoy could measure waves and currents only for a part of 1998, during which no cyclones crossed the coast. After interpolating for the missing data and making corrections based on visual observations, the wave climate for 1998 was generated. The monthly mean values of wave parameters estimated from the above data are given in the table. During cyclones, significant wave heights can reach 8m.

TABLE 1.4 MONTHLY MEAN WAVE PARAMETERS

Month	Significant wave height(m)	Significant wave period(s)	Wave direction from true north
January	0.90	8.10	90°
February	1.10	8.20	115°
March	0.90	8.30	135°
April	1.30	9.50	135°
May	1.60	10.80	135°
June	1.50	11.10	135°
July	1.00	10.40	135°
August	1.10	11.0	135°
September	1.20	11.0	135°



October	1.10	9.80	115°
November	1.00	8.60	90°
December	1.40	8.40	90°
Note:	90°-waves approach from East		
	115°-waves approach from ESE		
	135° -waves approach from SE		

1.5.5 WIND

The most prevalent wind direction at KPL is along the northeast and southwest directions. This corresponds to the monsoon seasons and is in accordance with more general data for the western part of the Bay of Bengal. South to southeast wind directions also occur frequently, mainly during the intervening period between the two monsoons.

1.5.6 RAINFALL

More than 60% of the annual rainfall is received during the NE monsoon (October to December). The average monthly rainfall in the period 1972 – 1983 varied from 1mm in March / April to 416 mm in November. The total annual rainfall shows considerable variation over the years, from 1522 mm in 1975 to 550 mm in 1982.

1.5.7 AIR TEMPERATURE

The average monthly air temperature varies between 37°C in May and June to about 29°C during December and January. The average minimum temperatures vary between 28°C in May and June and 21°C in January and February. The highest recorded temperature is 43° C and the lowest recorded temperature is 15° C

1.5.8 RELATIVE HUMIDITY

Ennore area, where the Kamarajar Port is situated, generally experiences high humidity. The average maximum values of the relative humidity remain high throughout the year (above 90%). The average minimum monthly values are between 25% in May and 48% in November.

1.5.9 VISIBILITY

The visibility at Ennore area is more than 20 km for most part of the year, occasionally extending to 50 km. On an average, visibility is between 4 and 10 km for 40 days in a year, and less than 4 km for only 4 days in a year.

1.6 Shipping Traffic Details

The port mainly handles coal, POL vessels, LNG vessels, container vessel, Multi cargo vessel and car carriers. The average number of vessels currently calling at the Port is around 59 per month and in the peak period it is around 70. The details of the vessels handled by the Kamarajar Port for the past two years are shown in the table for reference.



TABLE 1.4 Vessels handled by the Kamarajar Port

Sl.NO	YEAR (April- March)	CB 1	CB 2	ERS	ECTPL	EBTPL	AECTPL	GCB 1	GCB 2	LNKT	MLT	TOTAL
1	2023-24	129	72	-	153	35	219	109	1	16	233	967
2	2024-25	110	89	3	149	43	208	45	77	20	242	986

1.7 PROPOSED CAPITAL DREDGING FOR CONTAINER TERMINAL PHASE-I, STAGE-II (AECTPL) AND ITS ASSOCIATED DREDGING

The present proposal of capital dredging and its associated dredging are given below

1. Proposed Container Terminal phase-I, stage-II (AECTPL) berth pocket – 380m x 50m upto (-)16m CD depth
2. GCB II Approaches – 235m x 255m upto (-)16.50m CD depth
3. GCB II berth pocket – 235m x 50m upto (-) 16m CD depth
4. Existing AECTPL berth pocket – 400m x 50m upto (-)16m CD depth
5. EBTPL berth pocket – 270m x 50m upto (-)16m CD depth.

The total estimated dredging quantity is about 7,10,497 cubic meter.

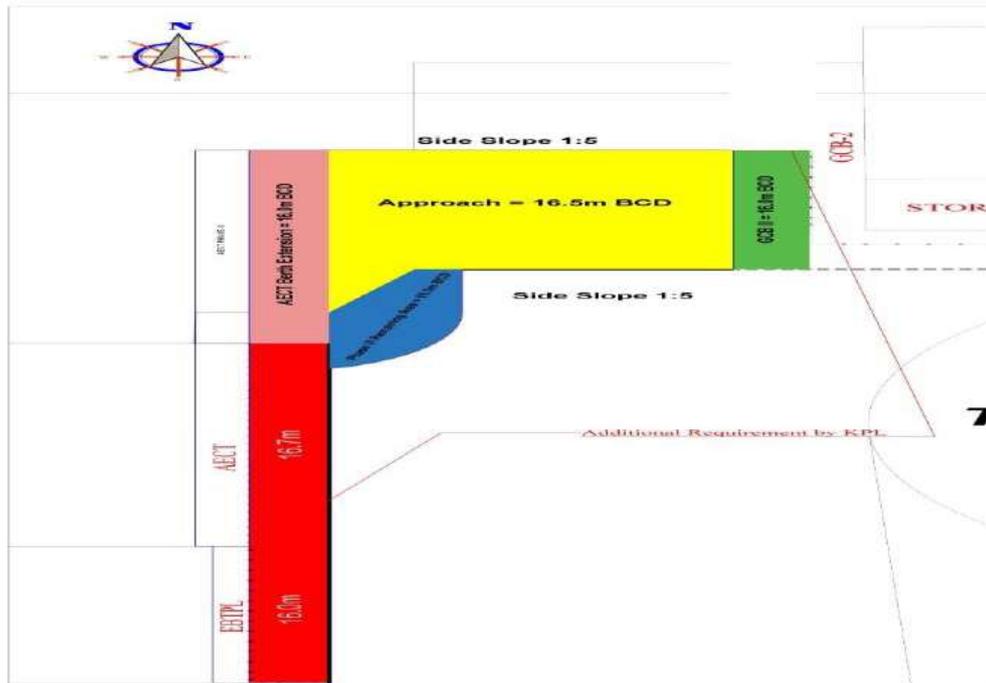


Figure.1.2 LOCATION OF EXISTING BERTHS AND PROPOSED CONTAINER TERMINAL PHASE-1 STAGE-II

1.8 PURPOSE OF THIS BID DOCUMENT

The purpose of this Bid Document is mainly to:

- Provide brief overview of the details of the Project, set out the terms and conditions of the Contract and the Scope of Work;
- Specify the terms and procedures governing the process for submission of Technical cum Commercial Bid and Financial Bid and selection of the sound & capable Bidders; and
- Outline the eligibility and evaluation criteria.

1.9 STRUCTURE OF BID DOCUMENT

- Part-1: Technical & Commercial Bid
- Part-2: Financial Bid

1.10 CONFIDENTIALITY

1.10.1 Any and all information or data provided in this Bid Document and shared with the Bidder pursuant hereto is and must be treated by the Bidder and their respective JV/Consortium Members and their employees, consultants, agents and other representatives as confidential information. Moreover, any such information may not be reproduced or distributed by the recipient to third parties (other than in confidence to the recipient's professional advisors).



**Capital Dredging for Container Terminal Phase-I Stage-II (AECTPL)
Tender No:KPL/ PPD/ CD (AECTPL)/2026**

1.10.2 This bid document is the property of Kamarajar Port Limited and shall not be reproduced or used for any other purpose without prior permission from the Authority.



Section – III

Instruction to Bidders



1.0 BRIEF DESCRIPTION OF WORK

As a mandate to create the designated depths at each terminal for safe manoeuvring of the vessels at the berths and their operations, the Port Authority has drawn up proposals for creating the required water depth. Considering all these requirements, the Capital Dredging for Container Terminal phase-I, stage-II (AECTPL) and its associated dredging at Kamarajar Port is finalized and dredging quantity is approximately 7,10,497 cubic metres. Scope of work covered in this tender

Kamarajar Port Limited invites bids under two cover system as scope of this tender. The scope of work broadly covers:

KPL envisages to carry out Capital dredging for the Container Terminal phase-I, stage-II (AECTPL) berth pocket from the existing level upto (-)16m CD. In addition, siltation in the existing GCB II it is proposed to carry out the dredging in the GCB II approach and basin area also. Further, the berth pockets of existing AECTPL berth, EBTPPL berth and GCB II berth are also to be dredged to remove the silted materials.

1. Proposed Container Terminal phase-I, stage-II (AECTPL) berth pocket – 380m x 50m upto (-)16m CD depth
2. GCB II Approaches and its dock basin – 235m x 255m upto (-)16.50m CD depth
3. GCB II berth pocket – 235m x 50m upto (-)16m CD depth
4. Existing AECTPL berth pocket – 400m x 50m upto (-)16m CD depth
5. EBTPPL berth pocket – 270m x 50m upto (-)16m CD depth.

1.2 Disposal Locations

The dredged materials from the capital dredging in the berth pocket of proposed Container Terminal phase-I, stage-II (AECTPL) berth and its approaches, dock basin shall be dumped inside the Port area, in line with the EC conditions. However, dredged materials from the dredging areas other than berth pocket of Container Terminal phase-I, stage-II (AECTPL) berth and its approaches, dock basin shall be disposed off into the existing dumping ground.

NOTE:

The total estimated dredging quantity is approximately 7,10,497 cubic metres including dry excavation.



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Out of this, the excavated material comprising dredging in the proposed berth pocket, approach channel and dock basin approximately 3,41,000 cubic metres shall be transported and disposed of within a lead of 5 km radius inside the port area as directed by the Engineer-in-Charge.

The remaining dredged quantity of about 3,70,000 cubic metres shall be disposed of at the designated offshore dumping ground as indicated in the disposal site drawing.

The quantities mentioned above are approximate and may vary depending on actual site conditions, in accordance with the provisions of Clause 12 of Section IV.

1.3 Equipment Capability for Dredging and shore protection works

- ❖ The material to be dredged predominantly consists of sand, silt and clay and its mixtures. The Bidder should mobilise equipment required for the capital dredging including dry excavation, offshore/onshore disposal and also pre, interim and post dredging, topographic/bathymetry survey.
- ❖ Dredger(s) capable of dredging to a depth of at least 18 meters to meet the requirements under the contract along with compatible equipment and associated marine spread.
- ❖ Survey spread for carrying out the hydrographic and topographic surveys for monitoring and measurement of the dredging works.
- ❖ Excavating and transporting the material to the onshore landfill within a lead of 5.0 km from the excavated area and capable of stockpiling up to a height as directed by the Engineer/ Employer. Being a minor component of the whole work, the bidders may either confirm the availability of the equipment or indicate their proposed arrangement for mobilizing their equipment as and when required.

1.4 Dredging, transporting and dumping the dredged material to the designated onshore/ offshore disposal location.

In general, the “dredging limit” alongside the berth shall be up to the face of the fender unless otherwise directed. In other place where the fenders cannot be considered for defining the dredging limit, the Engineer shall provide necessary guidelines prior to commencement of work. The required depth indicated at various locations shall be achieved up to the seaward of the dredging limit.

The bidder shall take all reasonable steps to protect the environment in and around the area to be dredged and carry out its monitoring.



2.0 MINIMUM ELIGIBILITY CRITERIA FOR THE FIRM TO PARTICIPATE IN THE BID

2.1 Financial Turnover

Average annual financial turnover during the latest three audited years (2022-23, 2023-24 and 2024-25 shall be at least Rs. **22,14,50,000/-**. (excluding GST) (The relevant Audited Balance Sheets certified by Chartered Accountant for meeting qualification criteria shall be submitted along with tender).

2.2 Similar works

Experience of having successfully completed similar dredging works during the **last 7 years ending 31.01.2026 (Completion Certificates issued by the Client / Employer shall be enclosed for each eligible project.)**

- At least one similar dredging work of value costing not less than Rs**59,05,31,000/-**(excluding GST).

OR

- At least two similar dredging works of value costing not less than Rs.**36,90,82,000/-** (excluding GST) each.

OR

- At least three similar works of value costing not less than Rs.**29,52,65,000/-**(excluding GST) each.

Definition of Similar Work:

Similar dredging works means successfully completed dredging and reclamation works in large scale and capability of onshore/offshore disposal of dredged soil using suitable dredging equipment at sea ports.

The value of similar works completed by the Tenderer will be brought to current cost level by enhancing the actual value of work with the multiplication factor as detailed below for assessing the eligibility of the Tenderer under experience. The base year shall be taken as 2024-25.

Year	Multiplication factor
FY 2024-25	1.00
FY 2023-24	1.07
FY 2022-23	1.14
FY 2021-22	1.21
FY 2020-21	1.28
FY 2019-20	1.35
FY 2018-19	1.42



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Note:

- i) Bidder should indicate actual figures of costs and amount for the works executed by them in the schedule without accounting for the above-mentioned factors. In case the financial figure and the value of completed works are in foreign currency, the above enhancement factors will not be applied. Instead, the foreign currency will be converted into equivalent Indian Rupees (INR) at the State Bank of India BC selling rate prevailing 28 days prior to bid due date.
- ii) The Financial year of completion for the similar completed works shall be taken into account while applying multiplication factors for arriving current cost level.

2.3 Equipment and Experience

The bidder shall either own dredgers of suitable type and other equipment's capable of executing the dredging work within the time schedule or the firm should have entered into an agreement with any firm owning such equipment and willing to place them at the disposal of the bidder for the entire period of contract, if they secure the contract. The bidders should substantiate their claims through proper documentary evidence such as an irrevocable agreement, ownership details, etc.

The documentary evidence regarding the capability, experience in the relevant field and financial status to be furnished along with the offer are: -

- Details of dredging work executed in the last **7 years**, type of dredging work executed, details of dredgers deployed, quantity, scheduled period of execution, date of commencement, date of completion and certificates/testimonials from the concerned clients regarding successful completion of the job. (Ref: Annexure – 7)
- Details of dredger(s) and other ancillary crafts and facilities including discharge pipeline etc. available and proposed to be deployed and their mobilisation time to this site. (Ref: Annexure –9)
- Capability of the firm in carrying out pre, progressive and post topographic and bathymetric surveys.
- Name and curriculum vitae of dredging team and surveyors proposed to be deployed.
- Registration details of the firm, name of bankers, company profile, solvency certificate and financial position of the firm during the last five years.

NOTE:

- 1) **Every documentary evidence submitted in support of the eligibility criteria shall be in either original or duly notarized.**



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2) **Conversion rate: Exchange rate of respective currencies prevailing 28 days prior to bid due date.**

3.0 CONFLICT OF INTEREST

3.1. Tenderer shall not have conflict of interest that may affect the Selection Process or the Contract (the “Conflict of Interest”). Any tenderer found to have a Conflict of Interest shall be disqualified.

3.2. The Authority requires that the Contractor provides professional, objective, and impartial advice and at all times hold, the Authority’s interest’s paramount, avoid conflicts with other assignments or its own interests, and act without any consideration for future work. The Contractor shall not accept or engage in any assignment that would be in conflict with its prior or current obligations to other clients, or that may place it in a position of not being able to carry out the assignment in the best interests of the Authority.

3.3. Tenderer shall be deemed to have a Conflict of Interest affecting the Selection Process, if:

3.3.1. The tenderer, its consortium member (the “**Member**”) or Associate (or any constituent thereof) and any other Applicant, its consortium member or Associate (or any constituent thereof) have common controlling shareholders or other ownership interest; provided that this disqualification shall not apply in cases where the direct or indirect shareholding or ownership interest of an tenderer, its Member or Associate (or any shareholder thereof having a shareholding more than 5 per cent of the paid up and subscribed share capital of such tenderer, Member or Associate, as the case may be) in the other tenderer, its consortium member or Associate is less than 5% (five per cent) of the subscribed and paid up equity share capital thereof; provided further that this disqualification shall not apply to any ownership by a bank, insurance company, pension fund or a public financial institution referred to in Section 4A of the Companies Act, 1956 the indirect shareholding held through one or more intermediate persons shall be computed as follows: (aa) where any intermediary is controlled by a person through management control or otherwise, the entire shareholding held by such controlled intermediary in any other person (the “**Subject Person**”) shall be taken into account for computing the shareholding of such controlling person in the Subject Person; and (bb) subject always to sub-clause (aa) above, where a person does not exercise control over intermediary, which has shareholding in the Subject Person, the computation of indirect shareholding of such person in the Subject Person shall be undertaken on a proportionate basis; provided, however, that no such shareholding shall be reckoned under this sub-clause (bb) if the shareholding of such person in the intermediary is less than 26% (twenty six per cent) of the subscribed and paid up equity shareholding of such intermediary; or



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- 3.3.2. A constituent of such tenderer is also a constituent of another tenderer; or
- 3.3.3. Such tenderer or its Associate receives or has received any direct or indirect subsidy or grant from any other tenderer or its Associate; or
- 3.3.4. Such tenderer has the same legal representative for purposes of this tender as any other tenderer; or
- 3.3.5. Such tenderer has a relationship with another tenderer, directly or through common third parties, that puts them in a position to have access to each other's' information about, or to influence the tender of either or each of the other tenderer; or
- 3.3.6. There is a conflict among this and other contract assignments of the tenderer (including its personnel and Sub-contractor) and any subsidiaries or entities controlled by such tenderer or having common controlling shareholders. The duties of the Consultant will depend on the circumstances of each case. While providing Contract services to the Authority for this particular contract, the tenderer shall not take up any contract that by its nature will result in conflict with the present contract; or
- 3.3.7. A firm which has been engaged by the Authority to provide goods or works or services for a project, and its Associates, will be disqualified from providing contract services for the same project save; conversely, a firm hired to provide contract services for the preparation or implementation of a project, and its Members or Associates, will be disqualified from subsequently providing goods or works or services related to the same project; or
- 3.3.8. The tenderer, its Member or Associate (or any constituent thereof), and the tenderer or Concessionaire, if any, for the Project, its contractor(s) or sub-contractor(s) (or any constituent thereof) have common controlling shareholders or other ownership interest; provided that this disqualification shall not apply in cases where the direct or indirect shareholding or ownership interest of a tenderer, its Member or Associate (or any shareholder thereof having a shareholding of more than 5% (five per cent) of the paid up and subscribed share capital of such tenderer, Member or Associate, as the case may be,) in the tenderer or Concessionaire, if any, or its contractor(s) or sub-contractor(s) is less than 5% (five per cent) of the paid up and subscribed share capital of such Concessionaire or its contractor(s) or subcontractor(s); provided further that this disqualification shall not apply to ownership by a bank, insurance company, pension fund or a Public Financial Institution referred to in section 4A of the Companies Act, 1956. For the purposes of this sub-clause (h), indirect shareholding shall be computed in accordance with the provisions of sub-clause (a) above

For purposes of this tender, Associate means, in relation to the tenderer, a person who controls, is controlled by, or is under the common control with



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such tenderer (the “**Associate**”). As used in this definition, the expression “**control**” means, with respect to a person which is a company or corporation, the ownership, directly or indirectly, of more than 50% (fifty per cent) of the voting shares of such person, and with respect to a person which is not a company or corporation, the power to direct the management and policies of such person by operation of law or by contract.

- 3.4.** A tenderer eventually appointed to provide contract for this Project, and its Associates, shall be disqualified from subsequently providing goods or works or services related to the construction and operation of the same Project and any breach of this obligation shall be construed as Conflict of Interest; provided that the restriction herein shall not apply after a period of 5 (five) years from the completion of this assignment or to contract assignments granted by banks/ lenders at any time; provided further that this restriction shall not apply to contract services performed for the Authority in continuation of this contract or to any subsequent contract services performed for the Authority in accordance with the rules of the Authority. For the avoidance of doubt, an entity affiliated with the tenderer shall include a partner in the contract firm or a person who holds more than 5% (five per cent) of the subscribed and paid up share capital of the Contract, as the case may be, and any Associate thereof.

3.5. Black listed Companies

Contractors who have been black listed or banned and such blacklisting /ban are still in force by any Major Port Authorities, Central or State Government agencies shall not be eligible to take part in this tender.

4.0 JOINT AND SEVERAL LIABILITY

If the Contractor constitutes (under applicable Laws) a joint venture, consortium or other unincorporated grouping of two or more persons/ companies

- (a) these persons/ companies shall be deemed to be jointly and severally liable to the Employer for the performance of the Contract;
- (b) these persons/ companies shall notify the Employer of their leader who shall have authority to bind the Contractor and each of these persons/ companies shall provide a parent company guarantee in format at Annexure 4;
- (c) the Contractor shall not alter its composition or legal status without the prior consent of the Employer.
- (d) JVs/ Consortia shall be allowed in all contracts of estimated cost of more than Rs.5 Crores. However, there shall be no limit on the number of partners.



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- (e) The technical and financial criteria (PQC) may be met jointly by the partners. At the same time, it has to be ensured that firms are capable. Thus, only firms with at least 26% equity holding each shall be allowed to jointly meet the eligibility criteria.
- (f) In computing the Bidder qualification criteria of the bidder, the experience of their parent company shall be considered, provided that the bidder is subsidiary of the parent company (Parent company shall have the controlling stake more than 51% in the subsidiary company) and the parent company provides an undertaking that they are jointly or severally responsible for successful performance of the contract.

5.0 BIDDING PROCESS:

- 5.1. Tender document is available at website (www.kamarajarport.gov.in) and from e-procurement portal link. The complete tender document including drawings can be downloaded from EMPLOYER'S website: www.kamarajarport.gov.in and e-procurement portal link and submitted online as tender offer on or before the due date and time of submission.
- 5.2. The Bidder should fill and upload security Declaration Form' provided in Annexure 5 of Section -7.
- 5.3. Bidders should follow the following procedure to submit the bids online through the e-Procurement portal <http://eprocure.gov.in>
 - 5.3.1. The bidder shall obtain e-token from a licensed Certifying Authority of National Information Centre (NIC) such as MTNL/SIFY/TCS/nCode/eMudhra to get access for Online Bid Submission through the e - Procurement site <https://eprocure.gov.in>
 - (i) Bidder should do the registration in the tender site using the "Click here to Enrol" option available.
 - (ii) Bidder can use "My Space" area to update standard documents in advance as required for various tenders and use them during bid submission. This will facilitate the bid submission process by reducing time.
 - (iii) Bidder should read the tenders published in the site and download the required documents / tender schedules for the tenders.
 - (iv) Bidder then logs into the site by giving the user id/password chosen during registration and password of the DSC/e token.
 - (v) Only one Digital Signature Certificate (DSC) should be used for one bidder. If a bidder uses more than one DSC token, the bid would summarily be rejected.
 - (vi) Bidder should read the Tender schedules carefully and submit the documents as per the Tender.



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- (vii) If there are any clarifications, the same may be clarified as per the tender conditions.
- (viii) Bidder should take into account the corrigenda, if any published before submitting the bids online.
- (ix) Bidder must in advance, prepare the bid documents to be submitted as indicated in the tender schedule and they should be in the required format. If there are more than one document, they can be clubbed together.
- (x) Bidder selects the tender in which he is interested using search option & then moves it to my favourite folder.
- (xi) From the folder, appropriate tender can be selected and all the details can be viewed.
- (xii) The bidder should read the terms & conditions and accept the same to proceed further to submit the bids.
- (xiii) The Bidder has to select the payment option as offline to pay the EMD and tender document cost as applicable.
- (xiv) The details of the DD instrument / any other accepted instrument, physically sent, should tally with the details available in the scanned copy and the data entered during bid submission time. Otherwise, the bid submitted will not be acceptable.
- (xv) The bidder has to enter the password of the DSC / e-token and the required bid documents have to be uploaded one by one as indicated.
- (xvi) The bidder has to submit the relevant files required as indicated in the cover content. In case of any irrelevant files, the bid will be rejected / will not be accepted by the system.
- (xvii) The tendering system will give a successful bid updating message and then a bid summary will be shown with the bid no., the date and time of submission of the bid and all other relevant details. The bidder has to submit the relevant documents required as indicated in the cover content. In case any irrelevant files, are submitted the bid will be rejected.
- (xviii) The bid summary has to be printed and kept as an acknowledgement and token of the submission of the bid.
- (xix) The bid summary will act as a proof of bid submission for the subject tender and will also act as an entry point to participate in the bid opening.
- (xx) For any clarifications regarding the Tender, the bid number can be used as a reference.



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- (xxi) Bidder should log into the site well in advance for bid submission so as to submit the bid in time (i.e.) on or before the bid submission time. If there is any delay due to other issues, bidder only is responsible.
- (xxii) Each document to be uploaded online for the tenders should be of size less than 2 MB. If any document of size more than 2MB, it can be reduced by scanning at low resolution and then uploaded.
- (xxiii) The time settings fixed in the server site & displayed at the top of the tender site, will be valid for all actions of requesting, bid submission, bid opening etc., in the e-tender system. The bidders should follow this time during bid submission.
- (xxiv) All the data being entered by the bidders would be encrypted using PKI encryption techniques to ensure the secrecy of the data. The data entered will not be viewable by unauthorized persons during bid submission & cannot be viewed by any one until the prescribed date & time of bid opening.
- (xxv) The confidentiality of the bids would be maintained. Secured Socket Layer 128-bit encryption technology is used. Data storage encryption of sensitive fields is done.
- (xxvi) Any document that is uploaded to the server is subjected to symmetric encryption using a generated symmetric key. Further this key is subjected to asymmetric encryption using buyer's public keys. Overall, the submitted tender documents become readable only after the tender opening by the authorized individual.
- (xxvii) For any queries, the bidders are asked to contact by mail cppp-nic@nic.in or by phone 1-800-233-7315 well in advance.
- (xxviii) Tenderer is required to submit their tender through online in the form of Two Cover System on or before schedule bid due date of closing and time as notified in NIT. The tender received after the due date and time will not be entertained.
- (xxix) Tender Document can be submitted online only in the designated e-procurement portal eprocure.gov.in on or before the due date and time. The time of opening of technical bid will be as notified in the NIT.
- (xxx) Tenderer should submit the tender as per specification of work, drawings and in accordance with the instructions to bidders, General Conditions of Contract and Special Conditions of Contract.

5.4. Deadline for Submission of Bids

- 5.4.1. Bids must be uploaded in the website www.eprocure.gov.in not later than the time and date indicated in the Online Bid Reference.



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- 5.4.2. The Employer may extend the deadline for submission of the bid by issuing an amendment in accordance with the online bid reference, in which case all rights and obligations of the Employer and the bidders previously subject to the original deadline will then be subject to the new deadline.
- 5.4.3. Since the bid document is being downloaded from web site and uploaded through e-Tender website www.eprocure.gov.in, the bidder shall give an undertaking that no changes have been made in document.
- 5.4.4. For technical evaluation purpose, e-tender and the relevant documents uploaded along with e-tender alone will be considered.
- 5.4.5. The financial bid, the details provided in the e-procurement in the Excel spread sheet only shall be considered for evaluation.

5.5. Modification and Withdrawal of Bids

- 5.5.1. The bidders may modify, substitute or withdraw their tender after submission before the deadline prescribed in the online bid reference.
- 5.5.2. No bid shall be modified after the deadline for submission of bids.

6.0 BID PROPOSAL REQUIREMENTS

6.1. General

- 6.1.1. The Bid Document issued to the Bidder is non-transferable. Bid Documents shall remain the property of EMPLOYER.
- 6.1.2. EMPLOYER will not be responsible for any costs or expenses incurred by the bidder in connection with the preparation and delivery of his bid or for any other expenses incurred in connection with such bidding.
- 6.1.3. The scope of work is described in the Bid document (in the technical specifications, Bill of Quantity and drawings) and in general includes, but is not limited to deploying requisite number of dredgers, support crafts, land-based earth moving equipment, all materials including consumables, and equipment necessary to conduct surveys, dredging and disposal of spoil at specified locations as described in the Bid Document.
- 6.1.4. Quantities, drawings and specifications given in the Bid Document are for the sole purpose of indicating to bidders the order of magnitude of work and are not in any way guaranteed to remain unchanged. Time is the essence of contract and the work should be completed in all respects within a period of 4 months from the date of receipt of letter of acceptance.
- 6.1.5. Bidders are advised to visit the site of the work, review the drawings, and acquaint themselves with all site conditions prior to submission of their bid. Failure to visit the site will in no way relieve the successful bidder of any of the obligations in performing the work in accordance with this Bid Document within the quoted price.



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- 6.1.6. If the bidders find discrepancies in or omission from the drawings, specifications, or other documents, or have any doubts as to the meaning or intent of any part thereof, they shall at once inform EMPLOYER/Engineer who may send a written instruction or explanation to all bidders. No oral interpretations shall be made by any bidder as to the meaning of any of the provisions of the bid documents. Every request for an interpretation shall be in writing addressed and forwarded to the General Manager (Corporate Strategy and Business Development)
- 6.1.7. In formulating their bid, bidders shall have full regard to the contents of the Bid Documents since the bid will be deemed to have been made after taking into account all the provisions thereof. The agreement as finally executed will include the Employer's Bid Documents, the Bidder's offer as finally accepted by the EMPLOYER together with Addenda, bid clarifications and all correspondence exchanged between Kamarajar Port and the bidder, if any.
- 6.1.8. The bidders may please note that the EMPLOYER/Engineer will not entertain any correspondence or queries on the status of the offers received against this Bid. Bidders are also requested not to depute any of their personnel or Agents to visit the Employer's offices for making such enquiries till finalisation of the bid.
- 6.1.9. The bidders shall give an undertaking that they have not made any payment or illegal gratification to any person / authority connected with the bid process so as to influence the bid process and have not committed any offence under the Prevention of Corruption Act,1988(as amended in 2018) in connection with the bid. (Ref: Annexure -15)
- 6.1.10. The bidders shall disclose any payments made or proposed to be made to any intermediaries (agents etc.) in connection with the bid.
- 6.1.11. Canvassing in any form by the bidder or by any other agency acting on behalf of the bidder after submission of the bid may disqualify the said bidder. The Employer's decision in this regard shall be final and binding on the bidder.
- 6.1.12. The EMPLOYER may reject, accept or prefer any bid without assigning any reason whatsoever. The EMPLOYER also reserves to himself the right to accept any bid in part or parts only with such conditions as he may prescribe.
- 6.1.13. EMPLOYER will not be liable for any financial obligation in connection with the work until such time the EMPLOYER has communicated to the successful bidder in writing his decision to award the Work (covered by the bid document issued to him).
- 6.1.14. Telex/Telegraphic offers will not be considered. Bidders should prepare their bid themselves. Bids submitted by agents will not be recognized.
- 6.1.15. Bids received after the due date & time and any change in quotation after the specified date will be rejected. EMPLOYER will not be responsible for the



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loss of the bid document or for the delay in postal transit for the documents prescribed to be submitted physically

- 6.1.16. In case of an unscheduled holiday on the prescribed closing/opening day of the bid, the next working day will be treated as the scheduled prescribed day of closing/opening of the bid.
- 6.1.17. Bidders to note that the bids shall first be evaluated for minimum eligibility criteria given in the tender call notice. Bidders not meeting the eligibility criteria do not qualify.
- 6.1.18. The word “Shall” indicates requirement and the word “Should” indicates recommendation.

7.0 EARNEST MONEY DEPOSIT

- 7.1 The Earnest Money Deposit (EMD) of INR **93,81,635/-** (Rupees Ninety Three lakh Eighty one thousand six hundred and thirty five only) shall be paid as described in the Tender Document. The EMD shall be submitted in the form of BG/DD/BC/ Insurance Security Bond from Nationalized Bank/Scheduled bank in favour of “Kamarajar Port Limited” payable at Chennai.
- 7.2 The copy of EMD (BG/DD/BC/Insurance Security Bond) shall be uploaded as a scanned copy of the instrument through e-procurement mode under the Tender Document i.e. Technical Bid while submitting tender electronically in the e-procurement portal. The original EMD instrument must reach Kamarajar Port Limited in the corresponding address before opening of Technical Bid as prior to the date and time given in this tender. Mere uploading of Tender document and scanned copy of EMD in the portal and non-submission of the EMD at the address given below before the Technical Bid opening date & time will lead to rejection of bids.
- 7.3 The original EMD instrument (BG/DD/BC/Insurance Security Bond) shall be placed in an envelope and sealed can also be dropped in the Tender Box kept at the address of General Manager (Corporate Strategy and Business Development).
- 7.4 Previous dues / deposits with Kamarajar Port Limited shall not be accounted / adjusted towards EMD.
- 7.5 The EMD shall be retained until finalization of Tender process.
- EMD shall be forfeited (a) If any statements documents / information submitted by Tenderer is found false / incorrect or wilful misrepresentation or omission of facts or fake / forged documents; or (b) The Successful Bidder fails within the specified time limit to



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- i) sign the Agreement or
- ii) furnish the required Performance Security
- iii) If the work not commenced or fail to extend the validity
- iv) submission/ misrepresentation of the bid

7.6 Upon return request EMD of the unsuccessful tenderers will be refunded once LOA is awarded to successful tenderer while the EMD for successful tenderer will be refunded on submission of Performance security and signing of Contract Agreement.

8.0 PERFORMANCE SECURITY

8.1 Performance Security Deposit to be submitted at award of work.

8.1.1 Performance Securities Deposit should be 5% of Contract price should be submitted as Insurance surety bond or Account payee Bank Guarantee or Demand Draft or Fixed deposit Receipt from commercial Bank within 28 days of receipt of Letter of Award of work.

8.1.2 Performance Security Deposit in the form of Insurance surety bond or Account payee Bank Guarantee or Demand Draft or Fixed deposit Receipt from commercial Bank must be made out in favour of Kamarajar Port Limited. No interest will be allowed. The successful bidder can also furnish towards Performance Security Deposit as Bank Guarantee from State Bank of India or their associates or any Nationalized Bank or from Scheduled Bank issued by their branches at Chennai enforceable and en-cashable at Chennai.

8.1.3 Failure of the successful bidder to comply with the requirements of **Clause 8.1** shall constitute sufficient grounds for cancellation of the award and also the bidder will be disqualified from bidding for any contract for a period of two year from the date of notification.

8.1.4 The Performance Security Deposit shall remain valid till one month from payment of final bill.

9.0 RETENTION MONEY (SECURITY DEPOSIT)

In addition to performance guarantee (5%), contracts for works usually provide for a percentage (5%) of each running bill (periodic/ interim payment) to be withheld as retention money until final acceptance. However, the Performance Guarantee and Retention money shall not exceed 10%.

9.1 The Earnest Money Deposit (EMD), instead of being released may form part of the Security Deposit if requested by the contractor.

9.2 A sum @10% of the gross amount of the bill shall be deducted from each running bill of the contractor, till the sum along with the sum of EMD adjusted amount reaches 5% of the contract value.



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9.3 The contractor may, at his opinion, replace the retention amount with an unconditional Bank Guarantee from a bank acceptable to Port at the following stages:

- i. After the amount reaches half the value of the limit of retention money; and
- ii. After the amount reaches the maximum limit of retention money, one half of the retention money (or BG which replaced retention money) shall be released on the issue of the taking over certificate.
- iii. If the Taking Over Certificates are issued in parts, then in such proportions as the Engineer may determine, having regard to the value of such part or section.
- iv. The other half of the retention money (or BG which replaced the retention money) shall be released upon expiry of 365 days after the Defect Liability Period of the works or final payment, whichever is earlier, on certification by the Engineer.

9.4 The Bank Guarantee submitted against retention money shall initially be valid up to the stipulated date of completion of the work plus the maintenance/Defect Liability Period as defined in the General Conditions of Contract (GCC) which shall be extended from time to time depending upon extension of contract.

10.0 BID SCHEDULE

Bid schedule and procedure shall be followed as per the NIT; however, the schedule is merely indicative in nature and EMPLOYER hereby reserves the right, at its sole discretion and, from time to time and at any time to revise or modify the aforesaid schedule (or any part thereof) by the issuance of requisite notice.

11.0 PRE-BID MEETING

10.1 The Bidder or his official representative is advised to attend a Pre- Bid meeting as per Bidding Schedule. Pre bid meeting will be conducted at the address given below:

KAMARAJAR PORT LTD.,
No:17, Jawahar Building,
RajajiSalai, Chennai - 600 001,
Ph: +91-44- 25251666-70
Fax: +91-44- 25251665
Email : pushpalatha@kplmail.in

The bidders requiring clarifications shall seek them in writing at the address mentioned below.



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The General Manager
(Corporate Strategy and Business Development),
No:17, Jawahar Building,
Kamarajar Port Limited,
Rajaji Salai (Near Chennai GPO),
Chennai – 600 001.
Ph: +91-44-25251666-70,
Fax: +91-44-25251665.

- 10.2 The purpose of the meeting will be to clarify issues and to answer questions on any matter related to this tender that may be raised at that stage.
- 10.3 The bidder is requested to submit any question in writing or by fax, to reach the Employer **not later than 2 days** before the meeting.

12.0 BID SUBMISSION AND OPENING OF TECHNICAL BID

- (a) The last date for submission of tender through e- procurement mode as per Bidding Schedule. On the due date and appointed time as specified the Employer will open Technical bids **in e- Procurement Mode** including modifications made pursuant to **Clause 5.5**. In the event of, the specified date for bid opening declared a holiday by the Employer, the bids will be opened at the appointed time and location on the next working day.
- (b) Late bids/ delayed bids not accepted by the e- portal after the stipulated last date and time for receipt of bids, due to any reasons whatsoever KPL will not be considered and accept the manual bid submission.
- (c) Kamarajar Port reserves the right to reject any or all the tenders without assigning any reason thereof.

13.0 Financial (Price) BID -COVER-II -OPENING

The Price bid shall be opened through e- procurement mode. Date and time of opening of commercial bid shall be intimated to the technically qualified bidders.

Price Bids of only those Bidders whose Technical proposals are complete and acceptable shall be opened on a suitable day to be intimated separately later.

14.0 INSTRUCTIONS FOR ONLINE BID SUBMISSION

PART- 1 DETAILS: TECHNICAL& COMMERCIAL BID

This shall contain the following: -



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- i) Bid Submission Letter (On letter head of the bidding firm as per Annexure - 17)
- ii) Exceptions and Deviations (Annexure - 1)
- iii) Power of Attorney for Authorised Signatory of the firm (Annexure - 2)
- iv) Bid Security – Bid Security Declaration as per (Annexure -5)(separately upload in the e-procurement mode)
- v) Integrity Pact (Annexure – 6)
- vi) Eligible Assignment - Abstract of Experience as Dredging Contractor during the last seven (7) years (Annexure – 7).
- vii) Concurrent works (Annexure – 8)
- viii) List of Dredgers and Equipment Proposed to be Deployed (Annexure- 9)
- ix) Company Information (Annexure – 10)
- x) Method Statement (Annexure – 11)
- xi) Proposed Site Organization, CV, etc. (Annexure – 12)
- xii) Proposed schedule, Equipment & Manpower Histogram (Annexure-13)
- xiii) Undertaking by Bidder (Annexure – 15)
- xiv) Security clearance Details (Annexure – 16)
- xv) Disputes Review Board Agreement (Annexure- 20)
- xvi) Performance Security Deposit (Bank Guarantee) (Annexure -4) Draft

PART – 2 DETAILS: FINANCIAL BID – Price Schedule

Price should be quoted in the Financial Bid in a spread sheet file (.xls format) available in **e-procurement Portal only**. Any indication of ‘Quoted price’ in the online technical bid documents shall lead to rejection of the bid outright. The tenderers shall upload the quoted financial bid in the e-procurement format. **Any other format shall be rejected.**

The financial bid submitted in a spread sheet file (.xls format) through e-procurement mode only be taken up for the purpose of evaluation. Any other format shall be rejected.

15.0 DETERMINATION OF RESPONSIVENESS OF BIDS:

A proposal shall be considered responsive if:

- (a) It is received by the proposed Due Date and Time.
- (b) It is Digitally Signed.



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- (c) It contains the information and documents as required in the Tender Document.
- (d) Bid Security Declaration
- (e) It contains information in formats specified in the Tender Document.
- (f) It mentions the validity period as set out in the document.
- (g) It provides the information in reasonable detail. The Port reserves the right to determine whether the information has been provided in reasonable detail.
- (h) There are no significant inconsistencies between the proposal and the supporting documents.
- (i) The Technical qualification conforms to the requirements as specified in the qualification criteria of General Rules and directions for the guidance of the Tenderer.
- (j) A Tender that is substantially responsive in one that conforms to the preceding requirements without material deviation or reservation. A material deviation or reservation is one (1) which affects in any substantial way, the scope, quality, or performance of the Tenderer or (2) which limits in any substantial way, inconsistent with the Tender document, or (3) whose rectification would affect unfairly the competitive position of other Qualified Applicant presenting substantially responsive bids.
- (k) Notwithstanding the above, the Port reserves the right to reject any tender which in its opinion is non-responsive and no request for alteration, modification, substitution or withdrawal shall be entertained by the Port in respect of such Tenders.
- (l) The EMPLOYER would have the right to review the Technical Qualification and seek clarifications wherever necessary.

16.0 CLARIFICATION

Since the tender involves selection based on pre-qualification criteria, the General Manager (Corporate Strategy and Business Development) or other authorized officials of EMPLOYER will examine and seek clarification, if any, from the uploaded documents during technical and financial evaluation stage.

17.0 PRICING OF BID

The offer shall include planning, mobilisation and demobilisation of suitable Dredgers/Suitable machinery with floating/ shore pipeline and other required crafts/ land-based equipment including all items/materials, labour, tools, fabrication, transportation, insurance, taxes (excluding GST), duties,



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consumables, overhead, profit etc. necessary for execution of dredging / excavation and reclamation works as described in the Bid Document.

18.0 CURRENCIES OF QUOTATION

All payments shall be in Indian Rupees. The Bidders shall quote the rates in **Indian Rupees**. The Bidder shall not quote in any currency other than Indian Rupees.

In case the bidder intends repatriating amounts to his home country, this shall be as per the RBI guidelines. EMPLOYER will provide NO OBJECTION CERTIFICATE for the same.

19.0 BID VALIDITY

The bid shall be valid for acceptance for a minimum period of **one hundred and eighty (180) days** from the due date of submission of Tender in the e-procurement mode.

20.0 DUTIES AND TAXES

The quoted rates of the bidders shall include of all taxes, duties, etc., excluding applicable GST. TDS as applicable shall be deducted at source by Kamarajar Port in accordance with IT, GST, Tamil Nadu construction workers welfare cess Act 1996, etc. Further, the contractor has to raise GST tax invoice timely, notwithstanding reimbursement/ payment from KPL and to comply timely GST statutory requirements i.e remittance, filing, etc. KPL shall reimburse the GST portion on reflection of Input tax credit at GST portal. Any new taxes, levies, duties imposed after submission of bid shall be considered by the Employer on production of documentary evidence.

21.0 INFORMATION TO BE FURNISHED BY BIDDER

20.1 Part -1 Technical& Commercial Bid

- (a) A description of the facilities in detail with clarification to enable the EMPLOYER to make an evaluation and comparison of the Bid.

List of major marine equipment proposed to be deployed for this work. The Bidder shall provide complete details such as dimensions, capacity of Dredgers, other marine crafts and equipment etc. if any, trade name, year-built Registration particulars etc. as per Annexure-9

- (b) Description of Bidder's work experience in the past on projects of similar nature with the details given in tables enclosed as Annexure – 7 to the bid. This will include: Design, planning and execution of large dredging works in the last seven years. Concurrent commitments of the bidder shall be



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separately given with the details indicated at Table enclosed as Annexure-8 to the bid.

- (c) Bidder shall furnish a list of the supervisory personnel he intends to deploy with their Bio-data and proposed methodology for execution of the work i.e. design, planning, dredging with disposal of spoil, quantity surveying instruments and its accuracy and progress of the work etc. so as to ensure maintenance of dredged levels till taking over of the work as applicable at respective locations as stipulated in the Specifications attached to this Bid Document.
- (d) If required, the Contractor should be capable of mobilizing additional resources like dredgers, equipment etc. at his own cost for proper completion of work. Keeping the above in view and since time is the essence of contract, the Bidder shall indicate how he/she would execute the work within the time specified by submitting a description of equipment and work methodology to be employed and the limiting weather condition for the proposed equipment. The Bidder shall also include a description of all procedures or any special technique to be employed in setting up the Works.
- (e) An overall project schedule, including, deployment, using Critical Path Method shall be furnished along with the bid. The Bidder shall indicate the project key-milestones for all activities.
- (f) Un-priced copies of Schedule of Prices with details of quantities only as specified in the Bid Document shall be enclosed with technical bids.
- (g) Power of Attorney in Annexure- 2 to the bid.
- (h) Detailed dredger / equipment deployment schedule indicating total equipment-days planned item-wise.
- (i) Bidder may request for any clarification / information on the tender conditions prior to or during the pre-bid meeting which shall be replied during the pre-bid meeting and subsequently in writing. After the pre-bid clarifications are issued, no exceptions/ deviations from Bid Document specifications and conditions are permissible. **Conditional bids are liable to be rejected.** Bidder shall enter 'Nil' in the "Proposal Form Exceptions and Deviations, Annexure-1" while submitting the bid.
- (j) EMD as stipulated in relevant clauses.
- (k) Any other information required in terms of this Bid Documents.
- (l) List of instruments for survey and monitoring the work and list of other equipment for actual measurement at the dredged spoil location/ reclamation areas with the details are to be indicated.
- (m) Audited Balance sheets along with turnover, Income Tax clearance certificates, profit and loss account for the last 3 audited years (2022-23 ,



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2023-24 and 2024-25), Memorandum of Articles and Articles of Association. In case of foreign firms, the statement to be given to the effect that they have no claims pending against them from any State Authority in India with respect to Income tax, Customs duty, GST or any other dues. Any import duty/fee in respect of equipment shall be borne by the firm/ bidder. Income tax leviable for foreign contractor and the foreign employees shall be borne by the firm/ bidder.

20.2 Part-2–Financial Bid

The financial bid shall contain only prices in the format as per e-procurement mode with no conditions whatsoever. Any conditions given in the price bid shall not be taken into account and it shall be sufficient cause for rejection of bid.

22.0 EVALUATIONS AND COMPARISON OF BIDS

General

After the receipt of bids, if required, the EMPLOYER may inspect the facilities available with the bidder to ensure suitability and satisfactory working conditions of the dredgers and of the equipment listed to be used by the bidder for the work. The bidder shall ensure that aforesaid team shall at all the times have access to visit and inspect dredgers, equipment etc. the visit shall be made at Employer's cost.

EMPLOYER reserves the right to accept price part of the offer (Part II) of only such bidders whose technical and un-priced bid of the proposals (Part I) are acceptable and complete.

The Employer's decision in this regard shall be final and binding on the bidder. The EMPLOYER may not open price part of the offer (Part II) of the bidders whose technical and un-priced bid of the proposal is not acceptable or incomplete.

23.0 EVALUATION CRITERIA

The Bids received and accepted will be evaluated by EMPLOYER/Engineer to ascertain the relative position of the best Bid in the **interest of EMPLOYER, for the complete work covered up by Bid Documents.**

24.0 SIGNING OF THE CONTRACT

The successful Bidder shall be required to execute a Formal contract in accordance with the requirement of the EMPLOYER **within 28 days** from the date of issue of the acceptance of the Bid by the EMPLOYER, or within such



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extended time as may be permitted by the EMPLOYER. This agreement shall be in the Proforma indicated at Annexure-3 of the bid.

25.0 GUIDELINES ISSUED BY DG SHIPPING

Guidelines issued by Director General (Shipping), Mumbai from time to time in terms of relevant provisions of Merchant Shipping Act shall be applicable, except where such provisions are exempted by Government of India. The Ministry of Ports, Shipping and Waterways may in consultation with Director General (Shipping) provide exemptions from time to time as may be required.

25.0 CORRUPT OR FRAUDULENT PRACTICES:

The Employer requires that Bidders/Suppliers/Contractors under this contract, observe the highest standard of ethics during the procurement and execution of this contract. In pursuance of this policy, the Employer:

- (a) Defines, for the purpose of these provisions, the terms set forth below as follows:
 - I “corrupt practice” means the offering, giving, receiving, or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution; and
 - II “fraudulent practice” means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the Employer, and includes collusive practice among bidders (prior to or after bid submission) designed to establish bid prices at artificial non-competitive levels and to deprive the Employer of the benefits of free and open competition.
- (b) Will reject a proposal for award of work if the employer determines that the Bidder recommended for award has engaged in corrupt or fraudulent practices in competing for the contract in question.
- (c) Will declare a Bidder ineligible, either indefinitely or for a stated period of time, to be awarded contract/contracts if he at any time determines that the Bidder has engaged in corrupt or fraudulent practices in competing for, or in executing the contract.

26. INTEGRITY PACT

The integrity pact available in the tender document is an integral part of this tender document and all bidders have to execute the same and upload during bid submission. In case a bidder do not execute the integrity pact, his bid shall be liable for rejection. The names of the IEM’s (Independent external Monitors) are given below:

Independent Monitors



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The Principal/Employer has appointed two Independent External Monitors (hereinafter referred to as Monitors)

1. Shri Jatinderbir Singh, IAS (Retd)

House No. 1186, Sector 77, Mohali-140 308
Punjab
Email: jatinderbir@gmail.com

2. Shri. Muvvala Kondala Rao, IFoS (Retd)

201, Kalakunj-B,
Co-operative Society , Lane-6,
Dahanukar Colony, Kothrud,
Pune-411038
Email: mkraomuvvala@gmail.com



Section – IV

General Conditions of Contract (GCC)



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SECTION IV

GENERAL CONDITIONS OF CONTRACT

1.0 GENERAL PROVISIONS

1.1 Definitions

In the Conditions of Contract ("these Conditions"), which include Particular Conditions and these General Conditions, the following words and expressions shall have the meanings stated. Words indicating persons or parties include corporations and other legal entities, except where the context requires otherwise.

- 1.1.1 The "**Contract**" means the Contract Agreement, the Letter of Acceptance, the Letter of Tender, the Conditions, the Specification, the Drawings, the Schedules, and the further documents (if any) which are listed in the Contract Agreement or in the Letter of Acceptance.
- 1.1.2 "**Contract Agreement**" means the contract agreement referred to in Sub-clause 1.6[contract agreement]
- 1.1.3 "**Letter of Award/Acceptance**" means the letter of formal acceptance, signed by the Employer, of the Tender submitted by the tenderer, including any annexed documents.
- 1.1.4 "**Letter of Tender**" means the document entitled letter of tender, which was completed by the contractor and includes the signed offer to the Employer for the Works.
- 1.1.5 "**Specification**" means the document entitled specification, as included in the Contract, and any additions and modifications to the specification in accordance with the Contract. Such document specifies the works.
- 1.1.6 "**Drawings**" means the drawings of the Works, as included in the Contract, and any additional and modified drawings issued by (or on behalf of) the Employer in accordance with the Contract.
- 1.1.7 "**Schedules**" means the document(s) entitled schedules, completed by the Contractor and submitted with the Letter of Tender, as included in the Contract. Such document may include the Bill of Quantities, data, lists, and schedules of rates and/or prices.
- 1.1.8 "**Tender**" means the Letter of Tender and all other documents, which the Contractor submitted with the Letter of Tender, as included in the Contract.
- 1.1.9 "**Appendix to tender**" means the completed pages entitled appendix to tender, which are appended, to form part of the Letter of Tender.



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- 1.1.9 "Bill of Quantities"** means the documents so named (if any) which are comprised in the Schedules.
- 1.1.10 "Party"** means the employer or the contractor, as the context requires.
- 1.1.11 "Employer"** means Kamarajar Port Limited
- 1.1.12 "Contractor"** means the person(s) named as contractor in the Letter of Tender accepted by the Employer and the legal successors in title to this person(s).
- 1.1.13 "Engineer"** means the person appointed by the Employer to act as the Engineer for the purposes of the Contract and named in the Appendix to Tender.
- 1.1.14 "Contractor's Representative"** means the person named by the Contractor in the Contract or appointed from time to time by the Contractor under Sub-Clause 4.3 [Contractor's Representative], who acts on behalf of the Contractor.
- 1.1.15 "Employer's Personnel"** means the Engineer, the assistants referred to in Sub-Clause 3.2 [Delegation by the Engineer] and all other staff, labour and other employees of the Engineer and of the Employer; and any other personnel notified to the Contractor, by the Employer or the Engineer, as Employer's Personnel.
- 1.1.16 "Contractor's Personnel"** means the Contractor's Representative and all personnel whom the Contractor utilises on Site, who may include the staff, labour and other employees of the Contractor and of each Subcontractor; and any other personnel assisting the Contractor in the execution of the works.
- 1.1.17 "Sub-contractor"** means any person named in the Contract as a subcontractor, or any person appointed as a subcontractor, for a part of the Works; and the legal successors in title to each of these persons.
- 1.1.18 "Base Date"** means the date 28 days prior to the last date for submission of the Tender.
- 1.1.19 "Commencement Date"** means the date notified under Sub-Clause 7.1 [Commencement of Works].
- 1.1.20 "Time for Completion"** means the time for completing the Works or a Section (as the case may be) under Sub-Clause 7.2 [Time for Completion], as stated in the Appendix to Tender (with any extension under Sub-Clause 7.4 [Extension of Time for Completion]), calculated from the Commencement Date.
- 1.1.21 "Tests on Completion"** means the tests which are specified in the contract or agreed by both Parties or instructed as a Variation, and which are carried



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out under clause 8 [Tests on Completion] before the Works or a Section (as the case may be) before the Works are taken over by the Employer.

- 1.1.22 "Taking-Over Certificate"** means a certificate issued under clause 9 [Employer's taking over].
- 1.1.23 "Defects Notification Period"** means the period for notifying defects in the Works or a Section (as the case may be) under Sub-Clause 10.1 (Completion of Outstanding Work and Remedying Defects), as stated in the Appendix to tender (with any extension under Sub-Clause 10.3[Extension of defects Notification period]), calculated from the date on which the Works or Section is completed as certified under Sub-Clause 9.1(Taking Over of the Works and Section).
- 1.1.24 "Performance Certificate"** means the certificate issued under Sub-Clause 10.9 [*Performance Certificate*].
- 1.1.25 "Day"** means a calendar day and Year means 365 days.
- 1.1.26 "Accepted contract Amount"** means the amount accepted in the Letter of Award for the execution and completion of the Works including remedying of any defects.
- 1.1.27 "Contract Price"** means the price defined in Sub-Clause 13.1 [*The Contract Price*], and includes adjustments in accordance with the Contract.
- 1.1.28 "Cost"** means all expenditure reasonably incurred (or to be incurred) by the Contractor, whether on or off the Site, including overhead and similar charges, but does not include profit.
- 1.1.29 "Final Payment Certificate"** means the payment certificate issued under Sub-Clause 13.12 [*Issue of Final Payment Certificate*].
- 1.1.30 "Final Statement"** means the statement defined in Sub-Clause 13.10 [*Application for Final Payment Certificate*].
- 1.1.31 "Currency"** means Indian Rupees in which part (or all) of the Contract Price is payable.
- 1.1.32 "Interim Payment Certificate"** means a payment certificate issued under Clause 13.0 [*Contract Price and Payment*], other than the Final Payment Certificate.
- 1.1.33 "Payment Certificate"** means a payment certificate issued under Clause 13.0 [*Contract Price and Payment*].
- 1.1.34 "Provisional Sum"** means a sum (if any), which is specified in the Contract as a provisional sum, for the execution of any part of the Works or for the supply of Plant, Materials or services.
- 1.1.35 "Security Deposit"** means the *Retention Money*.



- 1.1.36 "**Statement**" means a statement submitted by the Contractor as part of an application, under Clause 13.0 [*Contract Price and Payment*] for a payment certificate.
- 1.1.37 "**Contractor's Equipment**" means all apparatus, machinery, vehicles and other things required for the execution and completion of the works and the remedying of any defects However, Contractor's Equipment excludes Temporary Works, Employer's Equipment (if any), Plant, Materials and any other things intended to form or forming part of the Permanent Works.
- 1.1.38 "**Goods**" means Contractor's Equipment, Materials, Plant and Temporary Works, or any of them as appropriate.
- 1.1.39 "**Materials**" means things of all kinds (other than Plant) intended to form or forming part of the Permanent Works, including the supply-only materials (if any) to be supplied by the Contractor under the Contract.
- 1.1.40 "**Permanent Works**" means the permanent works to be executed by the Contractor under the Contract.
- 1.1.41 "**Plant**" means the apparatus, machinery and vehicles intended to form or forming part of the Permanent Works.
- 1.1.42 "**EMPLOYER**" means Kamarajar Port Limited
- 1.1.43 "**Employer's representative**" means General Manager (CS & BD) or any officer authorised by him.
- 1.1.44 "**Section**" means a part of the Works specified in the Appendix to Tender as a Section (if any).
- 1.1.45 "**Temporary Works**" means all temporary works of every kind (other than contractor's Equipment) required on Site for the execution and completion of the Permanent Works and the remedying of any defects.
- 1.1.46 "**Works**" mean the Permanent Works and the Temporary Works, or either of them as appropriate.
- 1.1.47 "**Contractor's Documents**" means the calculations, computer programs and other software, drawings, manuals, models and other documents of a technical nature (if any) supplied by the Contractor under the Contract.
- 1.1.48 "**Country**" means the country India in which the Site is located, where the Permanent Works are to be executed.
- 1.1.49 "**Employer's Equipment**" means the apparatus, machinery and vehicles (if any) made available by the Employer for the use of the contractor in the execution of the Works, as stated in the specification; but does not include Plant which has not been taken over by the Employer.
- 1.1.50 "**Force Majeure**" is defined in Clause 18.0 [Force Majeure].



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1.1.51 "Laws" means all national (or state) legislation, statutes, ordinances and other laws, and regulations and by-laws of any legally constituted public authority.

1.1.52 "Performance Security" means the security (or securities, if any) under Sub-Clause 4.2

1.1.53 "Site" means the places where the Permanent Works are to be executed and to which Plant and materials are to be delivered, and any other places as may be specified in the Contract as forming part of the Site.

1.1.54 "Unforeseeable" means not reasonably foreseeable by an experienced contractor by the date for submission of the Tender.

1.1.55 "Variation" means any change to the Works, which is instructed or approved as a variation

1.2 Interpretation

In the Contract, except where the context requires otherwise:

- (a) words indicating one gender include all genders;
- (b) words indicating the singular also include the plural and words indicating the plural also include the singular;
- (c) provisions including the word "agree", "agreed" or "agreement" require the agreement to be recorded in writing, and
- (d) "written" or "in writing" means hand-written, type-written, printed or electronically made, and resulting in a permanent record.

The marginal words and other headings shall not be taken into consideration in the interpretation of these Conditions.

1.3 Communications

Wherever these Conditions provide for the giving or issuing of approvals, certificates, consents, determinations, notices and requests, these communications shall be:

- (a) in writing and delivered by hand (against receipt), sent by mail or courier, or transmitted using any of the agreed systems of electronic transmission as stated in the Appendix to Tender; and
- (b) Delivered, sent or transmitted to the address for the recipient's communications as stated in the Appendix to Tender. However:
 - i. if the recipient gives notice of another address, communications shall thereafter be delivered accordingly; and
 - ii. if the recipient has not stated otherwise when requesting an approval or consent, it may be sent to the address from which the request was issued.



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Approvals, certificates, consents and determinations shall not be unreasonably withheld or delayed. When a certificate is issued to a Party' the certifier shall send a copy to the other Party. When a notice is issued to a Party, by the other Party or the Engineer / EMPLOYER, a copy shall be sent to the Engineer / EMPLOYER or the other Party, as the case may be.

1.4 Law and Language

The Contract shall be governed by the law of the country (Indian Law).The language for communications shall be English as stated in Appendix to tender.

1.5 Priority of Documents

The documents forming the Contract are to be taken as mutually explanatory of one another. For the purposes of interpretation, the priority of the documents shall be in accordance with the following sequence:

- (a) The contract Agreement (if completed),
- (b) The Letter of Award/ Firm work order
- (c) The priced Bill of Quantities,
- (d) Bid Clarification,
- (e) The Technical Specification, Special conditions of contract and Information in Appendix to Tender.
- (f) The General conditions of contract.
- (g) The Drawings and Annexures
- (h) All Post bid correspondences and any other document forming part of contract.

If any ambiguity or discrepancy is found in the documents, the EMPLOYER / ENGINEER shall issue any necessary clarification or instruction.

1.6 Contract Agreement

The Parties shall enter into a Contract Agreement within **28 days** after the Contractor receives the Letter of Award, unless they agree otherwise. The Contract Agreement shall be in the format annexed to the bid. The costs of stamp duties and similar charges (if any) imposed by law in connection with entry into the Contract Agreement shall be borne by the tenderer.

1.7 Assignment

The Contractor shall not assign the whole or any part thereof the work to any benefit or interest therein or there under otherwise than by a change in favour of the contractor's Banker of any money due to or to become due under this contract without the prior written consent of the Employer.

1.8 Care and Supply of Documents

The Specification and Drawings shall be in the custody and care of the Employer. Unless otherwise stated in the Contract, two copies of the Contract and of each



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subsequent Drawing shall be supplied to the Contractor, who may make or request further copies at the cost of the Contractor.

Each of the Contractor's Documents shall be in the custody and care of the Contractor, unless and until taken over by the Employer. Unless otherwise stated in the Contract, the Contractor shall supply to the EMPLOYER/ENGINEER six copies of each of the Contractor's Documents.

The Contractor shall keep, on the Site, a copy of the Contract, publications named in the Specification, the Contractor's Documents (if any), the Drawings and Variations and other communications given under the Contract. The Employer's Personnel shall have the right of access to all these documents at all reasonable times.

If a Party becomes aware of an error or defect of a technical nature in a document, which was prepared for use in executing the Works, the Party shall promptly give notice to the other Party of such error or defect.

1.9 Drawings or Instructions

The Engineer / EMPLOYER shall issue / approve necessary drawings or instructions within reasonable time and not later than 35 days after the contractor's request.

The Contractor shall give notice to the Engineer whenever the works are likely to be disrupted if any necessary drawing or instruction is not issued to the Contractor. The notice shall include details of the necessary drawing or instruction, details of why and by when it should be issued, and details of the affect such delay in issue / approval.

If the Contractor suffers delay and/or incurs Cost as a result of a failure of the Engineer to issue the notified drawing or instruction within a time which is reasonable and is specified in the notice with supporting details, the Contractor shall give a further notice to the Engineer and shall be entitled subject to Sub-Clause 19.1 [Contractor's Claims] to:

- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 7.4 [Extension of Time for Completion], and
- (b) payment of any such Cost-plus reasonable profit, which shall be included in the Contract Price.

After receiving this further notice, the Engineer shall proceed in accordance with Sub-Clause 3.4 [Determinations] to agree or determine these matters.

However, if and to the extent that the Engineer's failure was caused by any error or delay by the Contractor, including an error in, or delay in the submission of, any of the Contractor's Documents, the Contractor shall not be entitled to such extension of time, Cost or profit.



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1.10 Employer's Use of Contractor's Documents

As between the Parties, the Contractor shall retain the copyright and other intellectual property rights in the Contractor's Documents and other project documents made by/or on behalf of the Contractor.

The Contractor shall be deemed (by signing the Contract) to give to the Employer, a non-terminable transferable non-exclusive royalty-free Licence to copy, use and Communicate the Contractor's Documents, including making and using modifications of them. This Licence shall:

Apply throughout the actual or intended working life (whichever is longer) of the relevant parts of the Works,

Entitle any person in authorized possession of the relevant part of the Works to copy, use and communicate the Contractor's Documents for the purposes of completing, operating, maintaining, altering, adjusting, repairing and demolishing the Works,

In the case of Contractor's Documents, which are in the form of computer programs and other software, permit their use on any computer on the Site and other places as envisaged by the Contract, including replacements of any computers supplied by the Contractor.

The Contractor's Documents and other design documents made by (or on behalf of) the Contractor shall not, without the Contractor's consent, be used, copied or communicated to a third party by (or on behalf of) the Employer for purposes other than those permitted under this Sub-Clause.

1.11 Contractor's use of Employer's Documents

As between the Parties, the Employer shall retain the copyright and other intellectual property rights in the Specification, the Drawings and other documents made by (or on behalf of) the Employer. The Contractor may, at his cost, copy, use, and obtain communication of these documents for the purposes of the Contract. They shall not, without the Employer's consent, be copied, used or communicated to a third party by the Contractor, except as necessary for the purposes of the Contract.

1.12 Confidential Details

The Contractor shall disclose all such confidential and other information as EMPLOYER may reasonably require in order verifying the Contractor's compliance with the Contract.

1.13 Compliance with Laws

The Contractor shall, in performing the Contract, comply with applicable Laws. Unless otherwise:

- (a) The Employer shall have obtained (or shall obtain) the planning, zoning or similar permission for the Permanent works, and any other permissions described in the Specification as having been (or being) obtained by the



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Employer; and the Employer shall indemnify and hold the Contractor harmless against and from the consequences of any failure to do so; and

- (b) The Contractor shall give all notices, pay all taxes, duties and fees, and obtain all permits, licences and approvals for his equipment and manpower as required by the Laws in relation to the execution and completion of the Works and the remedying of any defects; and the Contractor shall indemnify and hold the Employer harmless against and from the consequences of any failure to do so.

1.14 Joint and Several Liability

If the Contractor constitutes (under applicable Laws) a joint venture, consortium or other unincorporated grouping of two or more persons/ companies

- (a) These persons/ companies shall be deemed to be jointly and severally liable to the Employer for the performance of the Contract;
- (b) These persons/ companies shall notify the Employer of their leader who shall have authority to bind the Contractor and each of these persons/ companies shall provide a parent company guarantee in format at Annexure 4;
- (c) The Contractor shall not alter its composition or legal status without the prior consent of the Employer.
- (d) JVs/Consortia shall be allowed in all contracts of estimated cost of more than Rs.5 Crores. However, there shall be no limit on the number of partners.
- (e) The technical and financial criteria may be met jointly by the partners. At the same time, it has to be ensured that firms are capable. Thus, only firms with at least 26% equity holding each shall be allowed to jointly meet the eligibility criteria.
- (f) In computing the Bidder qualification criteria of the bidder, the experience of their parent company shall be considered, provided that the bidder is subsidiary of the parent company (Parent company shall have the controlling stake more than 51% in the subsidiary company) and the parent company provides an undertaking that they are jointly or severally responsible for successful performance of the contract.

1.15 Details to be Confidential

The Contractor shall treat the details of the contract as private and confidential, except to the extent necessary to carry out obligations under it or to comply with applicable laws. The Contractor shall not publish, permit to be published or disclose any particulars of the works in any trade or technical paper or elsewhere without the previous agreement of the Employer.



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2.0 THE EMPLOYER

2.1 Right of Access to the Site

The Employer shall give the Contractor right of access to and possession of, all parts of the Site within the time (or times) stated in the Appendix to Tender. The right and possession may not be exclusive to the Contractor. If, under the Contract, the Employer is required to give (to the Contractor) possession of any foundation, structure, plant or means of access, the Employer shall do so in the time and manner stated in the Specification. However, the Employer may withhold any such right or possession until the Performance Security has been received.

If no such time is stated in the Appendix to Tender, the Employer shall give the Contractor right of access to, and possession of, the Site within such times as may be required to enable the Contractor to proceed in accordance with the programme submitted.

If the Contractor suffers delay and/or incurs Cost as a result of a failure by the Employer to give any such right or possession within such time, the Contractor shall give notice to the EMPLOYER/ ENGINEER and shall be entitled to

- (a) an extension of time for any such delay, if completion is or will be delayed
- (b) Payment of any such Cost-plus reasonable profit, which shall be included in the Contract Price.

After receiving this notice, the EMPLOYER/ENGINEER shall proceed to agree or determine these matters.

However, if and to the extent that the Employer's failure was caused by any error or delay by the Contractor, including an error in, or delay in the submission of, any of the Contractor's Documents, the Contractor shall not be entitled to such extension of time Cost or profit.

2.2 Permits, Licenses or Approvals

The Employer shall (where he is in a position to do so) provide reasonable assistance to the Contractor at the request of the Contractor:

- (a) By obtaining copies of the Laws of the Country which are relevant to the Contract but are not readily available, and
- (b) For the Contractor's applications for any permits, Licences or approvals required by the Laws of the Country:
- (c) For the delivery of Goods, including clearance through customs, and
- (d) For the export of Contractors Equipment when it is removed from the Site.

2.3 Employer's Personnel

The Employer shall be responsible for ensuring that the Employer's Personnel and the Employers' other contractors on the Site:

- (a) Co-operate with the Contractor's efforts under sub clause 4.6 (Co-operation)



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- (b) Take actions similar to those, which the Contractor is required to take under sub paragraphs of a, b and c of sub clause 4.8 (Safety procedures) and under sub clause 4.18 (protection of the environment)

2.4 Employer's Claims

If the Employer considers himself to be entitled to any payment under any Clause of these Conditions or otherwise in connection with the Contract, the Employer or the Employer shall give notice and particulars to the Contractor. However, notice is not required for payments due. The notice shall be given as soon as practicable after the Employer became aware of the event or circumstances giving rise to the claim.

The particulars shall specify the Clause or other basis of the claim, and shall include substantiation of the amount and/or extension to which the Employer considers himself to be entitled in connection with the Contract. Employer shall then proceed in accordance with the amount (if any) which the Employer is entitled to be paid by the Contractor.

This amount may be included as a deduction in the Contract Price and Payment Certificates. The Employer shall only be entitled to set off against or make any deduction from an amount certified in a Payment Certificate, or to otherwise claim against the Contractor.

3.0 ENGINEER

3.1 Engineer's Duties and Authority

The Employer shall appoint the Engineer who shall carry out the duties assigned to him in the Contract. The Engineer's staff shall include suitably qualified engineers and other professionals who are competent to carry out these duties.

The Engineer shall have no authority to amend the Contract

The Engineer may exercise the authority attributable to the Engineer as specified in or necessarily to be implied from the Contract. The Engineer shall obtain prior approval of the Employer for giving any instructions to the Contractor or taking any action on aspects, which are beyond the scope of the contract. The Employer shall not to impose constraints on the Engineer's authority, except as agreed with the Contract.

However, whenever the Engineer exercises a specified authority for which the Employer's approval is required, then (for the purposes of the Contract) the Employer shall be deemed to have given approval.

Except as otherwise stated in these Conditions:

- (a) Whenever carrying out duties or exercising authority, specified in or implied by the Contract, the Engineer shall be deemed to act for the Employer;
- (b) The Engineer has no authority to relieve either Party of any duties, obligations or responsibilities under the Contract; and



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- (c) Any approval, check, certificate, consent, examination, inspection, instruction, notice, proposal, request, test or similar act by the Engineer (including absence of disapproval) shall not relieve the Contractor from any responsibility he has under the Contract, including responsibility for errors, omissions, discrepancies and non-compliances.

3.2 Delegation by the Engineer

The Engineer may from time to time assign duties and delegate authority to assistants, and may also revoke such assignment or delegation. These assistants may include engineer(s), and/or Independent inspectors appointed to inspect and/or test items of Plant and/or Materials. The assignment, delegation or revocation shall be in writing and shall not take effect until copies have been received by both Parties. However, unless otherwise agreed by both Parties, the Engineer shall not delegate the authority to determine any matter in accordance with Sub-Clause 3.4 [*Determination*].

Assistants shall be suitably qualified persons, who are competent to carry out these duties and exercise this authority; and who are fluent in the language for communication defined in Sub-Clause 1.4 [*Law and Language*].

Each assistant, to whom duties have been assigned or authority has been delegated, shall only be authorized to issue instructions to the Contractor to the extent defined by the delegation. Any approval, check, certificate, consent, examination, inspection, instruction, notice, proposal, request, test, or similar act by an assistant, in accordance with the delegation, shall have the same effect as though the act had been an act of the Engineer However:

- (a) Any failure to disapprove any work, Plant or Materials shall not constitute approval, and shall therefore not prejudice the right of the Engineer to reject the work, Plant or Materials;
- (b) If the Contractor questions any determination or instruction of an assistant, the Contractor may refer the matter to the Engineer, who shall promptly confirm, reverse or vary the determination or instruction

3.3 Instructions of the Engineer

The Engineer may issue to the Contractor (at any time) instructions and additional or modified Drawings, which may be necessary for the execution of the works and the remedying of any defects, all in accordance with the Contract. The Contractor shall only take instructions from the Engineer, or from an assistant to whom the appropriate authority has been delegated under this Clause. If an instruction constitutes a Variation, Clause 12.0 [*Variations and Adjustments*] shall apply.

The Contractor shall comply with the instructions given by the Engineer or delegated assistant, on any matter related to the Contract. Whenever practicable, their instructions shall be given in writing. If the Engineer or a delegated assistant:

- (a) gives an oral instruction,



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- (b) receives a written confirmation of the instruction, from (or on behalf of) the Contractor, within two working days after giving the instruction, and does not reply by issuing a written rejection and/or instruction within two working days after receiving the confirmation, then the confirmation shall constitute the written instruction of the Engineer or delegated assistant (as the case may be).

3.4 Determination

Whenever these Conditions provide that the Engineer shall proceed in accordance with this Sub-Clause 3.4 to agree or determine any matter, the Engineer shall consult with each Party in an endeavour to reach agreement. If agreement is not achieved, the Engineer shall make a fair determination in accordance with the Contract, taking due regard of all relevant circumstances

The Engineer shall give notice to both Parties of each agreement or determination, with supporting particulars. Each Party shall give effect to each agreement or determination unless and until revised under Clause 19 [Claims, Disputes and Arbitration] and Clause 28 (Idle Time).

3.5 Management Meetings

The Engineer and or the Contractor's Representative may require attending a management meeting in order to review the progress and arrangements for future work. The Engineer shall record the business of management meetings and supply copies of the record to those attending the meeting.

4.0 THE CONTRACTOR

4.1 Contractor's General Obligations

The Contractor shall design (to the extent specified in the contract), execute and complete the Works in accordance with the Contract and with the EMPLOYER/ENGINEER's instructions, and shall remedy any defects in the Works.

The Contractor shall provide the Plant and Contractor's Documents specified in the contract, and all Contractor's Personnel, Goods, consumables and other things and services, whether of a temporary or permanent nature, required in and for the design, execution, completion and remedying of defects.

The Contractor shall be responsible for the adequacy, stability and safety of all Site operations and of all methods of construction. Except to the extent specified in the Contract, the Contractor (i) shall be responsible for all Contractor's Documents, Temporary Works, and such design of each item as is required for the item to be in accordance with the Contract, and (ii) shall not otherwise be responsible for the design or specification of the Permanent Works.

The Contractor shall, whenever required by EMPLOYER/ENGINEER, submit details of the arrangements and methods, which the Contractor proposes to adopt for the execution of the works. No significant alteration to these arrangements and methods



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shall be made without this having previously been notified to the ENGINEER / EMPLOYER.

If the Contract specifies that the Contractor shall design any part of the Permanent Works, then

- (a) the Contractor shall submit to the Engineer / EMPLOYER the Contractor's Documents for this part in accordance with the procedures specified in the Contract;
- (b) These Contractor's Documents shall be in accordance with the Specification and Drawings, shall be written in the language for communications and shall include additional information required by the Engineer to add to the Drawings for co-ordination of each Party's designs;
- (c) the Contractor shall be responsible for this part and it shall, when the Works are completed, be fit for such purposes for which the part is intended as are specified in the Contract; and
- (d) prior to the commencement of the Tests on Completion, the Contractor shall submit to the Engineer the "as-built" documents and operation and maintenance manuals in accordance with the Specification and in sufficient detail for the Employer to operate, maintain, dismantle, reassemble, adjust and repair this part of the Works. Such part shall not be considered to be completed for the purposes of taking-over under Sub-Clause 9.1 [Taking Over of the Works and Sections] until these documents and manuals have been submitted to the Engineer.

4.2 Performance Security

The Contractor shall obtain (at his cost) and submit a Performance Security for proper performance, in the amount, currencies and mode stated in the tender.

The Contractor shall deliver the Performance Security to the Employer **within 28 days** after receiving the Letter of Award, The Performance Security shall be issued by an entity and from within a country (jurisdiction) approved by the Employer, and shall be in the form annexed to the Particular Conditions or in another form approved by the Employer.

The Contractor shall ensure that the Performance Security is valid and enforceable until the Contractor has executed and completed the works and remedied any defects. If the terms of the Performance Security specify its expiry date, and the Contractor has not become entitled to receive the Performance Certificate by the date 28 days prior to the expiry date, the Contractor shall extend the validity of the Performance Security until the Works have been completed and any defects have been remedied.

The Employer shall not make a claim under the Performance Security, except for amounts to which the Employer is entitled under the Contract in the event of:



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- (a) failure by the Contractor to extend the validity of the Performance Security as described in the preceding paragraph, in which event the Employer may claim the full amount of the Performance Security,
- (b) failure by the Contractor to pay the Employer an amount due, within 42 days after this agreement or determination,
- (c) failure by the Contractor to remedy a default within 42 days after receiving the Employer's notice requiring the default to be remedied, or
- (d) Circumstances, which entitle the Employer to termination, irrespective of whether notice of termination has been given.

The Employer shall indemnify and hold the Contractor harmless against and from all damages, losses and expenses (including legal fees and expenses) resulting from a claim under the Performance Security to the extent to which the Employer was not entitled to make the claim.

The Employer shall return the Performance Security corresponding to the value of work of dredging, to the Contractor within one month after making final payment.

4.3 Contractor's Representative

The Contractor shall appoint the Contractor's Representative and shall give him all authority necessary to act on the Contractor's behalf under the Contract.

Unless the Contractor's Representative is named in the Contract, the Contractor shall, prior to the Commencement Date, submit to the Engineer / EMPLOYER for consent the name and particulars of the person the Contractor proposes to appoint as Contractor's Representative. If consent is withheld or subsequently revoked, or if the appointed person fails to act as Contractor's Representative, the Contractor shall similarly submit the name and particulars of another suitable person for such appointment.

The Contractor shall not, without the prior consent of the Engineer / EMPLOYER, revoke the appointment of the Contractor's Representative or appoint a replacement.

The whole time of the Contractor's Representative shall be given to directing the performance of the Contract. If the Contractor's Representative is to be temporary absent from the Site during the execution of the Works, a suitable alternative/replacement person shall be appointed, subject to the Engineer / EMPLOYER's prior consent, and the Engineer / EMPLOYER shall be notified accordingly.

The Contractor's Representative shall, on behalf of the Contractor, receive instructions

The Contractor's Representative may delegate any powers, functions and authority to any competent person, and may at any time revoke the delegation. Any delegation or revocation shall not take effect until the Engineer / EMPLOYER has received prior



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notice signed by the Contractor's Representative, naming the person and specifying the powers, functions and authority being delegated or revoked.

The Contractor's Representative and all these persons shall be fluent in the language for communications

If the Contractor's Representative or all the other persons are not fluent in the language for communication, the Contractor shall make a competent interpreter available during all working hours.

4.4 Subcontractors

The Contractor shall not subcontract the whole of the Works.

The Contractor shall be responsible for the acts or defaults of any Subcontractor, his agents or employees, as if they were the acts or defaults of the Contractor. However, unless otherwise stated,

- (a) The Contractor shall not be required to obtain consent to suppliers of Materials, which are in accordance with the standards specified in the contract.
- (b) The prior approval of the ENGINEER/ EMPLOYER shall be obtained for engaging proposed Subcontractors. In case subcontract is approved by Employer then;
 - i. The Contractor shall give the ENGINEER /EMPLOYER not less than 7 days' notice of the intended date of the commencement of each Subcontractor's work, and of the commencement of such work on the Site; and
 - ii. Each subcontract shall include provisions, which would entitle the Employer to require the subcontract to be assigned to the Employer under Sub-Clause 4.5 [Assignment of Benefit of Subcontract] (if or when applicable) or in the event of termination under Sub-Clause 14.2 [Termination by Employer].

4.5 Assignment of Benefit of Subcontract

If a Subcontractor's obligations extend beyond the expiry date of the relevant Defects Notification Period and the Engineer, prior to this date, instructs the Contractor to assign the benefit of such obligations to the Employer, then the Contractor shall do so. Unless otherwise stated in the assignment, the Contractor shall have no liability to the Employer for the work carried out by the Subcontractor after the assignment takes effect.

4.6 Co-operation

The Contractor shall, as specified in the Contract or as instructed by the Engineer, allow appropriate opportunities for carrying out work to:

- (a) the Employer's Personnel,



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- (b) any other contractors employed by the Employer, and
- (c) the personnel of any legally constituted public authorities,

Who may be employed in the execution on or near the Site of any work not included in the Contract.

Any such instruction shall constitute a Variation if and to the extent that it causes the Contractor to incur Unforeseeable Cost. Services for these personnel and other contractors may include the use of Contractor's Equipment, Temporary Works or access arrangements, which are the responsibility of the Contractor.

If, under the Contract, the Employer is required to give to the Contractor possession of any foundation, structure, plant or means of access in accordance with Contractor's Documents, the Contractor shall submit such documents to the EMPLOYER/ENGINEER in the time and manner stated in the Specification.

4.7 Setting out

The Contractor shall set out the Works in relation to original points, lines and levels of reference specified in the Contract or notified by the Engineer. The Contractor shall be responsible for the correct positioning of all parts of the Works, and shall rectify any error in the positions, levels, dimensions or alignment of the Works.

The Employer shall be responsible for any errors in these specified or notified items of reference, but the Contractor shall use reasonable efforts to verify their accuracy before they are used.

If the Contractor suffers delay and/or incurs Cost from executing work which was necessitated by an error in these items of reference, and an experienced contractor could not reasonably have discovered such error and avoided this delay and/or Cost, the Contractor shall give notice to the Engineer and shall be entitled subject to Sub-Clause 19.1 [Contractor's Claims] to:

- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 7.4 [Extension of Time for Completion], and
- (b) payment of any such Cost plus reasonable profit, which shall be included in the Contract Price.

After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.4 [Determinations] to agree or determine (i) whether and (if so) to what extent the error could not reasonably have been discovered, and (ii) the matters described in sub-paragraphs (a) and (b) above related to this extent.

4.8 Safety Procedures

The Contractor shall:

- (a) comply with all applicable safety regulations,
- (b) take care for the safety of all persons entitled to be on the Site,



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- (c) use reasonable efforts to keep the Site and Works clear of unnecessary obstruction so as to avoid danger to these persons
 - (d) provide fencing, lighting, guarding and watching of the Works until completion and taking over under Clause 9 [Employer's Taking Over], and
 - (e) provide any Temporary Works (including roadways, footways, guards and fences), which may be necessary, because of the execution of the Works, for the use and protection of the public and of owners and occupiers of adjacent land.
 - (f) shall have HSE plan in place and shall submit HSE plan to the Engineer prior to commencement of work for approval and implementation. HSE monthly return shall be submitted
 - (g) Shall carry out Risk Assessment as per standard practice.

4.9 Quality Assurance

The Contractor shall institute a quality assurance system to demonstrate compliance with the requirements of the Contract. The system shall be in accordance with the details stated in the Contract. The Engineer shall be entitled to audit any aspect of the system.

Details of all procedures and compliance documents shall be submitted to the Engineer for information before each design and execution stage is commenced. When any document of a technical nature is issued to the Engineer, evidence of the prior approval by the Contractor himself shall be apparent on the document itself.

Compliance with the quality assurance system shall not relieve the Contractor of any of his duties, obligations or responsibilities under the Contract.

4.10 Site Data

The Employer shall have made available to the Contractor for his information, prior to the Base Date, all relevant data in the Employer's possession on sub-surface and hydrological conditions at the Site, including environmental aspects. The Employer shall similarly make available to the Contractor all such data, which come into the Employer's possession after the Base Date. The Contractor shall be responsible for interpreting all such data.

To the extent which was practicable, the Contractor shall be deemed to have obtained all necessary information as to risks, contingencies and other circumstances which may influence or the Tender or Works. To the same extent, the Contractor shall be deemed to have inspected and examined the Site, its surroundings, the above data and other available information, and to have been satisfied before submitting the Tender as to all relevant matters, including (without limitation):

- (a) The form and nature of the Site, including sub-surface conditions, Details of bore-hole data of harbour basin is enclosed.



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- (b) The hydrological and climatic conditions,
- (c) The extent and nature of the work and Material and Goods necessary for the execution and completion of the Works and the remedying of any defects,
- (d) The Laws, procedures and labour practices of the Country, and the Contractor's requirements for access, accommodation, facilities, personnel, power, transport, water and other services.

4.11 Sufficiency of the Accepted Contract Amount

The Contractor shall be deemed to:

- (a) have satisfied himself as to the correctness and sufficiency of the Accepted Contract Amount, and
- (b) Have based the Accepted Contract Amount on the data provided, interpretations, necessary information, inspections, examinations and satisfaction. As to all relevant matters referred to in Sub-Clause 4.10 [Site Data].

Unless otherwise stated in the Contract, the Accepted Contract Amount covers all the Contractor's obligations under the Contract (including those under Provisional Sums; If any) and all things necessary for the proper execution and completion of the works and the remedying of any defects.

4.12 Unforeseeable Physical Conditions

In this Sub-Clauses, "physical conditions" means natural physical conditions and man-made & other physical obstructions and pollutants, which the Contractor encounters at the Site when executing the works, including sub-surface and hydrological conditions but excluding climatic conditions.

If the Contractor encounters adverse physical conditions, which he considers to have been Unforeseeable, the Contractor shall give notice to ENGINEER /EMPLOYER as soon as practicable/but in any case, within 24 hours.

This notice shall describe the physical conditions, so that they can be inspected by ENGINEER /EMPLOYER, and shall set out the reasons why the Contractor considers them to be Unforeseeable. The Contractor shall continue executing the Works, using such proper and reasonable measures as are appropriate for the physical conditions, and shall comply with any instructions, which the ENGINEER /EMPLOYER may give. If an instruction constitutes a Variation, Clause 12 [Variations and Adjustments] shall apply.

If and to the extent that the Contractor encounters physical conditions which are unforeseeable, gives such a notice, and suffers delay and/or incurs Cost due to these conditions, the Contractor shall be entitled to:

- (a) an extension of time for any such delay, if completion is or will be delayed, and



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(b) Payment of any such Cost, which shall be additional to the Contract Price.

After receiving such notice and inspecting and/or investigating these physical conditions, the ENGINEER /EMPLOYER shall proceed to agree or determine (i) whether and (if so) to what extent these physical conditions were Unforeseeable, and (ii) the matters described in subparagraphs (a) and (b) above related to this extent.

However, before additional Cost is finally agreed or determined under subparagraph (b), ENGINEER /EMPLOYER may also review whether other physical conditions in similar parts of the Works (if any) were more favourable than could reasonably have been foreseen when the Contractor submitted the Tender. If and to the extent that these more favourable conditions were encountered, the ENGINEER /EMPLOYER may proceed to agree or determine the reductions in Cost which were due to these conditions, which may be included (as deductions) in the Contract Price and Payment Certificates. However, the net effect of all adjustments under subparagraph (b) and all these reductions, for all the physical conditions encountered in similar parts of the Works, shall not result in a net reduction in the Contract Price.

ENGINEER /EMPLOYER may take account of any evidence of the physical conditions foreseen by the Contractor when submitting the Tender, which may be made available by the Contractor, but shall not be bound, by any such evidence.

4.13 Rights of Way and Facilities

The Contractor shall bear all costs and charges for special and/or temporary rights of-way which he may require, including those for access to the Site. The Contractor shall also obtain, at his risk and cost, any additional facilities outside the Site, which he may require for the purposes of the Works.

4.14 Avoidance of Interference

The Contractor shall not interfere unnecessarily or improperly with:

- (a) The convenience of the public, or
- (b) The access to and use and occupation of all roads and footpaths, irrespective of whether they are public or in the possession of the Employer or of others.

The Contractor shall indemnify and hold the Employer harmless against and from all damages, losses and expenses (including legal fees and expenses) resulting from any such unnecessary or improper interference.

4.15 Access Route

The Contractor shall be deemed to have been satisfied as to the suitability and availability of access routes to the Site. The Contractor shall use reasonable efforts to prevent any road or bridge from being damaged by the Contractor's traffic or by the Contractor's Personnel.

These efforts shall include the proper use of appropriate vehicles and routes.



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Except as otherwise stated in these Conditions:

- (a) the Contractor shall (as between the Parties) be responsible for any maintenance which may be required for his use of access routes;
- (b) the Contractor shall provide all necessary signs or directions along access routes, and shall obtain any permission which may be required from the relevant authorities for his use of routes, signs and directions;
- (c) the Employer shall not be responsible for any claims which may arise from the use or otherwise of any access route,
- (d) the Employer does not guarantee the suitability or availability of particular access routes, and
- (e) Costs due to non-suitability or non-availability, for the use required by the Contractor, of access routes shall be borne by the Contractor.

4.16 Transport of Goods

Unless otherwise stated in the Particular Conditions:

- (a) the contractor shall give the Engineer / EMPLOYER not less than 07 days' notice of the date on which any Plant or a major item of other Goods will be delivered to the Site;
- (b) the Contractor shall be responsible for packing, loading, transporting, receiving, unloading, storing and protecting all Goods and other things required for the Works; and
- (c) the Contractor shall indemnify and hold the Employer harmless against and from all damages, losses and expenses (including legal fees and expenses) resulting from the transport of goods, and shall negotiate and shall negotiate and pay all claims arising from their transport.

4.17 Contractor's equipment

The Contractor shall be responsible for all Contractors' equipment. When brought on to the Site, Contractor's equipment shall be deemed to be exclusively intended for the execution of the Works and shall be retained at the site till the completion of the work. The Contractor shall not remove from the Site any major items of Contractor's equipment without the consent of the EMPLOYER. However, consent shall not be required for vehicles transporting Goods or Contractor's Personnel off Site.

4.18 Protection of Environment

The Contractor shall take all reasonable steps to protect the environment (both on and off the Site) and to limit damage and nuisance to people and property resulting from pollution, noise and other results of his operations. The Contractor shall ensure that emissions, surface discharges and effluent from the Contractor's activities shall not exceed the values indicated in the Specification, and shall not exceed the values prescribed by applicable Laws.



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Dredging works shall be undertaken such a way as to ensure that these operations do not deteriorate the surface water quality. Adequate anti-pollution measures should be taken so that environmental quality is maintained.

Samples of harbour water and sediment to be collected at various points including off shore disposal area at least once in a 15 days and as the case may be and will have to be tested by a laboratory approved by Central/State Pollution Control Boards and test results will have to be submitted to EMPLOYER/ENGINEER for records. The tested sample result should be compared with primary water quality standards framed by Central water pollution Control Board (SW IV waters) and also back ground concentration values for other parameters.

Base Samples shall be collected one week prior to commencement of works

The parameters to be monitored are:

a) For water quality-

Physical properties- pH, EC, colour, odour, salinity, temperature, turbidity and total suspended solids.

Chemical properties- DO, BOD, COD, Oil & Grease, nutrients, sulphates, and chlorides.

Heavy metals: Fe, Zn, Mg, Cd, Cr, Hg

Marine biology: Phytoplankton & Zooplankton

b) For sediment quality-

Physical properties- pH, organic matter, nutrients, oil & grease

Heavy metals: Fe, Mn, Cd, Ni, Cr, Hg, Zn and Pb

Benthic Communities: Macro & Micro Benthic Flora and Fauna.

The Contractor shall observe the conservancy rules relating to the Harbour and shall always take such necessary additional steps to keep the harbour waters free of noxious or unhygienic matters coming from his works as are required by the Employer.

Under no circumstances shall inflammable material and untreated Sewage be allowed to spill to the Harbour area.

All the marine crafts engaged for the works shall comply with MARPOL regulations.

Any services rendered by Employer during the execution of contract will be chargeable as per KPL scale of rates.

4.19 Site facilities

The Contractor shall provide all services, amenities, water, temporary structures including security fencing and storage compounds, machinery, buildings and construction equipment necessary for the proper execution of the Works at Site at



his cost except for the items specified below, which may be provided by the Employer free of cost.

- (a) Total of 48 Hrs berth facility per month for dredgers for Maintenance subject to availability.
- (b) Temporary storage area of not exceeding 3000sq.m anywhere inside the port premises for the contractor's land based equipment, pipelines etc.
- (c) For facilitation, Small marine crafts which is less than 200 GRT shall be permitted at finger jetties at KPL subject to availability on free of cost for survey and utility purpose.

4.20 Progress Reports

Unless otherwise stated, monthly progress reports shall, be prepared by the Contractor and submitted to the ENGINEER /EMPLOYER in four copies. The first report shall cover the period up to the end of the first calendar month following the Commencement Date. Reports shall be submitted monthly thereafter, each within 7days after the last day of the period to which it relates.

Reporting shall continue until the Contractor has completed all work, which is known to be outstanding at the completion date, stated in the Taking-Over Certificate for the Works. Each report shall include:

- (a) charts and detailed descriptions of progress, including each stage of design (if any), Contractor's Documents, procurement, manufacture, delivery to Site, construction, erection and testing; and including these stages for work by each Subcontractor,
- (b) photographs showing the status of manufacture and of progress on the Site;
- (c) percentage progress, and the actual or expected dates of
 - i. commencement,
 - ii. Contractor's inspections,
 - iii. tests, and
 - iv. shipment and arrival at the Site;
- (d) copies of quality assurance documents, test results and certificates of Materials;
- (e) list of notices given under Sub-Clause 2.4 [Employer's Claims] and notices given under Sub-Clause 19.1 [Contractor's Claims];
- (f) safety statistics, including details of any hazardous incidents and activities relating to environmental aspects and public relations; and



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- (g) Comparisons of actual and planned progress, with details of any events or circumstances which may jeopardise the completion In accordance with the Contract, and the measures being (or to be) adopted to overcome delays.

The contractor shall also submit daily and weekly progress reports. The contractor prior commencing works shall submit reporting plan for approval of the Engineer which will be followed during the execution of the project

4.21 Security of the Site

Unless otherwise stated:

- a) the Contractor shall be responsible for keeping unauthorised persons off the Site, and
- b) authorised persons shall be limited to the Contractor's Personnel and the Employer's Personnel; and to any other personnel notified to the Contractor, by the Employer, as authorised personnel of the Employer's other contractors on the Site.

4.22 Contractor's Operations on Site

The Contractor shall confine his operations to the Site, and to any additional areas, which may be obtained by the Contractor and agreed by the EMPLOYER as working areas. The Contractor shall take all necessary precautions to keep Contractor's Equipment and Contractor's Personnel within the site and these additional areas, and to keep them off adjacent land.

During the execution of the Works, the Contractor shall keep the Site free from all unnecessary obstruction, and shall store or dispose of any Contractor's Equipment or surplus materials. The Contractor shall clear away and remove from the Site any wreckage, rubbish and Temporary Works, which are no longer, required.

Upon the issue of a Taking-Over Certificate, the Contractor shall clear away and remove, from that part of the Site and Works to which the Taking-Over Certificate refers, all Contractor's Equipment, surplus material, wreckage, rubbish and Temporary Works. The Contractor shall leave that part of the Site and the Works in a clean and safe condition.

4.23 Fossils

All fossils, coins, articles of value or antiquity, and structures and other remains or items of geological or archaeological interest found on the Site shall be placed under the care and authority of the Employer. The Contractor shall take reasonable precautions to prevent Contractor's Personnel or other persons from removing or damaging any of these findings.

The Contractor shall, upon discovery of any such finding, promptly give notice to the EMPLOYER/ENGINEER for further action. Payment for any such cost shall be included in the Contract Price.



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5.0 STAFF AND LABOUR

5.1 Engagement of Staff and Labour

Except as otherwise stated in the Specification, the Contractor shall make arrangements for the engagement of all staff and labour, local or otherwise, and for their payment, housing, feeding and transport.

5.2 Rates of Wages and Conditions of Labour

The Contractor shall pay rates of wages, and observe conditions of labour, which are not lower than those established for the trade or industry where the work is carried out. If no Established rates or conditions are applicable, the Contractor shall pay rates of wages and Observe conditions, which are not lower than the general level of wages, and conditions observed locally by employers whose trade or industry is similar to that of the Contractor.

5.3 Persons in the Service of Employer

The Contractor shall not recruit, or attempt to recruit, staff and labour from amongst the Employer's Personnel.

5.4 Labour Laws

The Contractor shall comply with all the relevant labour Laws applicable to the Contractor's Personnel, including Laws relating to their employment, health, safety, welfare, immigration and emigration, and shall allow them all their legal rights. The Contractor shall require his employees to obey all applicable Laws, including those concerning safety at work.

5.5 Working Hours

The contractor shall be permitted to work 24 x 7 and based on prior request, on locally recognized days of rest, stated in the Appendix to tender, unless:

- a) otherwise stated in the Contract,
- b) the Engineer gives consent, or

The work is unavoidable, or necessary for the protection of life or property or for the safety of the Works, in which case the Contractor shall immediately advise the Engineer.

However, dredging and marine related activities being specialized work, permit shall be given for working round the clock.

5.6 Facilities for Staff and Labour

Except as otherwise stated in the Specification, the Contractor shall provide and maintain all necessary accommodation and welfare facilities for the Contractor's Personnel. The Contractor shall also provide facilities for the Employer's Personnel as stated in the Specification.



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The Contractor shall not permit any of the Contractor's Personnel to maintain any temporary or permanent living quarters within the structures forming part of the Permanent Works or within the port premises.

5.7 Health and Safety

The Contractor shall at all times take all reasonable precautions to maintain the health and safety of the Contractor's Personnel. In collaboration with local health authorities, the Contractor shall ensure that medical staff, first aid facilities, sick bay and ambulance service are available at all times at the Site and at any accommodation for Contractor's and Employer's Personnel, and that suitable arrangements are made for all necessary welfare and hygiene requirements and for the prevention of epidemics.

The Contractor shall appoint a Safety officer round the clock at the Site, responsible for maintaining safety and protection against accidents. This person shall be qualified for this responsibility, and shall have the authority to issue instructions and take protective measures to prevent accidents. Throughout the execution of the Works, the Contractor shall provide whatever is required by this person to exercise this responsibility and authority.

The Contractor shall send, to EMPLOYER, details of any accident as soon as practicable after its occurrence. The Contractor shall maintain records and make Reports concerning health, safety and welfare of persons, and damage to property, as EMPLOYER may reasonably require.

5.8 Contractor's Superintendence

- a) Throughout the execution of the Works, and as long thereafter as is necessary to fulfil the Contractor's obligations, the Contractor shall provide all Necessary superintendence to plan, arrange, direct, manage, inspect and test the work.
- b) Superintendence shall be given by a sufficient number of persons having adequate knowledge of the language for communications and of the operations to be carried out (including the methods and techniques required, the hazards likely to be encountered and methods of preventing accidents), for the satisfactory and safe execution of the Works.
- c) A reasonable proportion of the Contractor's Superintending staff shall have a working knowledge of English or the Contractor shall have a sufficient number of competent interpreters available during all working hours.
- d) *Foreign Staff and Labour:*

The Contractor may appoint any foreign personnel or otherwise who are necessary for the execution of the works. The Contractor must ensure that these personnel are provided with the required residence visas and work permits. The Contractor shall be responsible for the return to the place where they were recruited or to their domicile of imported Contractor's personnel. In the event of



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the death in the Country of any of these personnel or members of their families, the Contractor shall similarly be responsible for making the appropriate arrangements for their return or burial.

e) Measures against Insect and Pest Nuisances:

The Contractor shall at all-time take necessary precautions to protect all staff and all labour employed on the site from insect and pest nuisance, and to reduce their danger to health. The Contractor shall provide suitable prophylactics for the Contractor's personnel and shall comply with all the regulations of the local health authorities, including use of appropriate insecticide.

f) Alcoholic Liquor or Drugs:

The Contractor shall not, otherwise than in accordance with the Laws of the Country, import, sell, give, barter or otherwise dispose of any alcoholic liquor or drugs or permit or allow importation, sale, gift, barter, or disposal by Contractor's Personnel.

g) Arms and Ammunition:

The Contractor shall not give, barter or otherwise dispose of to any person any arms or ammunition of any kind, or allow Contractor's Personnel to do so.

h) Festivals and Religious Customs:

The Contractor shall respect the Country's recognised festivals, days of rest and religious or other customs.

5.9 Contractor's Personnel

The Contractor's Personnel shall be appropriately qualified, skilled and experienced in their respective trades or occupations. EMPLOYER may require the Contractor to remove (or cause to be removed) any person employed on the Site or Works, including the Contractor's Representative if applicable, who:

- a) persists in any misconduct or lack of care,
- b) carries out duties incompetently or negligently,
- c) fails to conform to any provisions of the Contract, or
- d) Persists in any conduct, which is prejudicial to safety, health, or the protection of the environment.

If appropriate, the Contractor shall then appoint (or cause to be appointed) a suitable replacement person

5.10 Records of Contractor's Personnel and Equipment

The Contractor shall submit, to EMPLOYER, details showing the number of each class of Contractor's Personnel and of each type of Contractor's Equipment on the Site. Returns shall be submitted each calendar month, in a form approved by EMPLOYER, until the Contractor has completed all work, which is known to be



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outstanding at the completion date, stated In the Taking-Over Certificate for the Works.

5.11 Disorderly Conduct

The Contractor shall at all times take all reasonable precautions to prevent any unlawful, riotous or disorderly conduct by or amongst the Contractor's Personnel, and to preserve peace and protection of persons and property on and near the Site.

6.0 PLANT, MATERIALS AND WORKMANSHIP

6.1 Manner of Execution

The Contractor shall carry out the scope of dredging and reclamation works as the case may be and all other execution of the Works:

- (a) in the manner specified in the Contract,
- (b) in a proper workmanlike and careful manner, in accordance with recognised good practice, and
- (c) With properly equipped facilities and non-hazardous Materials, except as otherwise specified in the Contract.

6.2 Samples

Deleted

6.3 Inspection

Deleted

6.4 Testing

Deleted

6.5 Rejection

Deleted

6.6 Remedial Works

Notwithstanding any previous test or certification, the Engineer may instruct the Contractor to:

- (a) remove from the Site and replace any Plant or Materials which is not in accordance with the Contract,
- (b) remove and re-execute any other work which is not in accordance with the Contract, and
- (c) execute any work which is urgently required for the safety of the Works, whether because of an accident, unforeseeable event or otherwise.

The Contractor shall comply with the instruction within a reasonable time, which shall be the time (if any) specified in the instruction, or immediately if urgency is specified under sub-paragraph (c). If the Contractor fails to comply with the



instruction, the Employer shall be entitled to employ and pay other persons to carry out the work. Except to the extent that the Contractor would have been entitled to payment for the work, the Contractor shall pay to the Employer all costs arising from this failure.

Ownership of Plant and Materials

Each item of Plant and Materials shall, to the extent consistent with the Laws of the Country, become the property of the Employer at whichever is the earlier of the following times, free from liens and other encumbrance

- (a) when it is delivered to the Site;
- (b) when the Contractor is entitled to payment of the value of the

Plant and Materials under Sub-Clause 7.10 [Payment for Plant and Materials in Event of Suspension].

6.7 Royalties

Unless otherwise stated in the Specification, the Contractor shall pay all royalties, rents and other statutory payments for the scope of work for

- (a) Materials obtained from outside the Site, and
- (b) the disposal of material from demolitions and excavations and of other surplus material (whether natural or man-made) except to the extent that disposal area within the Site is specified in the Contract.

7.0 COMMENCEMENT, DELAYS AND SUSPENSIONS

7.1 Commencement of work

The Engineer shall give the Contractor not less than 7 days' notice of the Commencement date. Unless otherwise stated, the Commencement date shall be within 30 days after the Contractor receives the Letter of Award.

The Contractor shall commence the execution of the works as soon as is reasonably practicable after the Commencement Date and shall then proceed with the Works with due expedition and without delay.

7.2 Time of Completion, Compensation for Delay to Contractor's Negligence

The Contractor shall complete the whole of the Works, and each Section (if any), within the Time for Completion for the Works or Section (as the case may be), including:

- (a) achieving the passing of the Tests as required on Completion, and
- (b) Completing all works which is stated in the Contract as being required for the Works or section to be considered to be completed for the purposes of taking over. The entire project shall be taken over at one time, however at the entire



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discretion of the Employer partial taking over can be considered only in case of operational requirement of the section.

- (c) Time period for completion of work including mobilisation/demobilisation shall be **4 months) from the date** of commencement date indicated by Employer.

7.2.1 Liquidated Damages

In case of delay in completion of the contract, liquid damages (L.D) may be levied at the rate of ½% of the contract value per week of delay or part thereof, subject to a maximum of 10 per cent of the contract price.

The Employer, if satisfied, that the works can be completed by the contractor within a reasonable time after the specified time for completion, may allow further extension of time at its discretion with or without the levy of L.D. In the event of extension granted being with L.D, the Employer will be entitled without prejudice to any other right or remedy available in that behalf, to recover from the contractor as agreed damages equivalent to half per cent (1/2%) of the contract price of the works for each week or part of the week.

- (i) The Employer, if not satisfied that the works can be completed by the contractor and in the event of failure on the part of the contractor to complete work within further extension of time allowed as aforesaid, shall be entitled, without prejudice to any other right or remedy available in that behalf, to rescind the contract.
- (ii) The Employer, if not satisfied with the progress of the contract and in the event of failure of the contractor to recoup the delays in the mutually agreed time frame, shall be entitled to terminate the contract.
- (iii) In the event of such termination of the contract as described in Clauses-14.0 or both the Employer shall be entitled to cover L.D up to ten per cent (10%) of the contract value and forfeit the security deposit made by the contractor besides getting the work completed by other means at the risk and cost of the contractor.
- (iv) The ceiling of L.D is 10% of the contract price with applicable duties and taxes.
- (v) In case part/portions of the work can be commissioned and Port operates the portion for commercial purposes, the rate of L.D will be restricted to the uncompleted value of work, the maximum LD being on the entire contract value.

7.3 Programme

The Contractor shall submit a detailed time programme in the form of CPM/PERT chart to ENGINEER / EMPLOYER within 28 days after receiving the **LOA**. The Contractor shall also submit a revised / catch up programme whenever the previous programme is inconsistent with actual progress or with the Contractor's obligations. Each programme shall include:



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- (a) the order in which the (Contractor intends to carry out the Works, including the anticipated timing of each stage, Contractor's Documents, procurement, manufacture of Plant, delivery to Site, construction, erection and testing,
- (b) the sequence and timing of inspections and tests specified in the Contract, and
- (c) a supporting report which includes:
 - (i) A general description of the methods which the Contractor intends to adopt; and of the major stages, in the execution of the Works, and
 - (ii) Details showing the Contractor's reasonable estimate of the number of each class of Contractor's Personnel and of each type of Contractor's Equipment required on the Site for each major stage.

Unless ENGINEER / EMPLOYER, within 21 days after receiving a programme, gives notice to the Contractor stating the extent to which it does not comply with the Contract, the Contractor shall proceed in accordance with the programme, subject to his other obligations under- the Contract. The Employer's Personnel shall be entitled to rely upon the programme when planning their activities.

The Contractor shall promptly give notice to ENGINEER / EMPLOYER of specific probable future events or circumstances, which may adversely affect the work, increase the Contract Price or delay the execution of the Works. ENGINEER / EMPLOYER may require the Contractor to submit an estimate of the anticipated effect of the future event.

If, at any time, ENGINEER / EMPLOYER gives notice to the Contractor that a programme fails (to the extent stated) to comply with the Contract or to be consistent with actual progress and the Contractor's stated intentions, the Contractor shall submit a revised programme in the form of CPM/PERT chart to ENGINEER / EMPLOYER

7.4 Extension of Time for Completion

The Contractor shall be entitled to an extension of the Time for Completion if and to the extent that completion for the purposes of delay by any of the following causes:

- (a) a Variation (unless an adjustment to the Time for Completion has been agreed under Sub-clause 12.2[Variation procedure]) or other substantial change in the quantity of an item of work included in the Contract,
- (b) a cause of delay giving an entitlement to extension of time under a Sub-Clause of these Conditions,
- (c) exceptionally adverse climatic conditions,
- (d) Unforeseeable shortages in the availability of personnel or Goods caused by epidemic or pandemic or governmental actions, or



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- (e) Any delay, impediment or prevention caused by or attributable to the Employer, the Employer's Personnel, or the Employer's other contractors on the Site.

If the Contractor considers himself to be entitled to an extension of the Time for Completion, the Contractor shall give notice to ENGINEER / EMPLOYER in accordance with Sub-Clause 19.1 [Contractor's Claims]. When determining each extension of time under Sub-Clause 19.1, ENGINEER / EMPLOYER shall review previous determinations and may increase, but shall not decrease, the total extension of time. Further, extension of contract period shall be decided by the engineer as per tender condition including periods where idle charge is paid.

7.5 Delays caused by Authorities

If the following conditions apply, namely:

- (a) The Contractor has diligently followed the procedures laid down by the relevant legally constituted public authorities in the Country,
- (b) These authorities delay or disrupt the Contractor's work; and,
- (c) the delay or disruption was Unforeseeable, then this delay or disruption will be considered as a cause of delay under sub-paragraph (b) of Sub-Clause 7.4 [Extension of Time for Completion].

7.6 Rate of Progress

If, at any time actual progress is too slow to complete within the Time for Completion, other than as a result of a cause listed in Sub-Clause 7.4 [Extension of Time for Completion], then ENGINEER / EMPLOYER may instruct the Contractor to submit, under Sub -Clause 7.3[programme] a revised programme and supporting report describing the revised methods which the Contractor proposes to adopt in order to expedite progress and complete within the Time for Completion.

Unless the ENGINEER / EMPLOYER notifies otherwise, the Contractor shall adopt these revised methods, which may require increases in the working hours and/or in the numbers of Contractor's Personnel and/or Goods, at the risk and cost of the Contractor. If these revised methods cause the Employer to incur additional costs, the Contractor shall pay these costs to the Employer based on the determination of ENGINEER / EMPLOYER.

7.7 Contractor's responsibility

Notwithstanding the payment of liquidated damages if any, clause 7.2 this shall not relieve the contractor from his obligation to complete the work or from any other obligations / liabilities under this contract.

7.8 Suspension of Work

EMPLOYER may at any time instruct the Contractor to suspend progress of part or all of the Works. During such suspension, the Contractor shall protect, store and secure such part or the Works against any deterioration, loss or damage.



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EMPLOYER may also notify the cause for the suspension. If and to the extent that the cause is notified and is the responsibility of the Contractor, the following Sub Clauses 7.9, 7.10 and 7.11 shall not apply.

7.9 Consequences of Suspension

If the Contractor suffers delay and/or incurs Cost from complying with ENGINEER's / EMPLOYER's instructions under Sub-Clause 7.8 [Suspension of work] and/or from resuming the work, the Contractor shall give notice to EMPLOYER and shall be entitled subject to Sub-Clause 19.1 [Contractor's Claims] to:

an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 7.4 [Extension of Time for Completion], and

- (a) payment of any such Cost, which shall be included in the Contract Price.

After receiving this notice, the Engineer shall proceed in accordance with Sub Clause 3.4 [Determinations] to agree or determine these matters.

The Contractor shall not be entitled to an extension of time for, or to payment of the Cost incurred in, making good the consequences of the Contractor's faulty, workmanship or materials, or of the Contractor's failure to protect, store or secure in accordance with Sub-Clause 7.8 [*Suspension of Work*].

7.10 Payment for Equipment and Materials in Event of Suspension

The Contractor shall be entitled to payment of the value (as at the date of suspension) of Equipment and/or Materials which have not been delivered to Site, if:

- (a) the work on Plant or delivery of Equipment and/or Materials has been suspended for more than 28 days, and
- (b) The Contractor has marked the Equipment and/or Materials as the Employer's property in accordance with EMPLOYER's instructions, applicable as per the clause for idle time.

7.11 Prolonged Suspension

If the suspension under Sub-Clause 7.8 [Suspension of Work] has continued for more than 84 days, the Contractor may request EMPLOYER's permission to resume the works. If EMPLOYER does not give permission within 28 days after being requested to do so, the Contractor may, by giving notice to EMPLOYER, treat the suspension as an omission under Clause 12 [Variations and Adjustments] of the affected part of the Works. If the suspension affects the whole of the Works, the Contractor may give notice of termination under Sub-Clause 15.2 [Termination by Contractor].

7.12 Resumption of Work

After the permission or instruction to proceed is given, the Contractor and ENGINEER / EMPLOYER shall jointly examine the Works and the Plant and Materials affected by the suspension. The Contractor shall make good any



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deterioration or defect in or loss of the Works or Plant or Materials, which has occurred during the suspension.

8.0 TESTS ON COMPLETION

8.1 Contractor's obligation

Contractor shall carry out all tests as per requirement of this contract. No additional charges on any such account shall be payable by the Employer.

The Contractor shall give to the Engineer not less than 21 days' notice of the date after which the Contractor will be ready to carry out each of the Tests on completion. Unless otherwise agreed, Tests on completion shall be carried out within 14 days after this date, on such day or days as the Engineer shall instruct.

In considering the results of the Tests on Completion, the Engineer shall make allowances for the effect of any use of the Works by the Employer on the performance or other characteristics of the Works. As soon as the Works, or a Section, have passed any Tests on Completion, the Contractor shall submit a certified report of the results of these Tests to the Engineer.

8.2 Delayed Test

If the Contractor is prevented, for more than 14 days, from carrying out the survey on Completion by a cause for which the Employer is responsible, the Employer shall be deemed to have taken over the Works on the date when the survey on Completion would otherwise have been completed.

If the Contractor suffers delay and/or incurs Cost as a result of this delay in carrying out the survey on Completion, the Contractor shall give notice to EMPLOYER / ENGINEER and shall be entitled.

- (a) an extension of time for any such delay, if completion is or will be delayed, and
- (b) Payment of any such Cost plus reasonable profit, which shall be additional to the Contract Price.

After receiving this notice, ENGINEER / EMPLOYER shall proceed to agree or determine these matters.

8.3 Retesting

If the Works, or a Section, fail to pass the Tests on Completion, Sub-Clause 6.5[Rejection] shall apply, and the Engineer or the Contractor may require the failed Tests, and Tests on Completion on any related work, to be repeated under the same terms and conditions.

8.4 Failure to Remedy Defects

If the Contractor fails to remedy any damage within a reasonable time, a date may be fixed by (or on behalf of) the Employer, on or by which the damage is to be remedied. The Contractor shall be given reasonable notice of this date.



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If the Contractor fails to remedy the damage by this notified date and this Remedial work was to be executed at the cost of the Contractor.

- (a) carry out the work himself or by others, in a reasonable manner and at the Contractor's cost, but the Contractor shall have no responsibility for this work; and the Contractor shall pay to the Employer the costs reasonably incurred by the Employer in remedying the damage;
- (b) Require ENGINEER / EMPLOYER to agree or determine a reasonable reduction in the Contract Price.

9.0 EMPLOYER'S TAKING OVER

9.1 Taking over of the Works and Sections

Except as stated in Sub-Clause 8.4 [Failure to Remedy Defects], the Works shall be taken over by the Employer when (i) the Works have been completed in accordance with the Contract, including the matters described in Sub-Clause 7.2 [Time for Completion] and except as allowed in sub-paragraph (a), below, and (ii) a Taking-Over Certificate for the Works has been issued, or is deemed to have been issued in accordance with this Sub-Clause.

The Contractor may apply by notice to the Engineer for a Taking-Over Certificate not earlier- than 14 days before the Works will, in the Contractors opinion, be complete and ready for taking over. If the Works is divided into Sections, the Contractor may similarly apply for a Taking-Over Certificate for each Section.

The Engineer shall, within 28 days after receiving the Contractor's application:

- (a) issue the Taking-Over Certificate to the Contractor, stating the date on which the Works or Section were completed in accordance with the Contract, except for any minor outstanding work and defects which will not substantially affect the use of the Works or Section for their intended purpose (either until or whilst this work is completed and these defects are remedied);
- or
- (b) reject the application, giving reasons and specifying the work required to be done by the Contractor to enable the Taking-Over Certificate to be issued. The Contractor shall then complete this work before issuing a further notice under this Sub-Clause.

If the Engineer fails either to issue the Taking-Over Certificate or to reject the Contractor's application within the period of 28 days, and if the Works or Section (as the case may be) are substantially in accordance with the Contract, the Taking Over Certificate shall be deemed to have been issued on the last day of that period.

9.2 Taking Over of Parts of the Works

The Engineer may, at the sole discretion of the Employer, issue a Taking-Over Certificate for any part of the Permanent Works.

The Employer shall not use any part of the Works (other than as a temporary measure which is either specified in the Contract or agreed by both Parties) unless



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and until the Engineer has issued a Taking-Over Certificate for this part. However, if the Employer does use any part of the Works before the Taking-Over Certificate is issued:

- (a) the part which is used shall be deemed to have been taken over as from the date on which it is used,
- (b) the Contractor shall cease to be liable for the care of such part as from this date, when responsibility shall pass to the Employer, and
- (c) if requested by the Contractor, the Engineer shall issue a Taking-Over Certificate for this part.

After the Engineer has issued a Taking-Over Certificate for a part of the Works, the Contractor shall be given the earliest opportunity to take such steps as may be necessary to carry out any outstanding Tests on Completion. The Contractor shall carry out these Tests on Completion as soon as practicable before the expiry' date of the relevant Defects Notification Period.

If the Contractor incurs Cost as a result of the Employer taking over and/or using a part of the 'Works, other than such use as is specified in the Contract or agreed by the Contractor, the Contractor shall (i) give notice to the Engineer and (ii) be entitled subject to Sub-Clause 19.1 [Contractor's Claims] to payment of any such Cost plus reasonable profit, which shall be included in the Contract Price. After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.4 [Determinations] to agree or determine this Cost and profit.

In case part/portions of work can be commissioned and port operates the portion for commercial purposes, the rates of Liquidated Damage will be restricted to uncompleted / undelivered value of work beyond the stipulated date of completion. The defects notification period for the portions taken over in sections shall be as indicated in the appendix to tender.

9.3 Interference with Tests on Completion

If the Contractor is prevented, for more than 14 days, from carrying out the Tests on Completion by a cause for which the Employer is responsible, the Employer shall be deemed to have taken over the Works or Section (as the case may be) on the date when the Tests on Completion would otherwise have been completed.

The Engineer shall then issue a Taking-Over Certificate accordingly, and the Contractor shall carry out the Tests on Completion as soon as practicable, before the expiry date of the Defects Notification Period. The Engineer shall require the Tests on Completion to be carried out by giving 14 days' notice and in accordance with the relevant provisions of the Contract.

If the Contractor suffers delay and/or incurs Cost as a result of this delay in carrying out the Tests on Completion, the Contractor shall give notice to the Engineer and shall be entitled subject to Sub-Clause 19.1 [Contractor's Claims] to:



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- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 7.4 [Extension of Time for Completion], and
- (b) payment of any such Cost plus overheads and profit @ 15%, which shall be included in the Contract Price.

After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.4 [Determinations] to agree or determine these matters.

10.0 DEFECTS LIABILITY

10.1 Completion of Outstanding Work and Remedying Defects

In order that the works in Contract documents and each Section shall be in the condition required by the Contract (fair wear and tear accepted) by the expiry date of the relevant Defects Notification Period given in the appendix to tender or as soon as practicable thereafter, the Contractor shall:

- (a) complete any work which is outstanding on the date stated in a Taking-Over Certificate, within such reasonable time as is instructed by the Engineer, and
- (b) execute all work required to remedy defects or damage, as may be notified by (or on behalf of the Employer on or before the expiry date of the Defects Notification Period for the Works or Section (as the case may be).

There is no defect liability for dredging work.

10.2 Cost of Remedying Defects

Deleted.

10.3 Extension of Defects Notification Period

Deleted.

10.4 Failure to Remedy Defects

Deleted.

10.5 Removal of Defective Work

Deleted.

10.6 Further Tests

Deleted.

10.7 Right of Access

Until the Performance Certificate has been issued, the Contractor shall have such right of access to the Works as is reasonably required in order to comply with this Clause, except as may be inconsistent with the Employers reasonable security restrictions.



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10.8 Contractor to Search

The Contractor shall, if required by the Engineer, search for the cause of any defect, under the direction of the Engineer. Unless the defect is to be remedied at the cost of the Contractor under Sub-Clause 10.2 [Cost of Remedying Defects], the Cost of the search plus reasonable profit shall be agreed or determined by the Engineer in accordance with Sub-Clause 3.4 [Determinations] and shall be included in the Contract Price.

10.9 Performance Certificate

Performance of the Contractor's obligations shall not be considered to have been completed until the Engineer has issued the Performance Certificate to the Contractor, stating the date on which the Contractor completed his obligations under the Contract.

The Engineer shall issue the Performance Certificate within 28 days after the latest of the expiry dates of the Defects Notification Periods after completion of dredging in every section, length of which shall be determined by the Engineer, unless otherwise stated in Special Conditions of Contract (Section-V) or as soon thereafter as the Contractor has supplied all the Contractor's Documents and completed and tested all the Works, including remedying any defects. A copy of the Performance Certificate shall be issued to the Employer.

Only the Performance Certificate shall be deemed to constitute acceptance of the Works.

10.10 Unfulfilled Obligations

After the Performance Certificate has been issued, each Party shall remain liable for the fulfilment of any obligation, which remains unperformed at that time. For the purposes of determining the nature and extent of unperformed obligations, the Contract shall be deemed to remain in force.

10.11 Clearance of Site

Upon receiving the Performance Certificate, the Contractor shall remove any remaining Contractor's Equipment, surplus material, wreckage, rubbish and Temporary Works from the Site.

If all these items have not been removed within 28 days after the Employer receives a copy of the Performance Certificate, the Employer may sell or otherwise dispose of any remaining items. The Employer shall be entitled to be paid the costs incurred in connection with, or attributable to, such sale or disposal and restoring the Site.

Any balance of the moneys from the sale shall be paid to the Contractor. If these moneys are less than the Employer's costs, the Contractor shall pay the outstanding balance to the Employer.



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11.0 MEASUREMENT AND EVALUATION

11.1 Works to be measured

The Works shall be measured, and valued for payment, in accordance with this Clause.

Whenever ENGINEER / EMPLOYER requires any part of the Works to be measured, reasonable notice shall be given to the Contractor's Representative, who shall:

- (a) promptly either attend or send another qualified representative in making the measurement, and
- (b) Supply any particulars requested by ENGINEER / EMPLOYER.

If the Contractor fails to attend or send a representative, the measurement made by (or on behalf of) ENGINEER / EMPLOYER shall be accepted as accurate.

Except as otherwise stated in the Contract, wherever any Permanent Works are to be measured from records, these shall be prepared by ENGINEER / EMPLOYER. The Contractor shall, as and when requested, attend to examine and agree with the records with ENGINEER / EMPLOYER, and shall sign the same when agreed. If the Contractor does not attend, the records shall be accepted as accurate.

If the Contractor examines and disagrees with the records, and/or does not sign them as agreed, then the Contractor shall give notice to ENGINEER / EMPLOYER of the respects in which the records are asserted to be inaccurate. After receiving this notice, ENGINEER / EMPLOYER shall review the records and either confirm or vary them. If the Contractor does not so give notice to ENGINEER / EMPLOYER within 14 days after being requested to examine the records, they shall be accepted as accurate.

11.2 Method of Measurement

Except as otherwise stated in the Contract and notwithstanding local practice:

- (a) measurement shall be made of the net actual quantity of each item of the Permanent Works, and
- (b) the method of measurement shall be in accordance with the Bill of Quantities or other applicable Schedules.

11.3 Evaluation

Except as otherwise stated in the Contract, ENGINEER / EMPLOYER shall proceed to agree or determine the Contract Price by evaluating each item of work, applying the measurement agreed or determined in accordance with the appropriate rate or price for the item.

For each item of work, the appropriate rate or price for the item shall be the rate or price specified for such item in the Contract or, if there is no such item, specified for similar work. However, a new rate or price shall be appropriate for an item of work if:



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- (a) No specified rate or price is appropriate because the item of work is not of similar character, or is not executed under similar conditions, as any item in the Contract.
 - (b) Each new rate or price shall be derived from any relevant rates or prices in the Contract, with reasonable adjustments to take account of the matters described. If no rates or prices are relevant for the derivation of a new rate or price, it shall be derived from the reasonable cost of executing the work, together with reasonable profit, taking account of any other relevant matters.
 - (c) Until such time as an appropriate rate or price is agreed or determined, ENGINEER / EMPLOYER shall determine a provisional rate or price for the purposes of Interim Payment Certificates.

11.4 Omissions

Whenever the omission of any work forms part (or all) of a Variation, the value of which has not been agreed, if:

- (a) the Contractor will incur (or has incurred) cost which, if the work had not been omitted, would have been deemed to be covered by a sum forming part of the Contract price;
- (b) the omission of the work will result (or has resulted) in this sum not forming part of the Contract Price; and
- (c) This cost is not deemed to be included in the evaluation of any substituted work; then the Contractor shall give notice to ENGINEER / EMPLOYER accordingly, with supporting particulars. Upon receiving this notice, ENGINEER / EMPLOYER shall to agree or determine this cost, which shall be included in the Contract Price.

12.0 VARIATIONS AND ADJUSTMENTS

12.1 Right to Vary

The Engineer shall make any variation of the form, quality or quantity of the works or any part thereof that may, in his opinion, be necessary and for that purpose, or if for any other reason it shall, in his opinion, be appropriate, he shall have the authority to instruct the contractor to do and the contractor shall do any of the following.

- (a) Increase or decrease the quantity of any work included in the contract.
- (b) Omit any such work (partially or fully)
- (c) Change the character or quality or kind of any such work
- (d) Change the levels, lines, position and dimension of any part of the work
- (e) Execute additional work of any kind necessary for the completion of the work
- (f) Change any specified sequence or timing of dredging of any part of the works



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No such variation shall in any way vitiate or invalidate the contract, but the effect, if any, of all such variations shall be valued in accordance with clause 12.2, provided that where the issue of an instruction to vary the works is necessitated by some default of or breach of contract by the contractor or for which he is responsible, any additional cost attributable to such default shall be borne by the contractor.

The contractor shall not make any variation without an instruction of the Engineer. Provided that no instruction shall be required for increase or decrease in the quantity of any work where such increase or decrease is not the result of an instruction given under this clause but is the result of the quantities exceeding or being less than those stated in the Bill of Quantities.

It shall be noted that the quantities given under relevant items of Bill of quantities (BoQ) are only approximate and can be increased or decreased in the manner detailed in the pre paragraphs Notwithstanding the variations in quantities of individual items of BoQ, the overall increase/decrease in the contract value will be limited to plus or minus (\pm) 25% of the original contract value. No extra claim for reason what so ever shall be entertained in this regard.

The Variations may be initiated by EMPLOYER at any time prior to issuing the Taking-Over Certificate for the Works, either by an instruction or by a request for the Contractor to submit a proposal.

12.2 Variation procedure

All variations referred to in clause 12.1 of this section shall be valued in the following manner: -

- (a) At the rates and prices set out in the contract if, in the opinion of ENGINEER / EMPLOYER the same shall be applicable
- (b) If the contract does not contain any rates or prices applicable to the varied work, the rates and prices in the contract shall be used as the basis for valuation so far as may be reasonable failing which after due consultation by ENGINEER / EMPLOYER with the contractor, suitable rates or prices shall be agreed up on between ENGINEER / EMPLOYER and the contractor.
- (c) In the event of disagreement ENGINEER / EMPLOYER shall fix such rates or prices as are in his opinion appropriate shall notify the contractor accordingly

Until such time as rates or price are agreed or fixed ENGINEER / EMPLOYER shall determine provisional rates or prices to enable on-account payments to be included in certificates issued in accordance with clause -13.0

12.3 Price adjustment

The contract price will be subjected to adjustment on account of variation of price of the main fuel according to the formula below: -

$$V = 0.85(P - P_o) \times R \times Q$$

P_o



V= Variation in price on account of fuel during the month under consideration.

Po = Price of fuel fixed by the IOCL in the Port, 14 days prior to the bid due date.

P = **Average** Price of fuel fixed by the IOCL in the Port, for the month (average for 30 days) under consideration. The contractor shall declare type fuel used.

Q = Percentage of fuel component shall be 25%.

R = value of the work during the month under consideration as per relevant item of Bill of Quantities excluding mobilisation and demobilisation.

NOTE:

- (a) Fuel does not include any kind of lubricants
- (b) No escalation on any other account will be payable by the Employer and the rate should be quoted accordingly. Beyond the contract period and during extended completion period, the price adjustment payment shall be made at the **actual** price index prevailing on the original scheduled date of completion of work.

12.4 Payment in Applicable Currencies

All the payments under this contract shall be made in **Indian Rupees only**.

12.5 Provisional Sums

Each Provisional Sum shall only be used, in whole or in part, in accordance with the Engineer's instructions, and the Contract Price shall be adjusted accordingly. The total sum paid to the Contractor shall include only such amounts, for the work, supplies or services to which the Provisional Sum relates, as the Engineer shall have instructed. For each Provisional Sum, the Engineer may instruct:

- (a) Work to be executed (including Plant, Materials or services to be supplied) by the Contractor and valued under Sub-Clause 12.2 [Variation Procedure]; and/or
- (b) Plant, Materials or services to be purchased by the Contractor, and for which there shall be included in the Contract Price:
 - (i) the actual amounts paid (or due to be paid) by the Contractor, and
 - (ii) a sum for overhead charges and profit @ 15%, calculated as a percentage of these actual amounts by applying the relevant percentage rate (if any) stated in the appropriate Schedule. If there is no such rate, the percentage rate stated in the Appendix to Tender shall be applied.

The Contractor shall; when required by the Engineer, produce quotations, invoices, vouchers and accounts or receipts in substantiation.

12.6 Adjustments for Changes in Legislation

The Contract Price shall be adjusted to take account of any increase or decrease in Cost resulting from a change in the Laws of the Country (including the introduction



of new Laws and the repeal or modification of existing Laws) or in the judicial or official governmental interpretation of such Laws, made after the base date, which affect the Contractor in the performance of obligations under the Contract.

If the Contractor suffers (or will suffer) delay and/or incurs (or will incur) additional Cost as a result of these changes in the Laws or in such interpretations, made after the Base Date, the Contractor shall give notice to EMPLOYER and shall be entitled subject to Sub-clause 19.1[contractor's claim] to:

- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 7.4 [Extension of Time for Completion],
- (b) Payment of any such Cost, which shall be included in the Contract Price.
- (c) After receiving this notice, ENGINEER / EMPLOYER shall proceed in accordance with Sub Clause 3.4 [Determinations] to agree or determine these matters.
- (d) Base date is defined as under clause 1.1.18 of this section.

13.0 CONTRACT PRICE AND PAYMENT

13.1 The Contract Price

- (a) the Contact Price shall be agreed and be subject to adjustments in accordance with the Contract;
- (b) the Contractor shall pay all taxes, duties and fees required to be paid by him under the Contract, and the Contract Price shall not be adjusted for any of these costs except as stated in Sub-Clause 12.6[*Adjustments for Changes in Legislation*];
- (c) any quantities which may be set out in the Bill of Quantities or other Schedule are estimated quantities and are not to be taken as the actual and correct quantities:
 - (i) of the Works which the Contractor is required to execute, or
 - (ii) for the purposes of Clause 11.0 [*Measurement and Evaluation*];

13.2 Advance Payment

The employer shall not make any advance payment for reason whatsoever other than specified in the bill of quantities.

13.3 Application for Interim Payment Certificates

The Contractor shall submit a Statement in four copies to ENGINEER / EMPLOYER after the end of each month, in a form approved by EMPLOYER, showing in detail the amounts to which the Contractor considers himself to be entitled, together with supporting documents which shall include the report on the progress during this month.

The Statement shall include the following items, as applicable, which shall be expressed in the agreed currencies in which the Contract Price is payable, in the sequence listed:



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- (a) The contract value of the Works executed and the Contractor's Documents produced up to the end of the month (including 'variations but excluding items described in sub-paragraphs (b) to (e) below);
- (b) Any amounts to be added and deducted for changes in legislation and changes in cost, any amount to be deducted for retention, calculated by applying the percentage of retention stated in the Appendix to Tender to the total of the above amounts;
- (c) Any amounts to be deducted towards repayments of advances.
- (d) Any other additions or deductions which may have become due under the Contract or otherwise and
- (e) The deduction of amounts certified in all previous Payment Certificates.

13.4 Schedule of Payments

- (a) The instalments quoted in this schedule of payments shall be the estimated contract values for the purposes of sub-paragraph (a) of Sub-Clause 13.3 [Application for Interim Payment Certificates];
- (b) If these instalments are not defined by reference to the actual progress achieved in executing the Works, and if actual progress is found to be less than that on which this schedule of payments was based, then the Engineer may proceed in accordance with Sub-Clause 3.4 [Determinations] to agree or determine revised instalments, which shall take account of the extent to which progress is less than that on which the instalments were previously based.

13.5 Issue of Interim Payment Certificates

No amount will be certified or paid until the Employer has received and approved the Performance Security. Thereafter, ENGINEER shall, within 15 days after receiving a Statement and supporting documents, issue to the Employer an Interim Payment Certificate, which shall state the amount, which EMPLOYER fairly determines to be due, with supporting particulars.

However, prior to issuing the Taking-Over Certificate for the Works, EMPLOYER shall not be bound to issue an Interim Payment Certificate in an amount which would (after retention and other deductions) be less than the minimum amount of interim Payment Certificates (if any). EMPLOYER shall give notice to the Contractor accordingly.

An Interim Payment Certificate shall not be withheld for any other reason, although:

- (a) if anything supplied or work done by the Contractor is not in accordance with the Contract, the cost of rectification or replacement may be withheld until rectification or replacement has been completed; and/or



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- (b) if the Contractor was or is falling to perform any work or obligation in accordance with the Contract, and had been so notified by EMPLOYER, the value of this work or obligation may be withheld until the work or obligation has been performed.

EMPLOYER may in any Payment Certificate make any correction or modification that should properly be made to any previous Payment Certificate. A Payment Certificate shall not be deemed to indicate EMPLOYER's acceptance, approval, consent or satisfaction.

13.6 Payment in the prescribed form

The Employer shall pay to the Contractor:

- (a) 75% payment release within 15 days against the monthly submitted bills and remaining 25% payment shall release within next 15 days. The bills have to be submitted in duplicate along with other relevant documents like charts, volume calculation, etc.
- (b) the amount certified in the Final Payment Certificate within 56 days after the Employer receives this Payment Certificate.
- (c) Payment of the amount due shall be made into the bank account, declared by the Contractor.

13.7 Delayed Payment- Not Applicable

13.8 Retention Money – Refer clause 9 of Section -III

13.9 Statement at Completion

Within 28 days after receiving the Taking-Over Certificate for the Works, the Contractor shall submit to EMPLOYER, four copies of a Statement at completion with supporting documents,

- (a) the value of all work done in accordance with the Contract up to the date stated in the Taking-Over Certificate for the Works,
- (b) any further sums which the Contractor considers to be due, and
- (c) An estimate of any other amounts, which the Contractor considers, will become due to him under the Contract. Estimated amounts shall be shown separately in this Statement at completion.

13.10 Application for Final Payment Certificate

Within 56 days after receiving the Performance Certificate, the Contractor shall submit, to Engineer, four copies of a draft final statement with supporting documents showing in detail in a form approved by EMPLOYER:

- (a) the value of all work done in accordance with the Contract, and
- (b) Any further sums which the Contractor considers to be due to him under the Contract or otherwise.



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If Engineer disagrees with or cannot verify any part of the draft final statement, the Contractor shall submit such further information as Engineer may reasonably require and shall make such changes in the draft as may be agreed between them. The Contractor shall then prepare and submit to Engineer the final statement as agreed. This agreed statement is referred to in these Conditions as the "Final Statement".

However, if, following discussions between Engineer and the Contractor and any changes to the draft final statement which are agreed, it becomes evident that a dispute exists, Engineer shall deliver to the Employer (with a copy to the Contractor) an Interim Payment Certificate for the agreed parts of the draft final statement. Thereafter, if the dispute is finally resolved as per relevant clause, the Contractor shall then prepare and submit to the Engineer (with a copy to EMPLOYER) a Final Statement.

13.11 Discharge

When submitting the Final Statement, the Contractor shall submit a written discharge, which confirms that the total of the Final Statement represents full and final settlement of all moneys due to the Contractor under or in connection with the Contract. This discharge may state that it becomes effective when the Contractor has received the Performance Security and the outstanding balance of this total, in which event the discharge shall be effective on such date.

13.12 Issue of Final Payment Certificate

Within 28 days after receiving the Final Statement and written discharge in accordance with Sub-Clause 13.10 [Application for Final Payment Certificate] and Sub-Clause 13.11 [Discharge], Engineer shall issue, to the Employer, the Final Payment Certificate which shall state:

- (a) the amount which is finally due, and
- (b) after giving credit to the Employer for all amounts previously paid by the Employer and for all sums to which the Employer is entitled, the balance (if any) due from the Employer to the Contractor or from the Contractor to the Employer, as the case- may be.

If the Contractor has not applied for a Final Payment Certificate in accordance with Sub-Clause 13.10 [*Application for Final Payment Certificate*] and Sub-Clause 13.11 [*Discharge*], *Engineer* shall request the Contractor to do so. If the Contractor fails to submit an application within a period of 28 days, Engineer shall issue the Final Payment Certificate for such amount as he fairly determines to be due.

13.13 Cessation of Employer's Liability

The Employer shall not be liable to the Contractor for any matter or thing under or in connection with the Contract or execution of the Works, except to the extent that the Contractor shall have included an amount expressly for it:

- (a) in the Final Statement and also



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- (b) (Except for matters or things arising after the issue of the Taking-Over Certificate for the Works) in the Statement at completion described in Sub-Clause 13.9 [Statement at Completion].

However, this Sub-Clause shall not limit the Employer's liability under his indemnification obligations, or the Employer's liability in any case of fraud, deliberates default or reckless misconduct by the Employer.

13.14 Currencies of Payment

The Contract Price shall be paid in the INR currency.

- (i) payments and deductions under Sub-Clause 12.6 [*Adjustments for Changes in Legislation*] shall be made in the above currencies and
- (ii) other payments and deductions under sub-paragraphs (a) to (d) of Sub-Clause 13.3 [*Application for Interim Payment Certificates*] shall be made in the above currencies;
 - (a) payment of the damages shall be made in the above currencies;
 - (b) other payments to the Employer by the Contractor shall be made in the currency in which the sum was expended by the Employer, or in such currency as may be agreed by both Parties;
 - (c) If any amount payable by the Contractor to the Employer in a particular currency exceeds the sum payable by the Employer to the Contractor in that currency, the Employer may recover the balance of this amount from the sums otherwise payable to the Contractor.

14.0 TERMINATION BY EMPLOYER

14.1 Notice to make good failure of contractor

If the Contractor fails to carry out any obligation under the Contract, EMPLOYER may by notice require the Contractor to make good the failure and to remedy it within a specified reasonable time.

14.2 Termination by Employer

The Employer shall be entitled to terminate the Contract if the Contractor:

- (a) fails to comply with Sub-Clause 4.2 [Performance Security] or with a notice under Sub-Clause 14.1 [Notice to Correct],
- (b) abandons the Works or otherwise plainly demonstrates the intention not to continue performance of his obligations under the Contract,
- (c) without reasonable excuse fails:
 - (i) to proceed with the Works in accordance with Clause 7.0 [Commencement, Delays and Suspension],or
 - (ii) subcontracts the whole of the Works or assigns the Contract without the required agreement,



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- (d) becomes bankrupt or insolvent, goes into liquidation, has a receiving or administration order- made against him, compounds with his creditors, or carries on business under a receiver, trustee or manager for the benefit of his creditors, or if any act is done or event occurs which (under applicable Laws) has a similar effect to any of these acts or events, or
- (e) gives or offers to give (directly or indirectly) to any person any bribe, gift, gratuity, commission or other thing of value, as an inducement or reward:
- (f) for doing or forbearing to do any action in relation to the Contract, or
- (g) for showing or forbearing to show favour or disfavour to any person in relation to the Contract,
- (h) Or if any of the Contractor's Personnel, agents or Subcontractors gives or offers to give (directly or indirectly) to any person any such inducement or reward as is described in this sub-paragraph (f). However lawful inducements and rewards to Contractor's Personnel shall not entitle termination.

In any of these events or circumstances, the Employer may, upon giving 14 days' notice to the Contractor terminate the Contract and expel the Contractor from the Site. However, in the case of sub-paragraph (e) or (f), the Employer may by notice terminate the Contract immediately.

The Employer's decision to terminate the Contract shall not prejudice any other rights of the Employer, under the Contract or otherwise.

The Contractor shall then leave the Site and deliver any required Goods, all Contractors' Documents, and other design documents made by or for him, to the Engineer. However, the Contractor shall use his best efforts to comply immediately with any reasonable instructions included in the notice (i) for the assignment of any subcontract, and (ii) for the protection of life or property or for the safety of the Works.

After termination, the Employer may complete the Works and/or arrange for any other entities to do so at the risk and cost of the Contractor. The Employer and these entities may then use any equipment, goods, Contractor's Documents and other design documents made on behalf of the Contractor.

The Employer shall then give notice that the Contractor's Equipment and Temporary Works will be released to the Contractor at or near the Site. The Contractor shall promptly arrange their removal, at the risk and cost of the Contractor. However, if by this time the Contractor has failed to make a payment due to the Employer, these items may be sold by the Employer in order to recover this payment. Any balance of the proceeds shall then be paid to the Contractor.

14.3 Valuation at Date of Termination

As soon as practicable after a notice of termination has taken effect, ENGINEER / EMPLOYER shall proceed to agree or determine the value of the Works, Goods and



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Contractor's Documents, and any other sums due to the Contractor for work executed in accordance with the Contract.

14.4 Payment after Termination

After a notice of termination has taken effect, the Employer may proceed

- (a) withhold further payments to the Contractor until the costs of execution, completion and remedying of any defects, damages for delay in completion (if any), and all other costs incurred by the Employer, have been established, and/or
- (b) recover from the Contractor any losses and damages incurred by the Employer and any extra costs of completing the Works, after allowing for any sum due to the Contractor. After recovering any such losses, damages and extra costs, the Employer shall pay any balance to the Contractor.

14.5 Employer's Entitlement to Termination

The Employer shall be entitled to terminate the Contract, at any time for the Employer's Convenience, by giving notice of such termination to the Contractor. The termination shall take effect 14 days after the later of the dates on which the Contractor receives this notice or the Employer returns the Performance Security. The Employer shall not terminate the Contract under this Sub-Clause in order to execute the Works himself or to arrange for the Works to be executed by another contractor.

After this termination, the Contractor shall proceed in accordance with Sub Clause 15.3 [Cessation of Work and Removal of Contractor's Equipment] and shall be paid in accordance with Sub-Clause 18.6 [Optional Termination, Payment and Release].

15.0 SUSPENSION AND TERMINATION BY CONTRACTOR

15.1 Contractor's Entitlement to Suspend Work

If EMPLOYER fails to certify in accordance with Sub Clause 13.5 (Issue of Interim Payment Certificate) or Sub Clause 13.6 (Payment) the Contractor may, after giving not less than 21 days' notice to the Employer, suspend work (or reduce the rate of work) unless and until the Contractor has received the Payment Certificate, reasonable evidence or payment, as the case may be and as described in the notice.

The Contractor's action shall not prejudice his entitlements to financing charges to termination.

If the Contractor subsequently receives such Payment Certificate, evidence or payment (as described in the relevant Sub-Clause and in the above notice.) before giving a notice of termination, the Contractor shall resume normal working as soon as is reasonably practicable.

If the Contractor suffers delay and/or incurs Cost as a result of suspension of work (or reducing the rate of work) in accordance with this Sub-Clause, the Contractor shall give notice to EMPLOYER and shall be entitled, an extension of time for any



such delay, if completion is or will be delayed, payment of any such Cost plus reasonable profit, which shall be included in the Contract Price.

15.2 Termination by Contractor

The Contractor shall be entitled to terminate the Contract if:

- (a) EMPLOYER fails, within 56 days after receiving a Statement and supporting documents; to issue the relevant Payment Certificate,
- (b) The Contractor does not receive the amount due under an Interim Payment Certificate within 42 days after the expiry of the time stated in Sub-Clause 13.6[*Payment*]within which payment is to be made (except for deductions in accordance with Sub-Clause 2.4[*Employer's Claims*]),
- (c) The Employer substantially fails to perform his obligations under the Contract,
- (d) The Employer fails to comply with Sub-Clause 1.6[*Contract Agreement*]
- (e) A prolonged suspension affects the whole of the Works as described in Sub Clause 7.11[*Prolonged Suspension*], or

In any of these events or circumstances, the Contractor may, upon giving 14 days' notice to the Employer, terminate the Contract.

The Contractor's decision to terminate the Contract shall not prejudice any other rights of the Contractor, under the Contract or otherwise.

15.3 Cessation of Work and Removal of Contractor's Equipment

After a notice of termination under Sub-Clause 14.5 [Employer's Entitlement to Termination], Sub-Clause 15.2 [Termination by Contractor] or Sub-Clause 18.6 [Optional Termination, Payment and Release] has taken effect, the Contractor shall promptly:

- (a) cease all further work, except for such work as may have been instructed by ENGINEER / EMPLOYER for the protection of life or property or for the safety of the Works,
- (b) hand over Contractor's Documents, Plant, Materials and other work, for which the Contractor has received payment, and
- (c) Remove all other Goods from the Site, except as necessary for safety, and leave the Site.

15.4 Payment on Termination

After a notice of termination under Sub-Clause 15.2 [Termination by Contractor] has taken effect, the Employer shall promptly:

- (a) return the Performance Security to the Contractor,
- (b) pay the Contractor in accordance with Sub-Clause 18.6 [Optional Termination, Payment and Release], and



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16.0 RISK AND RESPONSIBILITY

16.1 Indemnities

The Contractor shall indemnify and hold harmless the Employer, the Employer's Personnel, and their respective agents, against and from all claims, damages, losses and expenses (including legal fees and expenses) in respect of:

bodily injury, sickness, disease or death, of any person whatsoever arising out of or in the course of or by reason of the Contractor's design (if any), the execution and completion of the Works and the remedying of any defects, unless attributable to any negligence, wilful act or breach of the Contract by the Employer, the Employer's Personnel, or any of their respective agents, and damage to or loss of any property, real or personal (other than the Works), to the extent that such damage or loss:

- (i) arises out of or in the course of or by reason of the Contractor's design (if any), the execution and completion of the Works and the remedying of any defects, and
- (ii) Is attributable to any negligence, wilful act or breach of the Contract by the Contractor, the Contractor's Personnel, their respective agents, or anyone directly or indirectly employed by any of them.

The Employer shall indemnify and hold harmless the Contractor, the Contractor's Personnel, and their respective agents, against and from all claims; damages, losses and expenses (including legal fees and expenses) in respect of (1) bodily injury, sickness' disease or death, which is attributable to any negligence, wilful act or breach of the Contract by the Employer, the Employer's Personnel, or any of their respective agents, and (2) the matters for which liability may be excluded from Insurance cover.

16.2 Contractor's Care of the Works

The Contractor shall take full responsibility for the care of the Works and Goods from the Commencement Date until the Taking-Over Certificate is issued (or is deemed to be issued) for the works, when responsibility for the care of the Works shall pass to the Employer. If a Taking-Over Certificate is issued (or is so deemed to be issued) for any Section or part of the Works, responsibility for the care of the Section or part shall then pass to the Employer.

After responsibility has accordingly passed to the Employer, the Contractor shall take responsibility for the care of any work, which is outstanding on the date stated in a Taking-Over Certificate, until this outstanding work has been completed.

If any loss or damage happens to the Works, Goods or Contractor's Documents during the period when the Contractor is responsible for their care, from any cause not listed the Contractor shall rectify the loss or damage at the Contractor's risk and cost, so that the Works, Goods and Contractor's Documents conform with the Contract.



The Contractor shall be liable for any loss or damage caused by any actions performed by the Contractor after a Taking-Over Certificate has been issued. The Contractor shall also be liable for any loss or damage, which occurs after a Taking Over Certificate, has been issued and which arose from a previous event for which the Contractor was liable.

16.3 Employer's Risks

The risks referred to in Sub-Clause 16.4 below are:

- (a) war, hostilities (whether war be declared or not), invasion, act of foreign enemies, rebellion, terrorism, revolution, insurrection, military or usurped power, or civil war, within the Country,
- (b) riot, commotion or disorder within the Country by persons other than the Contractor's Personnel and other employees of the Contractor and Subcontractors,
- (c) munitions of war, explosive materials, ionising radiation or contamination by radio-activity, within the Country, except as may be attributable to the Contractor's use of such munitions, explosives, radiation or radio-activity,
- (d) pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speeds,
- (e) design of any part of the Works by the Employer's Personnel or by others for whom the Employer is responsible, and
- (f) any operation of the forces of nature which is Unforeseeable or against, which an experienced contractor could not reasonably have been expected to have taken adequate preventative precautions.

16.4 Consequences of Employer's Risks

If and to the extent that any of the risks listed in Sub-Clause 16.3 above results in loss or damage to the Works, Goods or Contractor's Documents, the Contractor shall promptly give notice to the Engineer and shall rectify this loss or damage to the extent required by the Engineer.

If the Contractor suffers delay and/or incurs Cost from rectifying this loss or damage, the Contractor shall give a further notice to the Engineer and shall be entitled subject to Sub-Clause 19.1 [Contractor's Claims] to:

- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 7.4 [Extension of Time for Completion], and
- (b) payment of any such Cost, which shall be, included in the Contract Price in the case of sub-paragraphs (e) and (f) of Sub-Clause 16.3 [Employer's Risks], reasonable profit on the Cost shall also be included.

After receiving this further notice, the Engineer shall proceed in accordance with Sub- Clause 3.4 [Determinations] to agree or determine these matters.



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16.5 Intellectual and Industrial Property Rights

In this Sub-Clause, "infringement" means an infringement (or alleged infringement) of any patent, registered design, copyright, trademark, trade name, trade secret or other intellectual or industrial property right relating to the Works; and "claim" means a claim (or proceedings pursuing a claim) alleging an infringement.

Whenever a Party does not give notice to the other Party of any claim within 28 days of receiving the claim, the first Party shall be deemed to have waived any right to indemnity under this Sub-Clause.

The Employer shall Indemnify and hold the Contractor harmless against and from any claim alleging an infringement which is or was:

- (a) an unavoidable result of the Contractor's compliance with the Contract, or
- (b) a result of any Works being used by the Employer:
 - (i) for a purpose other than that indicated by, or reasonably to be inferred from, the Contract, or
 - (ii) In conjunction with anything not supplied-by the Contractor, unless such use was disclosed to the Contractor prior to the Base Date or is stated in the Contract.

The Contractor shall indemnify and hold the Employer harmless against and from any other claim which arises out of or in relation to (i) the manufacture, use, sale or import of any Goods, or (ii) any design for which the Contractor is responsible.

If a Party is entitled to be indemnified under this Sub-Clause, the indemnifying Party may (at its cost) conduct negotiations for the settlement of the claim, and any litigation or arbitration, which may arise from it. The other Party shall, at the request and cost of the indemnifying Party, assist in contesting the claim. This other Party (and its Personnel) shall not make any admission, which might be prejudicial to the indemnifying Party, unless the indemnifying Party failed to take over the conduct of any negotiations, Litigation or arbitration upon being requested to do so by such other Party.

16.6 Limitation of Liability

Neither Party shall be liable to the other Party for loss of use of any Works, loss of profit, loss of any contract or for any indirect or consequential loss or damage which may be suffered by the other Party in connection with the Contract.

The total liability of the Contractor to the Employer, under or in connection with the Contract shall not exceed Accepted Contract Amount.

This Sub-Clause shall not limit liability in any case of fraud, deliberate default or reckless misconduct by the defaulting Party.



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17.0 INSURANCE

17.1 General Requirements for Insurance

The Contractor shall be responsible for effecting and maintaining the insurance specified in the relevant Sub-Clause.

Each insurance shall be effected with insurers and in terms approved by the ENGINEER / EMPLOYER. These terms shall be consistent with any terms agreed by both Parties before the date of the Letter of Award. This agreement of terms shall take precedence over the provisions of this Clause.

Each policy insuring against loss or damage shall provide for payments to be made in the currencies required to rectify the loss or damage. Payments received from insurers shall be used for the rectification of the loss or damage.

The Contractor shall, within the respective periods stated in the Appendix to Tender (calculated from the Commencement Date), submit to the Employer:

- (a) evidence that the insurances described in this Clause have been effected, and
- (c) copies of the policies for the insurances described in Sub-Clause 17.2 [Insurance for Works and Contractor's Equipment] and Sub-Clause 17.3 [Insurance against Injury Persons and Damage to Property].

When each premium is paid, the Contractor shall submit evidence of payment to the Employer.

The Contractor shall comply with the conditions stipulated in each of the insurance policies. The Contractor shall keep the insurers informed of any relevant changes to the execution of the Works and ensure that insurance is maintained in accordance with this Clause.

The Contractor shall not make any material alteration to the terms of any insurance without the prior approval of the other Employer. If the Contractor makes (or attempts to make) any alteration, the same shall be informed to the Employer in advance.

If the Contractor fails to effect and keep in force any of the insurances it is required to effect and maintain under the Contract, or fails to provide satisfactory evidence and copies of policies in accordance with this Sub-Clause, the Employer may (at its option and without prejudice to any other right or remedy) effect insurance for the relevant coverage and pay the premiums due. The Contractor shall pay the amount of these premiums to the Employer, and the Contract Price shall be adjusted accordingly.

Nothing in this Clause limits the obligations, liabilities or responsibilities of the Contractor, under the other terms of the Contract or otherwise. Any amounts not insured or not recovered from the insurer shall be borne by the Contractor in accordance with these obligations, liabilities or responsibilities. However, if the Contractor fails to effect and keep in force an insurance which is available and which



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it is required to effect and maintain under the Contract, and the Employer neither approves the omission nor effects insurance for the coverage relevant to this default, any moneys which should have been recoverable under this insurance shall be paid by the Contractor. Payments shall be subject to Sub-Clause 2.4 [Employer's Claims] or Sub-Clause 19.1 [Contractor's Claims], as applicable.

17.2 Insurance for Contractor's equipment

The Contractor shall insure the Plant, Materials and Contractor's Documents for not less than the full reinstatement cost including the costs of demolition, removal of debris and professional fees and profit. This insurance shall be effective from the date by which the evidence is to be submitted under sub-paragraph (a) of Sub-Clause 17.1 [General Requirements for Insurances], until the date of issue of the Taking-Over Certificate for the Works.

The Contractor shall maintain this insurance to provide cover until the date of issue of the Performance Certificate, for loss or damage for which the Contractor is liable arising from a cause occurring prior to the issue of the Taking-Over Certificate, and for loss or damage caused by the Contractor in the course of any other operations (including those under clause 10[defects Liability]).

The Contractor shall insure the Contractor's Equipment for not less than the full replacement value, including delivery to Site. For each item of Contractor's Equipment, the insurance shall be effective while it is being transported to the Site and until it is no longer required as Contractor's Equipment. The assurance

- (a) shall cover all loss and damage from any cause not listed in Sub-Clause 16.3 [Employer's Risks],
- (b) shall also cover loss or damage to a part of the Works which is attributable to the use or occupation by the Employer of another part of the Works, and loss or damage from the risks listed in sub-paragraphs (c), (g) and (h) of Sub Clause 16.3 [Employer's Risks], excluding (in each case) risks which are not insurable at commercially reasonable terms, with deductibles per occurrence of not more than the amount stated in the Appendix to Tender (if an amount is not so stated, this sub-paragraph (d) shall not apply), and
- (c) may however exclude loss of, damage to, and reinstatement of
 - (i) a part of the Works which is in a defective condition due to a defect in its design, materials or workmanship (but cover shall include any other parts which are lost or damaged as a direct result of this defective condition and not as described in sub-paragraph (ii) below),
 - (ii) a part of the Works which is lost or damaged in order to reinstate any other part of the Works if this other part is in a defective condition due to a defect in its design, materials or workmanship,
 - (iii) a part of the Works which has been taken over by the Employer, except to the extent that the Contractor is liable for the loss or damage, and



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(iv) goods while they are not in the Country,

If, more than one year after the Base Date; the cover described in sub-paragraph (b) above ceases to be available at commercially reasonable terms, the Contractor shall give notice to the Employer, with supporting particulars. The Employer shall then (i) be entitled subject to Sub-Clause 2.4 [Employer's Claims] to payment of an amount equivalent to such commercially reasonable terms as the Contractor should have expected to have paid for such cover, and (ii) be deemed, unless he obtains the cover at commercially reasonable terms, to have approved the omission under Sub-Clause 17.1 [General Requirements for Insurances]

17.3 Insurance against Injury to persons and damage to property

The Contractor shall insure against each Party liability for any loss, damage, death or bodily injury which may occur to any physical property (except things insured under Sub-Clause 17.2 [Insurance for Works and Contractor's Equipment] or to any person (except persons insured under Sub-Clause 17.3 [Insurance for Contractor's Personnel]), which may arise out of the Contractor's performance of the Contract and Occurring before the issue of the Performance Certificate.

This insurance shall be for a limit per occurrence of not less than the amount stated in the Appendix to Tender, with no limit on the number of occurrences. If an amount is not stated in the Appendix to Tender, this Sub-Clause shall not apply.

Unless otherwise stated in the Particular Conditions, the insurances specified in this Sub-Clause:

- (a) shall be effected and maintained by the Contractor as insuring Party,
- (b) shall be extended to cover liability for all loss and damage to the Employers property (except things Insured under Sub-Clause 17.2) arising out of the contractor's performance of the Contract, and
- (c) may however exclude liability to the extent that it arises from:
 - (i) the Employer's right to have the Permanent Works executed on, over, under, in or through any land, and to occupy this land for the Permanent Works,
 - (ii) damage which is an unavoidable result of the Contractor's obligations to execute the Works and remedy any defects, and
 - (iii) A cause listed in Sub-Clause 16.3 [Employer's Risks], except to the extent that cover is available at commercially reasonable terms.

17.4 Insurance for Contractor's Personnel

The Contractor shall effect and maintain insurance against liability for claims, damages, losses and expenses (including legal fees and expenses) arising from injury, sickness, disease or death of any person employed by the Contractor or any other of the Contractor's Personnel.



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The Employer and the Engineer shall also be indemnified under the policy of insurance, except that this insurance may exclude losses and claims to the extent that they arise from any act or neglect of the Employer or of the Employer's Personnel.

The insurance shall be maintained in full force and effect during the whole time that these personnel are assisting in the execution of the Works. For a Subcontractor's employees, the insurance may be affected by the Subcontractor, but the Contractor Shall be responsible for compliance with this Clause.

17.5 Insurance for Contractor's Marine Craft

Notwithstanding what is stated in the above all clauses, all the marine crafts including dredgers deployed in the operation should be insured under Marine Hull Policy and covered for various Port risks including pollution and wreck removal by a P & I club which is a member of an International Group of P & I Club.

18.0 FORCE MAJEURE

18.1 Definition of Force Majeure

In this Clause, "Force Majeure" means an exceptional event or circumstance:

- (a) which is beyond a Party's control,
- (b) which such Party could not reasonably have provided against before entering into the Contract,
- (c) which, having arisen, such Party could not reasonably have avoided or overcome, and
- (d) which, is not substantially attributable to the other Party.

Force Majeure may include, but is not limited to, exceptional events or circumstances of the kind listed below, so long as conditions (a) to (d) above are satisfied:

- (i) war, hostilities (whether war be declared or not), invasion, act of foreign enemies,
- (ii) rebellion, terrorism, revolution, insurrection, military or usurped power, or civil war,
- (iii) riot, commotion, disorder, strike or lockout by persons other than the Contractor's Personnel and other employees of the Contractor and Sub-contractors,
- (iv) munitions of war, explosive materials, ionising radiation or contamination by radio-activity, except as may be attributable to the Contractor's use of such munitions, explosives, radiation or radio-activity, and
- (v) natural catastrophes such as earthquake, tsunami, hurricane, typhoon or volcanic activity.



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18.2 Notice of Force Majeure

If a Party is or will be prevented from performing any of its obligations under the Contract by Force Majeure, then it shall give notice to the other Party of the event or circumstances constituting the Force Majeure and shall specify the obligations, the performance of which is or will be prevented. The notice shall be given within 14 days after the Party became aware, (or should have become aware), of the relevant event or circumstance constituting Force Majeure.

The Party shall, having given notice, be excused performance of such obligations for so long as such Force Majeure prevents it from performing them.

Notwithstanding any other provision of this Clause, Force Majeure shall not apply to obligations of either- Party to make payments to the other Party under the Contract.

18.3 Duty to Minimize Delay

Each Party shall at all times, use all reasonable endeavours to minimise any delay in the performance of the Contract as a result of Force Majeure.

A Party shall give notice to the other Party when it ceases to be affected by the Force Majeure.

18.4 Consequences of Force Majeure

If the Contractor is prevented from performing any of his obligations under the Contract by Force Majeure of which notice has been given under Sub-Clause 18.2 [Notice of Force Majeure], and suffers delay and/or incurs Cost by reason of such Force Majeure, the Contractor shall be entitled subject to Sub-Clause 19.1[Contractor's Claims] to:

- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 7.4 [Extension of Time for Completion], and
- (b) if the event or circumstance is of the kind described in sub-paragraphs (i) to (v) of Sub-Clause 18.1 [Definition of Force Majeure] and, in the case of sub-paragraphs (ii) to (iv), occurs in the Country, payment of any such Cost.

After receiving this notice, the Engineer shall proceed in accordance with Sub Clause 3.4 [Determinations] to agree or deter-mine these matters.

18.5 Force Majeure Affecting Subcontractor

If any Subcontractor is entitled under any contract or agreement relating to the Works to relief from force majeure on terms additional to or broader than those specified in this Clause, such additional or broader force majeure events or circumstances shall not excuse the Contractor's non-performance or entitle him to relief under this Clause.

18.6 Optional Termination, Payment and Release

If the execution of substantially all the Works in progress is prevented for a continuous period of 84 days by reason of Force Majeure of which notice has been



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given under Sub-Clause 18.2 [Notice of Force Majeure], or for multiple periods which total more than 140 days due to the same notified Force Majeure, then either Party may give to the other Party a notice of termination of the Contract. In this event, the termination shall take effect 7 days after the notice is given, and the Contractor shall proceed in accordance with Sub-Clause 15.3 [Cessation of Work and Removal of Contractor's Equipment].

Upon such termination, EMPLOYER shall determine the value of the work done and issue a Payment Certificate which shall include:

- (a) the amounts payable for any work carried out for which a price is stated in the Contract;
- (b) the Cost of Plant and Materials ordered for the Works which have been delivered to the Contractor, or of which the Contractor is liable to accept delivery: this Plant and Materials shall become the property of (and be at the risk of) the employer when paid for by the Employer, and the Contractor shall place the same at the Employer's disposal;
- (c) any other Cost or liability which in the circumstances was reasonably incurred by the Contractor in the expectation of completing the Works;
- (d) the Cost of removal of Temporary Works and Contractor's Equipment from the Site and the return of these items to the Contractor's works in his country (or to any other destination at no greater cost);

18.7 Release from Performance under the Law

Notwithstanding any other provision of this Clause, if any event or circumstance outside the control of the Parties (including, but not limited to, Force Majeure) arises which makes it impossible or unlawful for either or both Parties to fulfil its or their contractual obligations or which, under the law governing the Contract, entitles the Parties to be released from further performance of the Contract, then upon notice by either Party to the other Party of such event or circumstance:

- (a) the Parties shall be discharged from further performance, without prejudice to the rights of either Party in respect of any previous breach of the Contract, and
- (b) the sum payable by the Employer to the Contractor shall be the same as would have been payable under Sub-Clause 18.6 [Optional Termination, Payment and Release] if the Contract had been terminated under Sub-Clause 18.6.

19.0 CLAIM, DISPUTES AND ARBITRATION

19.1 Contractor's Claims

If the Contractor considers himself to be entitled to any extension of the Time for Completion and/or any additional payment, under any Clause of these Conditions or otherwise in connection with the Contract, the Contractor shall give notice to ENGINEER / EMPLOYER, describing the event or circumstance giving rise to the



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claim. The notice shall be given as soon as practicable as and not later than 28 days after the Contractor became aware; or should have become aware, of the event or circumstance.

If the Contractor fails to give notice of a claim within such period of 28 days, the Time for Completion shall not be extended, the Contractor shall not be entitled to additional payment, and the Employer shall be discharged from all liability in connection with the claim. Otherwise, the following provisions of this Sub-Clause shall apply.

The Contractor shall also submit any other notices which are required by the Contract, and supporting particulars for the claim, all as relevant to such event or circumstance.

The Contractor shall keep such contemporary records as may be necessary to substantiate any claim, either on the Site or at another location acceptable to ENGINEER / EMPLOYER. Without admitting the Employer's liability, ENGINEER / EMPLOYER may, after receiving any notice under this Sub-Clause, monitor the record-keeping and/or instruct the Contractor to keep further contemporary records. The Contractor shall permit ENGINEER / EMPLOYER to inspect all these records, and shall (if instructed) submit copies to ENGINEER / EMPLOYER.

Within 42 days after the Contractor became aware (or should have become aware) of the event or circumstance giving rise to the claim, or within such other period as may be proposed by the Contractor and approved by ENGINEER / EMPLOYER, the Contractor shall send to ENGINEER / EMPLOYER a fully detailed claim which includes full supporting particulars of the basis of the claim and of the extension of time and/or additional payment claimed. If the event or circumstance giving rise to the claim has a continuing effect:

- (a) this fully detailed claim shall be considered as interim;
- (b) the Contractor shall send further interim claims at monthly intervals, giving the accumulated delay and/or amount claimed, and such further particulars as ENGINEER / EMPLOYER may reasonably require; and
- (c) the Contractor shall send a final claim within 28 days after the end of the effects resulting from the event or circumstance, or within such other period as may be proposed by the Contractor and approved by ENGINEER / EMPLOYER.

Within 42 days after receiving a claim or any further particulars supporting a previous claim, or within such other period as may be proposed by ENGINEER / EMPLOYER and approved by the Contractor, ENGINEER / EMPLOYER shall respond with approval, or with disapproval and detailed comments. He may also request any necessary further particulars, but shall nevertheless give his response on the principles of the claim within such time.

Each Payment Certificate shall include such amounts for any claim as have been reasonably substantiated as due under the relevant provision of the Contract. Unless and until the particulars supplied are sufficient to substantiate the whole of the



claim, the Contractor shall only be entitled to payment for such part of the claim, as he has been able to substantiate.

The ENGINEER / EMPLOYER shall proceed to agree or determine (i) the extension (if any) of the Time for Completion (before or after its expiry) in accordance with Sub-Clause 7.4 [*Extension of Time for Completion*], and/or (ii) the additional payment (if any) to which the Contractor is entitled under the Contract.

The requirements of this Sub-Clause are in addition to those of any other Sub-Clause, which may apply to a claim. If the Contractor fails to comply with this or another Sub-Clause in relation to any claim, any extension of time and/or additional payment shall take account of the extent (if any) to which the failure has prevented or prejudiced proper investigation of the claim, unless the claim is excluded under the second paragraph of this Sub-Clause.

19.2 Amicable Settlement

In case of any disputes, both Parties shall attempt to settle the dispute amicably before the commencement of arbitration. However, unless both Parties agree otherwise, arbitration may be commenced on or after the fifty-sixth day after the day on which notice of dissatisfaction was given, even if no attempt at amicable settlement has been made.

19.3 Arbitration

Unless settled amicably, disputes shall be settled by arbitration under the provisions of Indian Arbitration and Conciliation Act-1996. As per this, Dispute Resolution Board shall be setup with representatives of both parties to continuously facilitate resolution of issues. The place of arbitration shall be Chennai. Arbitral award has to be a reasoned award and in case interest is allowed on arbitration amount it shall be limited to SBI Prime Lending Rate + 2%.

20.0 EXPLOSIVES

Except as may be provided in the specification or approved by EMPLOYER, the Contractor shall not use explosives. The Contractor shall only permit handling and use of explosives to be carried out by men fully qualified and experienced in the storage, handling and use of the types of explosives to be used. He shall comply with the provisions of Indian Explosives Act. Prior permission of ENGINEER / EMPLOYER shall be obtained by the contractor before use of explosives. For such permission, contractor shall apply to ENGINEER / EMPLOYER furnishing details of charges, locations, etc.

21.0 PROPERTY IN EXCAVATED MATERIALS

All fossils, coins, articles of value or antiquity, and structures and other remains or items of geological or archaeological interest found during excavation / dredging shall be placed under the care and authority of the Employer



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22.0 DRAWINGS & DESIGNS

- (a) General details of the works are shown on the drawings accompanying this tender document. The Engineer will supply to the contractor from time to time during the progress of the works such further working drawings as will be necessary in his opinion for the proper and adequate execution and maintenance of the works in accordance with the Engineer's designs and/or any modification thereof as decided by the Engineer and the Contractor shall carry out the work in accordance with the said working drawings. Two sets of such working drawings will be issued. If more sets are required by the Contractor, he will have to make his own arrangement at his cost.
- (b) In the event of the Contractor proposing any alteration/modification to the dredging methodology, detail, method of construction, he shall at his own expenses prepare and submit for approval of the Engineer copies in duplicate (in the first instance) of detailed working drawings which may be required for such alteration/modification and at the same time call the attention of the Engineer to any alternative detail or modification of the Contract drawings which the Contractor may wish to make at least 30 days prior to the commencement of the work or part of the work to which such drawings relate. The contractor shall at the same time, if so required by the Engineer, furnish calculation sheets in duplicate relating to the strength and anticipated deflections performance in respect of such altered/ modified works. The Engineer will, after any such alteration which he may approve, record on the copies as amended his approval and will return one copy of the drawings and calculation sheets to the contractor, who shall carry out the work in accordance therewith. The Contractor shall forward to the Engineer three additional copies of the working drawings and calculation sheets as approved, in addition to these working drawings and calculation sheets as approved. In addition to these working drawings are also to be submitted (the same procedure as in the ease of the Contractor) in respect of any work proposed to be executed by sub-contractors. The approval of the Engineer of all or any of the calculation sheets, drawings shall not relieve the Contractor- of responsibility in connection with the execution of the altered/modified or sub-contractor s works.
- (c) The complete sets of tracing on linen or tracing film of all drawings showing every and all works 'As Made' under the contract shall be made by the Contractor at his own expense and delivered to the Engineer within one month of the completion of the various sections of the work or at such times as directed by the Engineer. All departure alteration/ modifications from the Contract Drawings and supplementary working drawings issued by the Engineer also shall be incorporated in the "As Made" drawings. The drawings shall be fully dimensioned, of an approved size and with the standard black or as approved by the Engineer.

23.0 FILLING IN HOLES AND TRENCHES

The Contractor immediately upon completion of any work under the contract shall at his own expenses fill up all holes or trenches which have been made or dug, level



or remove mounds of earth that may have been made and clear away all rubbish occasioned in the execution of the works or temporary works. The contractor shall bear and pay all costs, charges, damages and expenses which may be incurred or sustained on account or in consequence of any accident which may happen by reason of holes and trenches connected with the work being left unfenced or materials being left or placed in improper situations.

24.0 CONTRACT SUPERSEDES PREVIOUS DOCUMENTS

The Contractor shall have no right to increase in the rates in the Bill of Quantities nor any other right whatsoever by reason of any representative explanation or statement or alleged representative explanation or statement made or by reason of any information, promise or guarantee given or alleged to have been given to him by any person (whether in the employment of the Employer or not) before the date of the contract, embodies the whole arrangements between the parties with reference to the contract hereby constituted and all previous, correspondence/ negotiation/ representations/ explanations/ statements/ promises or guarantee, whether oral or written shall be excluded.

25.0 BRIBES AND COMMISSION

Any bribe, commission, gift or advantage given, promised or offered by or on behalf of the Contractor or his or their behalf to any officer, servant, representative or agent of the Engineer or to any person on his behalf in relation to the obtaining or execution of this or any other contract with the Employer shall in addition to any criminal liability which he may incur subject the contractor to the cancellation of this and all other contracts with the Employer and also to the payment of any loss or damage resulting from any such cancellation, and the Employer shall be entitled to deduct the amounts so payable from any money otherwise due to the contractor under this or any other contract. Any question or disputes as to the commission of any offence under the present clause shall be settled by the Engineer in such a manner and on such evidence or information as he shall think fit and consider sufficient and his decision shall be final and conclusive.

26.0 MOBILISATION AND DEMOBILISATION CHARGES

Maximum of 10% of the total quoted price (contract price) will be payable towards Mobilization/Demobilization charges.

Out of the total quoted rate for Mobilization and Demobilization in the BOQ by the contractor, 75% of the amount is payable on completion of total mobilization of dredgers and other ancillary equipment's and upon completion of atleast 5% of the total dredging quantity. The balance 25% will be paid only after Demobilization.

Mobilization amount shall be released subject to the following:

- (a) No payment shall be made towards mobilization of Dry Excavation Equipment



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- (b) Dredgers should commence the dredging operation as per the work plan submitted along with the offer and upon completion of atleast 5% of the total dredging quantity.

Demobilization fees for the above-mentioned items (a &b of clause 26) above shall be released after completion of respective works and certification by the ENGINEER.

Demobilization fees shall be paid only after site clearance and demobilization of the dredgers and marine spread and issue of Taking over certificate. However, dredger can be released on satisfaction of ENGINEER / EMPLOYER regarding completion of work.

27.0 SCHEDULE OF RATES

27.1 Preamble

- (a) The Schedule of Rates shall be read with all other sections of this Bidding Document.
- (b) The CONTRACTOR is deemed to have studied the drawings, specifications and details of works to be done within the Time Schedule and should have acquainted himself with the conditions prevailing at site.
- (c) The quantity shown against the various items are only approximate and may vary to any extent individually as detailed in General Conditions of Contract. No claim shall be entertained during the currency of this Contract towards any items due to the above including where the CONTRACTOR has quoted low/ high rates.
- (d) EMPLOYER reserves the right to interpolate or extrapolate the rates for any new item of work not covered in Schedule of Rates from the similar items already available in Schedule of Rates. All the works shall be measured upon completion and paid for at the rate quoted and accepted in the "Schedule of Rates". In case any activity though specifically not covered in Schedule of Rates descriptions but the same is covered under scope of work/ scope of supply/ specification/ drawings etc. no extra claim on this account shall be entertained, since Schedule of Rates is to be read in conjunction with all other documents forming part of the Contract.
- (e) All items of work mentioned in the Schedule of Rates shall be carried out as per the specifications, drawings and instructions of EMPLOYER and the rates are deemed to be inclusive of material, consumable, labour, supervision, tools & tackles and detailing of construction/fabrication drawings wherever required as called for in the detail specification and conditions of the Contract.
- (f) EMPLOYER reserves the right to cancel/ delete/ curtail any item or group of work if necessary. Such a step shall not be construed as reason for changing the rates.

27.2 General Terms of Payment

27.2.1 Mobilisation and demobilisation charges shall include hire charges of the equipment and also the cost incurred for personnel during journey to the



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site and till the time of its demobilisation, including insurance of equipment and personnel, all complete. Mobilisation is deemed to be complete after procedure document is approved, all equipment, dredging plant, marine spread and personnel are mobilised at the site as per technical specifications and certification.

27.2.2 The contractor shall make his own arrangements for their personnel towards travel, stay, food, water, fuel etc., within his lump sum costs.

27.2.3 Any downtime on account of weather, equipment/vessel/positioning breakdown shall be to the Contractors account.

27.2.4 It is the responsibility of the Dredging contractor to obtain all the clearances from appropriate authorities for the mobilisation of the dredging spread and marine spread. Employer shall provide only authorisation letters.

27.2.5 Quoted price shall be in Indian Rupees only and is inclusive of all taxes except GST, which shall be reimbursed as per actual.

28.0 IDLE TIME

28.1 Conditions for Idle time

All reasonable efforts will be taken by the Employer to ensure uninterrupted dredging operations while keeping in view, the shipping movements (Ref: Section – II, Information Clause 3.11) and other port operations.

Idle time payment shall be considered only for idling of TSHD's /CSD and no claim towards idling of other crafts, machineries, equipment and other accessories shall be entertained for reasons what so ever.

Idle time charges are payable to cover idling of contractor's equipment (TSHD's /CSD) on Employer account only and no other external factor until and unless defined elsewhere in the document.

Idle time charges shall be payable only if the dredger remains idle for more than four hours per calendar day. The idle time shall be calculated only if the cumulative idle time on any particular day extends beyond 4 hours and no idle time charges shall be payable for initial 4 hours.

28.2 Extension and Payment for Idle time

If the contractor suffers delay and/or incurs cost from complying with the Engineer's instructions, he shall give notice and shall submit his application for:

- (a) extension of time for any such delay; and
- (b) payment of any such cost with supporting documents, which shall be examined by the Engineer and his decision is final and binding.

Note:



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Idle time charges are payable only for the dredgers mentioned in the work methodology submitted by the bidder and shall be limited to 2 TSHDs/CSD.

28.3 Schedule of Rate for Equipment Rendered Idle

- 28.3.1 Idle time per spread to be provided as per Clause 28.0 of General Conditions of Contract.
- 28.3.2 Dredger spread comprises Dredger and associated equipment and Crew members.
- 28.3.3 Equipment (Dredger) rendered idle charges shall be paid only in case of suspension of work solely attributable to Employer.
- 28.3.4 Dredger rendered idle for less than 4hours on any particular day shall not be considered for payment of idle charges. In case dredger idling is for more than 4 hours on any particular day, the idle charges shall be payable for idling more than 4 hours. For example: For idle time of 7 hours, the amount payable=7- 4=3 X rate per hour.
- 28.3.5 For purpose of payment, the idle time shall be calculated once in a day. A day starts at from 0000 hours and ends at 2400 hours IST.
- 28.3.6 Schedule of rate for Dredging spread rendered idle shall be applicable only if it is confirmed in writing by the ENGINEER within 24 hours of occurrence.
- 28.3.7 The idle time charges for a dredger of hopper capacity of 7400cu.m and above is fixed at Rs. 1,25,000/- per hour.
- 28.3.8 The idle time charges for a dredger of hopper capacity below 7400cu.m is fixed at Rs. 96,000/- per hour.
- 28.3.9 The idle time charges for CSD along with associated equipment are fixed at Rs. 2,62,400/- per hour.

29.0 TAX

29.1 Goods and Service Tax

The quoted rates of the bidders shall include of all taxes, duties, etc., excluding applicable GST. TDS as applicable shall be deducted at source by Kamarajar Port in accordance with IT, GST, Tamil Nadu construction workers welfare cess Act 1996, etc. Further, the contractor has to raise GST tax invoice timely, notwithstanding reimbursement/ payment from KPL and to comply timely GST statutory requirements i.e remittance, filing, etc. KPL shall reimburse the GST portion on reflection of Input tax credit at GST portal. Any new taxes, levies, duties imposed after submission of bid shall be considered by the Employer on production of documentary evidence.

29.2 Income Tax

Income tax shall be deducted from the contractor's bill as per Income Tax Act applicable from time to time.



29.3 During bid submission, the bidder shall intimate the approximate time period required for obtaining necessary approvals from statutory Authorities (Ministry of Defence, Ministry of Home Affairs, etc.) for processing clearances for the Dredger & Crew, etc.

30.0 SECURITY CLEARANCE

- i. Prequalification of Bidders is subject to security clearance from Govt. of India and their Price Bids will be opened only on obtaining such security clearance.
- ii. The Bidder shall submit detailed information as per Annexure-16 along with their Tender for the purpose of obtaining security clearance from the Govt. of India.
- iii. The Successful Bidder shall also be required to comply with the relevant directives of the Government of India in this respect.
- iv. The Bid received from any Bidder may be summarily rejected on National Security consideration without any intimation thereof to the Bidder.



Section – V

Special Conditions of Contract (SCC)



SECTION V

SPECIAL CONDITIONS OF CONTRACT

1.0 GENERAL

- 1.1 Special Conditions shall be read in conjunction with the General Conditions of Contract, specification, Drawings and any other documents forming part of this contract wherever the context so requires.
- 1.2 Notwithstanding the Sub-division of the documents into the above separate sections and volume every part of each shall be deemed to be supplementary to and complementary of every other part and shall be read with and into the Contract so far as it may be practicable to do so.
- 1.3 Where any portion of the General Conditions of Contract is repugnant to or at variance with any provisions of the Special Conditions, the provisions of the Special Conditions shall be deemed to over-ride the provisions of the General Conditions of Contract and shall to the extent of such repugnancy of variations, prevail.
- 1.4 Where it is mentioned in the Specification that the contractor shall perform certain work or provide certain facilities, it is understood that the contractor shall do so at his own cost.
- 1.5 The materials and workmanship shall satisfy the relevant Indian standards, the specifications contained herein and codes referred to. Where the specifications stipulate requirement in addition to those contained in the Standard codes and specifications, these additional requirements shall also be satisfied.
- 1.6 Removal of boulders / under water boulders and debris form separate scope of works, for which separate provision is made in the BoQ. However, encountering of boulder and debris during the execution of dredging works does not entitle the contractor to any claim under adverse physical conditions.

2.0 THE WORK

2.1 Scope of Work

The scope of work is defined in the Technical Specifications. The contractor shall provide all necessary materials equipment and labour etc. for the execution and maintenance of the work till completion. All equipment /Tools/Software's that go with the work shall be approved by ENGINEER / EMPLOYER prior to use.



2.2 **Nature of Work**

The works under the contract include Dry Excavation, dredging of sand, silt, clay and all type of soils from the areas to be dredged and disposing the dredged material into the designated locations onshore/offshore as the case may be and as directed by the Engineer.

2.3 **Duties of the EMPLOYER's Representative/ Engineer**

The Employers Representative is a PMC firm/person appointed by the Employer. The Employers Representative is responsible to the Employer and shall carryout such duties and exercise such authority as may be delegated to the PMC firm by the Employer and shall act as 'Engineer'

2.4 **Engineer's Authority to Delegate**

The Engineer may from time-to-time delegate to the Engineer's Representative any of the duties and authorities vested in the Engineer and he may at any time revoke such delegation. Any such delegation or revocation shall be in writing. Any communication given by the Engineer's Representative to the Contractor in accordance with such delegation shall have the same effect provided that:

- (a) any failure of the Engineer's Representative to disapprove any work, materials or Plant shall not prejudice the authority of the Engineer to disapprove such work, materials or Plant and to give instructions for the rectification thereof;
- (b) if the Contractor questions any communication of the Engineer's Representative he may refer the matter to the Engineer who shall confirm, reverse or vary the contents of such communication.

2.5 **Deployment of Staff by the Engineer**

The Engineer shall deploy any number of persons from his firm or appoint any number of persons in the carrying out duties. Such persons have the authority to carry out their duties, acceptance of materials, verifications of drawings, checking the surveys, quantities of dredging, checking the locations of disposals of dredged material, plant or workmanship as being in accordance with the Contract, and any instructions given by any of them to the Contractor for those purposes shall be deemed to have been given by the Engineer's Representative on behalf of the Engineer of Kamarajar Port.

The authority delegated to the Engineer is described in Section – IV GCC

3.0 **THE SITE**

3.1 **General Site information.**

The site information and access to site is provided in Section- III introduction.

The intending tenderers are expected to visit the site and satisfy themselves on the actual site conditions, meteorological and oceanographic data, soil/subsoil strata to be dredged and the areas identified for disposal of dredged material, before tendering. Information regarding surface and subsurface strata, climatological,



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oceanographic data given in the tender documents are only intended as a general guidance for the tenderer/contractor and no warranty is given regarding the correctness of the same.

4.0 SURVEYS AND LEVELS TO BE AGREED

4.1. Before the works of any part thereof begin, the Contractor/ third party appointed by EMPLOYER/ ENGINEER shall together survey and take levels of the site of the works both above and below water level / Chart Datum level, and agree all particulars on which the measurements of the works are to be based. Such particulars shall be recorded and after agreement; the drawings shall be signed by the EMPLOYER/ENGINEER/Third party and contractor. Similar procedure is to be followed in post dredging survey.

Note: The cost towards appointment of Third Party by EMPLOYER/ ENGINEER shall be borne by the Employer.

4.2 Failing such surveys and agreements being prepared and/or signed by the contractor, the survey of the Engineer shall be final and binding on the Contractor.

4.3 The contractor shall be entirely responsible for the horizontal and vertical alignment, the levels and correctness of every part of the work and shall rectify any errors or imperfection therein. The contractor, at his own cost, shall carry out such rectification.

5.0 SETTING OUT THE WORKS

5.1 The EMPLOYER shall furnish the relevant existing grid points with Bench Mark with reference to permanent bench marks. It shall be Contractor's responsibility to set out the necessary central points on land and to set out alignment. The contractor shall have in his employ efficient survey team for this purpose and the accuracy of such setting out works shall be contractor's sole responsibility.

5.2 Before beginning the work, the Contractor shall work out the control points on ground which, are pre requisite for carrying out hydrographic surveys, accurately, with suitable markers as approved by EMPLOYER. All these points and markings shall be checked and approved by EMPLOYER's Representative before starting the work.

5.3 The contractor shall also provide necessary equipment, labour and other facilities for proper checking of triangulation / bench mark stations and inspection of the points during the survey and dredging operations at no cost to the Employer.

5.4 The contractor shall give EMPLOYER not less than 24 hours' notice in writing of his intention the set out or give levels for any part of the works so that arrangements may be made for checking the work.



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5.5 Work shall be suspended for such times as necessary for checking lines and levels on any part of the works.

5.6 The Contractor shall at his own expense provide all assistance which EMPLOYER may require for checking the setting out.

6.0 ORDER OF WORKS

The order in which the works are to be carried out shall be to the approval of EMPLOYER and shall be such as to suit the detailed method of construction, adopted by the contractor as well as the CPM schedule. The works shall be carried out in such a manner so as to enable the other contractors to work concurrently so that the entire project may be brought into use immediately after the completion of works.

7.0 CO-ORDINATION AND INSPECTION OF WORKS

The Co-ordination and inspection of the day-to-day work under the contract shall be the responsibility of EMPLOYER/ENGINEER. The written instructions regarding any particular work will be normally passed by EMPLOYER. A work order book will be maintained by the Contractor for each sector which aforesaid written instructions will be entered. These will be signed by the Contractor or his authorised representative by way of acknowledgment within 12 hours.

8.0 GENERAL CONDITIONS OF CONSTRUCTION AND ERECTION WORK

8.1 The work shall be permitted on the site round the clock.

8.2 The contractor must arrange for the placement of workers in such a way that the delayed completion of the works of any part thereof for any reason whatsoever will not affect their proper employment. The Employer will not entertain any claim for over time /idle time payment etc. whatsoever.

8.3 The Contractor shall submit to EMPLOYER / ENGINEER reports at regular intervals regarding the state and progress of work. The details and proforma of the report will mutually be agreed after the award of Contract.

9.0 WORKING IN MONSOON

9.1 The execution of the work entails working in the monsoon also. The Contractor must maintain sufficient labour force as may be required for the work and plant and execute the construction and erection according to the prescribed schedule. No special rate will be considered for such work in monsoon.

10.0 CONTRACTOR'S WORKING AREA

10.1 The Contractor shall be allowed suitable working area as per the scope of works and approved by EMPLOYER/ENGINEER.



11.0 TEMPORARY WORKS, OFFICE, JETTY, ETC.

- 11.1** The Contractor shall submit to EMPLOYER / ENGINEER for his approval, drawings and proposals for any temporary works, storage yard, office, store, false work and temporary platforms, workshop, etc. which he intend to construct for the execution of the contract and no such work shall be constructed before obtaining the written approval of EMPLOYER.
- 11.2** The Contractor shall obtain permission for any temporary work and would ensure that during execution of works the statutory requirements of the concerned authorities such as Kamarajar Port, Police, etc. would be complied with.
- 11.3** Not less than one month before the date when the Contractor intends to start erecting any part of the temporary works and staging required for carrying out the works, he shall furnish to EMPLOYER, complete drawings of that part of the temporary works and staging. The Contractor shall at the same time, if so, required by EMPLOYER furnish calculations in respect of such temporary works. The Contractor shall also furnish to EMPLOYER, drawings showing the method proposed for the erection of the various parts of the work.
- 11.4** The furnishing to EMPLOYER of any design for any temporary works and staging shall not relieve the Contractor of any liability or obligation under the contract in respect of such temporary works and staging. All temporary works shall remain the property of the Contractor.

12.0 OPERATIONS OF THE EMPLOYER AND OTHERS

- 12.1** The ordinary business and works of the Employer and others as carried out on and in the vicinity of the site will be continued during dredging, the execution of the Contract shall be conducted in such a way as to avoid interference with traffic of every kind by land and by water and with any other works in progress in vicinity.
- 12.2** The Contractor's attention is drawn to the fact that other contractors employed by the Employer may be working in the vicinity and due interfacing, cooperation and adjustment needs to be made by the contractor.

13.0 PORT RULES

- 13.1** The Contractor shall observe the conservancy rules relating to the Harbour and shall always take such necessary additional steps to keep the harbour waters free of noxious or unhygienic matters coming from his works as are required by the Employer. Under no circumstances shall inflammable material be allowed to spill into the Harbour area as per the MARPOL regulations.
- 13.2** The Contractor shall always observe and comply with the working rules and regulations of the Port in force or as issued from time to time.



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- 13.3 Vessel related charges will not be charged for the marine crafts engaged for executing the contract (after commencement of dredging operation to completion). Pilotage/ berth hire for carrying out the maintenance as per clause 4.19(a) of Section-IV will be on Employer's account. However, if any other marine facilities and miscellaneous services required to be availed by the contractor, the same will be provided and charged as per Scale of Rates of EMPLOYER subject to availability.
- 13.4 Applicable Vessel related charges shall be levied for all the Marine Crafts for the first entry and the last exit on completion of project.
- 13.5 Regulation of Entry of Ships into Ports, Anchorages and Offshore facilities rules 2012 and further notifications should be followed as per DG Shipping.

14.0 EXISTING SERVICES.

- 14.1 Drains, pipes, cables, overhead-wires and similar services encountered in the course of the work shall be guarded from injury by the Contractor at his own cost so that may continue in full and uninterrupted use to the satisfaction of the Employers thereof or otherwise occupy any part of the site in a manner likely to hinder the operation of such services
- 14.2 Should any damage be done by the Contractor to any mains pipes, cables or lines (whether above or below ground). Whether or not & shown on the drawings, the Contractor must make good or bear the cost of making good the same without delay to the satisfaction of EMPLOYER and of the owners.
- 14.3 Port roads and approach roads including culverts used for transporting of Dry Excavated material and Stones should not be damaged or defaced with mud and muck of tyres. The tyres of the transport equipment should be cleaned prior to usage of road. Should any damage or defacing happen, the contractor must make good or bear the cost of making good to the satisfaction of EMPLOYER and any other authority.

15.0 ENTRY ON PRIVATE OR OTHER PROPERTY

The Contractor shall not enter upon or commence any work in or upon, across or through any land, building or place being private property until authorised in writing by EMPLOYER or other competent authority to do so.

16.0 NOTICE OF OPERATIONS

No important operations shall be commenced nor shall work outside the usual working hours be carried out without the consent of Engineer in writing or without full and complete notice also in writing being given to him.

17.0 SECURITY AND SAFETY

- 17.1 The Contractor shall comply with all regulations imposed by the Customs and Kamarajar Port Security Authorities in respect of the passage of Plant, Vehicles, materials and personnel through Customs and Port barriers.



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- 17.2 The Contractor shall take all possible precaution to prevent outbreaks of fire on the site and in all offices, stores, camps and other places and things connected therewith and especially with respect to the safe storage of petroleum products, explosives and all other dangers of hazardous goods. He shall comply with all rules, regulations and orders of any Statutory Authority and of EMPLOYER at no extra cost to the Employer.
- 17.3 The Contractor shall obtain from the Employer details of any restricted areas in or around the site and shall have the details prominently and clearly displayed for the information of his staff and work people notices defining any such restricted areas. Such notices shall be provided at his own expenses.
- 17.4 The Contractor will be required to take entry passes to the restricted area of Port for all personnel, labourers and vehicle. No claim whatsoever on this account will be entertained.
- 17.5 Port entry passes to men, vehicles and equipment's shall be obtained as per the prevailing norms and charges.

18.0 RETURNS AND DRAWINGS

All reports, statement, returns, diagrams, photographs or drawings, etc. which the contractor is required to submit to EMPLOYER / ENGINEER shall unless otherwise directed, be furnished in four copies. Tentative list of reports is given below:

- (a) Daily activity & performance report
- (b) Weekly activity & performance report
- (c) Monthly report
- (d) Quarterly report

The Engineer shall submit format for submission of report prior to commencing of works for approval.

19.0 POSSESSION PRIOR TO COMPLETION

EMPLOYER shall have the right to take possession of or use any completed or partially completed work or part of the work. Such possession or use shall not be deemed to be acceptance of any work completion in accordance with the contract agreement. If such, prior possession or use by EMPLOYER delays the progress of work, on equitable adjustment in the time of completion will be made and the contract agreement shall be deemed to be modified according.

20.0 COMPLETION DOCUMENTS

For the purpose of provision of Clause 13.0 of the General Conditions of contract, to treat that the work has been completed and issue a final payment certificate, the following documents will be deemed to form the completion documents:

- i) The Technical documents according to which the work was carried out.
- ii) The set of construction drawings showing therein the modifications and corrections made during the course of execution signed by EMPLOYER.



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- iii) Certificates of final levels as set out for various works.
- iv) Certificates of tests performed for various works.
- v) List of surplus materials returned to stores, if any.

21.0 WATER AND POWER SUPPLY

The Contractor shall make them own arrangements for supply of water and power for the works under the scope.

22.0 DISPUTE IN MODE OF MEASUREMENT

In case of any dispute as to the mode of measurement not covered by the contract to be adopted for any item of work, mode or measurement as per relevant Standard Specification (Latest revision) shall be followed.

23.0 INCOME TAX

Income tax on the gross amount bill shall be deducted from the Contractor's bill as per applicable clauses of the Income Tax Act or as revised from time to time.

24.0 FACILITIES TO BE PROVIDED BY CONTRACTOR

Contractor shall provide the following facilities for the Employer personal attached to the project, Engineer and his representatives engaged by the Employer for supervision/ monitoring of the works

- 24.1** Suitable accommodation on-board dredgers for the representative of the employer/Engineer (up to a maximum of 2numbers per dredger) posted for Monitoring the dredging operations on 24x7 basis.
- 24.2** Complete set of Personal Protective equipment (PPE) for the Engineer and Engineer's representative to be provided by the contractor for site visit.
- 24.3** Certified and approved crew boat on request for transportation of Employer / Engineer or Engineers Representatives to and fro from the marine equipment / Dredger. The transport shall also be used by monitoring staff during shift change. All the persons travelling shall be provided with individual life vests. The boat used for this purpose can be the boat used by the Contractor for his own staff, a separate crew boat need not be provided, however on request the boat should be made available within reasonable time
- 24.4** Temporary site office with seating arrangement for three persons with tables/ chair/ cabinets / net connection / printer / copier. Same shall be the property of the Contractor on completion of works.
- 24.5** One Personal Computer and accessories installed with Licenced survey and Autocad software similar to the one used during the Survey by the contractor to be provided to the Engineer for his estimation and evaluation of quantities and monitoring of works. Necessary training to be provided the Engineer or his representative for the usage of Survey software if required. All the equipment along with the software shall be returned on completion of works.



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- 24.6 Two Laptops for the EMPLOYER's representative and one for the ENGINEER with Licenced survey and Autocad software similar to the one used during the Survey by the contractor to be provided. Computer and Laptops shall be high configuration.
- 24.7 Communication facilities (Mobiles / Walkie talkies) to be provided to establish communication between EMPLOYER/ ENGINEER with contractor's reclamation site/office and marine craft at all times.

25.0 ENVIRONMENTAL MONITORING

As per the guidelines, Environmental Management Plan shall be drawn by successful bidder in such a way that all reasonable precautions shall be undertaken so that the dredging and reclamation operations do not cause any adverse impact on the water quality and marine productivity in the vicinity. The Environmental Management Plan shall deal with impacts resulting from the dredging and offshore dumping which concerns sea water pollution and impacts resulting from the drainage of onshore reclamation. The Environmental Management Plan shall reflect the standards for environmental protection specified by the Ministry of Environment and Forest while issuing environmental clearance for the project.

It is the responsibility of the contractor to comply with all rules and regulations in connection with the dredging contract in general, complying with EC norms. The bidder shall consider all the environmental protection cost along with applicable norms in the relevant quantities of BoQ.

The Environmental Management Plan will also reflect measures to be taken by the successful bidder to mitigate and protect the environment against impacts resulting from the dredging and reclamation and offshore dumping operations. The general form of the Environmental Protection Plan shall include and not be limited to

- ❖ Objective
- ❖ Work Plan
- ❖ Implementation schedule
- ❖ Man power requirement and Monitoring procedure

Note:

- ❖ The dredged materials from the capital dredging in the berth pocket of proposed Phase II AECTPL berth shall be dumped inside the Port area, in line with the EC conditions. However, dredged materials from the dredging areas other than berth pocket of Phase II AECTPL berth, shall be disposed off into the existing dumping ground.
- ❖ All dredgers and other marine crafts of the contractor shall follow MARPOL regulations.
- ❖ Adequate noise control measures to be followed by the contractor so that the noise levels are within 45 db (A) at a distance of 100m from dredging operation.



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- ❖ Dredging shall not be carried out during the fish-breeding season.
- ❖ Dredging shall be carried out in the confined manner to reduce the impacts on marine environment including turbidity.
- ❖ In addition to various stipulation of this contract documents with regard to dredging, the Contractor shall comply with the specific conditions, other standard conditions and general clauses applicable for dredging as stipulated by MoEF&CC, Environmental and CRZ Clearances, prepare the EMP, and strictly adhere the same during dredging operations.

26.0 HEALTH SAFETY AND ENVIRONMENT, RISK & HAZARD

26.1 HSE Plan in line with Employers HSE policy and Contractors company policy shall be made and submitted within 28 days of commencing of works for the approval of the employer. The policy shall be followed during the life cycle of the project. The policy may be updated as and when required.

26.2 Risk and Hazard identification and mitigation plan shall be made and submitted within 28 days of commencing of works for approval of the employer. The plan may be updated as and when required.

27.0 CODES, STANDARDS AND SPECIFICATIONS

The design shall comply with the latest editions and revisions of the codes, specifications, and standards listed below:

- (a) BS: 6349 – BS Code of Practice for Marine Structures- Part 5 – Code of Practice for Dredging and Land reclamation.
- (b) Construction and Survey Accuracies for the Execution of Dredging and Stone Dumping Works-March 2001 published by Rotterdam Public Works Engineering Dept. the Nederland's association of dredging, shore and protection contractors and the International Association of Dredging Companies (IADC)
- (c) IS 2720 Part VIII and (d) IHO Manual - MANUAL ON HYDROGRAPHY



Section – VI

Technical Specifications



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SECTION VI

TECHNICAL SPECIFICATIONS

1.0 WORKS

1.1 Dredging Works

The scope of work broadly covers:

As a mandate to create the designated depths at each terminal for safe manoeuvring of the vessels at the berths and their operations, the Port Authority has drawn up proposals for creating the required water depth. Considering all these requirements, the Capital Dredging for Container Terminal phase-I, stage-II (AECTPL) and its associated dredging at Kamarajar Port is finalized and dredging quantity is approximately 7,10,497 cubic metres. Scope of work covered in this tender

Kamarajar Port Limited invites bids under two cover system as scope of this tender. The scope of work broadly covers:

KPL envisages to carry out Capital dredging for the Container Terminal phase-I, stage-II (AECTPL) berth pocket from the existing level upto (-)16m CD. In addition, siltation in the existing GCB II it is proposed to carry out the dredging in the GCB II approach and basin area also. Further, the berth pockets of existing AECTPL berth, EBTPPL berth and GCB II berth are also to be dredged to remove the silted materials.

1. Proposed Container Terminal phase-I, stage-II (AECTPL) berth pocket – 380m x 50m upto (-)16m CD depth
2. GCB II Approaches and its dock basin – 235m x 255m upto (-) 16.50m CD depth
3. GCB II berth pocket – 235m x 50m upto (-)16m CD depth
4. Existing AECTPL berth pocket – 400m x 50m upto (-) 16m CD depth
5. EBTPPL berth pocket – 270m x 50m upto (-)16m CD depth.

1.2 Disposal Locations

The dredged materials from the capital dredging in the berth pocket of proposed Container Terminal phase-I, stage-II (AECTPL) berth and its approaches, dock basin shall be dumped inside the Port area, in line with the EC conditions. However, dredged materials from the dredging areas other than berth pocket of Container Terminal phase-I, stage-II (AECTPL) berth and its approaches, dock basin shall be disposed off into the existing dumping ground.



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NOTE:

The total estimated dredging quantity is approximately 7,10,497 cubic metres including dry excavation.

Out of this, the excavated material comprising dredging in the proposed berth pocket, approach channel and dock basin approximately 3,41,000 cubic metres shall be transported and disposed of within a lead of 5 km radius inside the port area as directed by the Engineer-in-Charge.

The remaining dredged quantity of about 3,70,000 cubic metres shall be disposed of at the designated offshore dumping ground as indicated in the disposal site drawing.

The quantities mentioned above are approximate and may vary depending on actual site conditions, in accordance with the provisions of Clause 12 of Section IV.

1.3 Work Involved

The proposed dredging works involves as mentioned above. The combined approximate dredging quantity is 7,10,497 cubic meters. The dry excavated material from the proposed berth pocket, approach channel and dock basin is to be dumped within the port premises as directed by the Engineer.

1.4 Tolerance and side Slopes

- a) Payable tolerances and side slopes in the dredging area are:
 - i. Vertical tolerance upto 30 cm below the required design level as mentioned in clause 1.1.
 - ii. The horizontal tolerance upto +1.50 M is from the toe line
 - iii. The side slope to be maintained at 1:5.
- b) Tolerance in offshore disposal area
 - i. All dredged material shall be dumped within the specified limits of the sea disposal area as indicated in the drawing enclosed with the tender.
 - ii. The disposed material shall be evenly spread within the offshore disposal area to ensure that drop in depth due to disposal is not more than 0.5m to 1 meters at any time.
 - iii. The contractor shall mark the limits of the area(s) indicated with suitable buoys and shall carryout the dumping as per the instruction of Engineer.
- c) for land fill/ reclamation as directed by the Engineer, height of dredge disposal shall be 1.5m height from the existing ground and should be levelled. The contractor should take adequate



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measurements for embankment and its protection to avoid dredged disposal spoil adjacent land area.

2.0 OVER DREDGING

Over dredging is dredging deeper than the design dredge level plus the vertical dredging tolerance. This means that over dredging is deeper than the designed dredge level.

Over dredging shall not be permitted near the piles forming part of the Jetties, near the toes of the berths and breakwaters.

Should the Contractor wish to perform over dredging in the remaining dredge areas to allow for extra sedimentation arising either from his own operations or from natural phenomena, he shall request the approval of the Engineer's representative for such over dredging. Approval will not be given unless the Contractor can prove, to the full satisfaction of the Engineer, that the over dredging in question will not endanger the channel slope stability. The Contractor will not be entitled to payment for the extra material dredged.

DISPOSAL TOLERANCES

All dredged material shall be dumped within the specified limits of the disposal area as indicated in the tender.

Should dredged material be dumped outside the specified limits, the Contractor shall follow the instructions of the Engineer's Representative to rectify the matter at no extra cost to the Employer.

The Contractor shall mark the limits of the area(s) indicated with suitable buoys and shall carry out the dumping as per the instruction of Engineer.

3.0 BATHYMETRY

Chart and Drawing for reference:

- (a) Indian Hydrographic Chart No 3028
- (b) EMPLOYER generated latest hydrographic chart attached with Tender
- (c) EMPLOYER generated latest topographic chart attached with tender

4.0 REPORTING

Dredging and shore protection is to be undertaken in accordance with the Drawings and as directed.

The Contractor shall supply to the Engineer, at the end of each week following the commencement of dredging, all of the daily or shift log sheets. The log sheets shall cover all works carried out during that week and include, but not necessarily be limited to, number and main technical specifications of dredgers, periods of working of dredgers, details of dredging progress, times for setting anchors, details of breakdowns, and other interruptions which might affect the time for completion. The



daily or shift log shall also record an estimate of the quantity of material excavated or dredged.

The daily or shift log sheets shall be signed by both the Contractor's Dredge In-Charge for all dredging works, the Contractor's site representative for all other works, and a representative of the Engineer.

The signature of the Engineer's representative on these log sheets is solely for the purpose of indicating that the events have been witnessed and recorded and the log sheets have only been seen.

5.0 METHOD OF MEASUREMENT

Quantity for payment shall be measured based on difference in Pre and Post dredging survey.

- (a) Quantity for payment of onshore/ offshore disposal shall be based on difference in Pre bathymetry and Post Bathymetry survey of dredging area
- (b) Quantity for payment for dry excavation shall be based on Pre and Post levels.
- (c) Quantity for payment for removal of boulders will be based on stacked measurement on ground. 30% shall be considered as voids and deducted from the stacked volume
- (d) Payment for (b) above shall be made as per clause 27.2.6 of GCC.
- (e) The payment for part / interim bills shall be based on difference between intermittent/progress survey levels with the pre dredging survey.

6.0 SURVEYING

6.1 Work Set out & Bathymetry Survey

Bench Mark information to enable the Contractor to accurately define the boundaries of the excavation, dredging and deposition areas shall be supplied on the Drawings and Data provided by the Employer. It shall be the Contractor's responsibility to verify, erect and maintain any visual or other marks at site required to accurately control the excavation, dredging and reclamation / dumping operations.

The Contractor shall provide all labour, materials, plant and equipment to set out the Works, to monitor, progress, to the surveys of the area being dredged, excavated, and reclaimed / offshore disposal.

The cost of all types of surveys (Pre, Post & interim surveys) shall be borne by the Contractor.

The Engineer or his representative may at any time check the setting out of the work or to check the work completed.

Prior to the Contractor commencing work on the Site, the Contractor shall carry out a survey of the areas to be dredged, excavated and dumped with the Engineer or his representative in attendance.



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This survey shall establish the basis for payment to the Contractor. Survey of the area to be dredged shall be by hydro graphic techniques.

Pre-Dredging and Post dredging surveys may be jointly supervised by the Employer / Engineer and the contractor or through Government approved independent third-party agencies. Intermediate / Interim surveys shall be jointly carried out the Employer / Engineer and the Contractor.

6.2 Survey vessel

The survey vessel shall be of suitable size certified to accommodate minimum six persons and stable for undertaking safe and proper survey work in the prevailing site and sea conditions. The vessel shall be highly manoeuvrable at low speeds. The survey vessel shall have valid certificate for seaworthiness.

6.3 Datum Equipment and Accuracy

6.3.1 Datum and Geodetic Parameters

The WGS84 spheroid coordinates shall be followed for entire survey with UTM (Universal Traverse Mercator) Projection.

All measured depths and elevations shall be reduced to Chart Datum

6.3.2 Horizontal Control

Horizontal control shall be Electronic Positioning system consisting of Differential Global Positioning system (DGPS) or Real Time Kinematic (RTK) GPS with a horizontal accuracy sub-one meter

6.3.3 Vertical Control

The Establishing an automatic recording and transmitting tide gauge system shall be installed and the downloaded tide shall be used for tide corrections for the post-processing of survey data.

During the survey manual recording of tide at an accepted interval shall be done for cross reference. Employer may allow usage of its established tidal station.

The vertical levels shall be reduced to chart Datum. Accuracy of measurement shall be 0.05 m

6.3.4 Topographic Survey

Topographic survey shall be carried out by RTK techniques. It shall be cross checked with the project Base Station.

The accuracy of RTK technique generally is within 0.1 metre in horizontal and 0.05 metre in vertical.

6.3.5 Depth measuring

The echo sounder for hydrographic survey shall be capable of producing continuous bed profile. The echo sounder for hydrographic surveys shall be Single beam dual frequency with 33 & 210-KHz range (narrow beam transducer) with an accuracy of 0.05 m.



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A multi-beam Echo Sounder with frequency of about 300 Khz or above shall be used for sweeping areas to detect high spot at the end of the project

Multi-Beam Echo sounder with frequency of about 300 KHz or above can be used for interim surveys.

Pre and post dredging surveys shall be carried out by using single beam Echo Sounder. Digital format and hard copy of echo graph shall be provided to the Engineer/Employer.

6.3.6 Motion reference unit

A motion sensor for compensation of Heave, pitch and Roll shall be interfaced with the data acquisition software.

6.3.7 Data acquisition and Volume Calculation Software

Standard Hydrographic survey data acquisition and processing software like Latest version of 'HYPACK' software only acceptable to the Employer/ ENGINEER for collection of Survey data shall be used. The software shall have capability of interfacing with all common survey equipment such as Echo sounder, MRU, DGPS/Beacon receiver etc.

Latest version of "Hypack" for volume calculation shall be used to calculate dredging volume.

The volume of the material dredged shall be computed using Data acquisition Hypack software acceptable to the Engineer. One licenced copy of the Data acquisition software shall be made available for the exclusive use of the Employer during the contract period.

A copy of the raw data generated during the survey including the depths, position & tidal data recorded shall be given to the Employer so that the post processing can be independently carried out by the Employer to compute the volumes.

Volumes shall be calculated using "Advanced channel design / Tin model of Hypack".

6.3.8 Equipment Calibration

At the start and end of each survey work, all the equipment is to be calibrated to the specified accuracy. The calibration test shall not be limited to tests recommended by the manufacturer of the equipment. Field calibration tests like bar check, velocity checks, patch test etc. shall be carried out.

6.3.9 Accuracy

The survey equipment shall have following accuracy

The accuracy of survey in the horizontal plane, related to benchmark to be within 1.0 metres.

The accuracy of surveys in the vertical plane shall be as follows:



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- Echo sounding will be maintained a repeatable accuracy of 0.05 metre or better for measurement of distances between seabed and survey vessel waterline.
- The accuracy of registration of water level (tide) by means of an automatic self- recording tide gauge will be within 0.05 metre

6.4 Survey Grid and Sounding lines

- For the Hydrographic Survey Sounding lines shall run at Survey Grid of 10m by 10m. The survey lines shall extend 75m beyond the design slope wherever possible.
- Cross lines shall be run every 100 m for verification of soundings, if difference exceeds 50 mm, Engineer may instruct re-survey.
- For the Topographic survey, grid shall be 5 m by 5 m

6.5 Chart

All the survey charts and cross-sections shall be plotted showing the full results of the survey.

The scale of the bathymetric chart will be 1 in 2000. Contour interval is 1 metre.

As for the cross sections, horizontal scale will be 1 in 2000 or on a scale of convenient best fit and vertical scale 1 in 100. Cross section shall be plotted for every 50 m. The dredge design will also be presented on the cross sections together with the profile of the survey. Cross sections will be plotted on KPs related to the centreline of the channel / area.

These scales are indicative only and shall be adjusted according to the requirement of the client.

Four sets of signed hardcopy and a softcopy including raw data, tide, etc., shall be issued to the Engineer / Employer. The distribution of drawings format also applies to Interim, Control and Post-dredging surveys.

6.6 Survey Quality Assurance Quality Control

6.6.1 Calibration & Verification Certificates

- (a) All required calibration certificates shall be verified in accordance with the manufacturer's recommendation for the equipment. An overview shall be kept in the Survey Equipment database, while detailed record shall also be maintained.
- (b) Prior to execution of the survey works, field checks will be undertaken on all relevant equipment in order to ensure that the equipment is functioning correctly and adhering to manufacturer's specifications. Results of the field checks are to be made available.
- (c) Field checks and field calibrations shall be carried out according to standard guidelines for project surveys



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- (d) DGPS/RTK Base Station - The system shall be verified atleast once every one month by GPS-baseline measurement techniques, unless some changes or damage in the present set-up occur, which require immediate action.
- (e) Tide gauge - Every week, the tide gauge will be calibrated and the field check data will be recorded in the tidal calibration log sheet. For each survey, before and after carrying out the task, a check is performed between the tide as recorded and observed at the tide gauge.
- (f) Positioning - Prior to the survey boat leaving the harbour, a graphical position check shall be carried out on a known point, together with a tide check. All calibration and verification results are recorded on the survey log sheet
- (g) Single beam Echo Sounder - Pre and post bar check shall be carried out in the working area.
- (h) Multi-beam Echo Sounder – Calibration and the determination of mounting angles, will be carried out at least once every month, for each survey a sound velocity profile throughout the water column shall will be taken before and after the survey.
- (i) Processing - During processing, additional attention will be spent on matching criteria of consecutive surveys. Overlapping surveys, adjacent surveys and previous surveys shall be used for comparison.
- (j) Log Sheet - Each Survey shall be covered by relevant Log sheets informing:
 - the purpose of the survey
 - the surveyor in charge and the survey launch
 - description of all relevant calibrations, verifications and tests performed on board
 - time and place of survey
 - information about weather conditions

6.7 Survey Manual

The Contractor shall submit survey manual or method statement within 28 days of commencing works for Engineers / Employers review and approval. The survey manual shall be the guidelines for carrying out survey. The manual shall be updated as and when necessary

7.0 PLANT AND EQUIPMENT

- (a) The contractor shall arrange surveying equipment including boats, sounding devices etc. required for undertaking pre and post-dredging surveys. No additional cost will be paid to the contractor for the same.
- (b) No separate mobilisation and demobilisation charges will be paid to the Contractor for the extra equipment and dredgers to be deployed by the Contractor for the work. The rate of dredging quoted per cum. will squarely and totally include all the charges to be paid to the Contractor by the Employer.



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- (c) The Contractor shall not change the type, number, size and make of dredgers indicated in the contract without written approval of EMPLOYER. If the dredger breaks down, the Contractor should arrange for replacement of the same with an equivalent or higher capacity dredgers of suitable type with the prior approval of EMPLOYER. This shall not relieve the Contractor from obligations under other clauses of contract. No additional cost and time will be allowed on this account.
 - (d) The Contractor shall be responsible for obtaining specific approvals, Licences and for the payment of any fees relating to the execution of the works and to the process adopted by the Contractor, Eg. Right of way for discharge pipes, temporary works for pump out points, local authority approvals, Licences and approvals from DG Shipping etc.
 - (e) In case of any change in the deployment pattern of dredgers, prior approval of the Engineer / Employer should be taken with justification.

8.0 NAVIGATION

8.1 General

The Contractor shall make all necessary arrangements for temporary removal and replacement of any authorised buoys or piles that may obstruct the operations. The removal and reinstatement of all authorised or licensed buoys or piles will be carried out at full cost to the Contractor.

The dredger and other plant, including all stakes, buoys and pipeline used by the Contractor, shall display the correct navigation signals and shall be clearly marked and lit at night to the satisfaction of the Harbour Master.

8.2 Temporary Lights

The Contractor shall provide such temporary navigation lights and floating buoys on all plant, anchor ropes and works as may be required by the Harbour Master.

8.3 Minimum Interference with Navigation

In cases of works that involve disruption to any shipping movements that will be using the harbour/ channel/wharf, all works shall be carried out with minimum interference to navigation and in accordance with the directions of the Harbour master.

8.4 Navigation Requirement

So far as practicable the dredging work shall be organised so that dredging plant is so positioned as to allow the normal passage of vessels to the satisfaction of the Harbour Master.

Navigation signals, lights and warning markers shall be provided and maintained on floating plant, submerged pipelines, anchors and any other equipment placed by the Contractor to the satisfaction of the Harbour Master. Any floating pipeline shall be controlled to ensure the least obstruction to the movement of vessels.



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The Contractor shall prior to the establishment of plant on site notify the Harbour Master and the Engineer of his proposed programme and methods. The Contractor shall be responsible for providing the harbour Master and Engineer with details of any changes to the programme and methods, after approval by the Engineer.

8.5 Oil Spillage

Oil spill response equipment shall be provided on the Site in sufficient quantity to cope with spill from the dredging equipment and associated plant.

9 DIVING

Should any diving work be carried out during the Contract, this shall be in accordance with the requirements of Kamarajar port and Statutory Authorities. The cost of this diving works related to the Contractors works will be borne by the Contractor.

If the diving operation is required by the Employer for employer's works, case the cost shall be reimbursed by Employer.

10.0 SITE CLEARANCE AT AREA

Before start of the filling / reclamation activities at site all bushes, trees and all other temporary structures / permanent structures (except for permanent Bench marks, survey pillars etc.) if any shall be removed from site. It is the Contractor's responsibility to visit the site before quoting and assess the quantum of work involved in removing such structures.

All material shall be cleared from the site and disposed of by the contractor without any liability to the Employer.

In case any existing Grid pillar / permanent pillar at site are likely to get buried at site during the reclamation, these shall be relocated with top of pillar placed at min. 500 mm above the proposed Finished Ground Level (FGL) and new R.L and centre line coordinates shall be duly punched on the metal plate on top of the pillar.

11.0 DISPOSAL

The material so dredged shall be disposed of in a designated onshore/offshore disposal location to be identified by KPL, disposing/ dumping the dredged materials evenly in the designated area located anywhere in the port lands within a lead 5 km from the dredging location.

The contractor shall arrange to conduct periodical pre and post hydrographic & land surveys at his own cost as directed by the Employer/ Engineer. Pre and post survey will be witnessed by Third party appointed by Employer.

The quoted rate shall be inclusive of this pre, post & interim survey.

12.0 EXCAVATION AND DREDGING WORKS

Dredging is to be undertaken in accordance with the Drawings and as directed.



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The Contractor shall supply to the Engineer, at the end of each week following the commencement of dredging, all of the daily or shift log sheets. The log sheets shall cover all works carried out during that week and include, but not necessarily be limited to, no and main technical specifications of dredgers, periods of working of dredgers, details of dredging progress, times for setting anchors, details of breakdowns, and other interruptions which might affect the time for completion. The daily or shift log shall also record an estimate of the quantity of material excavated or dredged.

The daily or shift log sheets shall be signed at the end of each week by both the Contractor's Dredge Master for all dredging works, the Contractors site representative for all other works, and a representative of the Engineer. The signature of the Engineer's representative on these log sheets is for the purpose of indicating that the sheets have only been seen and is not for. The purpose of confirming the accuracy or otherwise of any information contained therein.



Section – VII

APPENDIX



**SECTION VII
APPENDIX**

APPENDIX TO TENDER (1 of 2)

Item	Sub Clause	Data
Employer's Name and Address	-	Kamarajar Port Limited No:17, Jawahar Building, Rajaji Salai, Chennai - 600001
Engineer's / PMC Name and Address	-	To be intimated separately
Governing Law	1.4of GCC	Constitution of India
Ruling Language	1.4of GCC	English
Language for Communication	1.3 of GCC	English
Right to Access to the Site	2.1of GCC	On commencement of works subject to interfacing with other contractor
Amount of Performance Security	8.0 of section III	5% of the Accepted Contract amount in the form of Insurance surety bond/ DD/ Banker Cheque Bank Guarantee on any Nationalised / Scheduled Bank (except Co-operative Bank) from any branch in India, encashable in Chennai. Valid till one month from payment of final bill.
Working Hours	5.5 of GCC	24 Hrs. per day x seven days/ week.
Liquidated damages	7.2& 7.2.1 of GCC	0.5% per week or part thereof subject to maximum of 10% of contract value
Time for Completion of the Work	7.2 of GCC	4 Months (Including mobilisation and demobilisation.
Right to Vary	12.1 of GCC	Plus / Minus 25% of original contract value
Retention money	9.0 of section III	10% on each running bill upto maximum of 5% of the contract value.



APPENDIX TO TENDER (2 of 2)

Item	Sub- Clause	Data
Escalation	12.3 of GCC	Only main fuel escalation is payable as price adjustment.
Currency of payment	13.14 of GCC	Indian Rupees only
Limitation of Liability	16.6 of GCC	Limited to total value of the Contract
Schedule of Rate	27.2 of GCC	General Payment terms
Idle time charges per hour	28.0 of GCC	Idle time shall be paid beyond four hours of idling on any particular day
Periods for submission of Insurance: a) evidence of insurance b) relevant policies	17.1 of GCC	28 days
Insurance of Equipment	17.2 of GCC	Full Replacement value of Equipment
Injury to persons and Damage to Property	17.3 of GCC	Rs 50 Million per Occurrence, no limit to number of Occurrence
Injury to Contractor's personnel, Employer and Employers representative including PMC appointed by Employer	17.4 of GCC	Rs 5.0 Million per incident
Contractor's Marine Craft	17.5 of GCC	H&M Policy, P&I club cover including for Oil pollution and wreck removal



Section – VIII

ANNEXURES



ANNEXURE-1

EXCEPTIONS AND DEVIATIONS

SL. No	Page No. of Bid Document	Clause No. of Bid Document	Subject Deviation

SIGNATURE OF BIDDER

Note:- Should be filled as 'Nil'



ANNEXURE-2

To be executed on No-judicial Stamp paper of Rs. 100/-

PROFORMA OF POWER OF ATTORNEY

To

The General Manager
(Corporate Strategy and Business Development),
Kamarajar Port Ltd
No:17, Jawahar Building,
Rajaji Salai, Chennai – 600 001

Dear Sir,

Know all men by these presents, We, _____, a company registered in _____, having our registered office at _____, by virtue of a General Power of Attorney granted to - _____ dated _____ (a copy of which is enclosed), do hereby constitute, appoint and authorize _____, residing at _____, who is presently employed with us and holding the position of _____, as our true and lawful attorney (hereinafter referred to as the "Authorized Representative"), to do in our name and on our behalf, all such acts, deeds and things necessary in connection with or incidental to " Capital Dredging for Container Terminal phase-I, stage-II (AECTPL) and its associated dredging at Kamarajar Port " (the "Project"), on behalf of _____ *Name of the bidder* authorised to represent us to bid, negotiate and conclude the agreement on our behalf with you against Tender No: KPL/ PPD/ CD (AECTPL)/2026

We confirm that, we shall be bound by all and whatsoever our said "Authorized Representative" shall commit, attendance and representation at the meetings, discussions and negotiations with regard to the Tender document, signing of agreement and submission of all documents and providing information / responses to *KAMARAJAR PORT LIMITED* in all matters in connection with our Proposal for the Project.

We hereby agree to ratify all acts, deeds and things lawfully done by our said attorney pursuant to this Power of Attorney and that all acts, deeds and things done by our aforesaid attorney shall and shall always be deemed to have been done by us.

Dated this the _____ th Day of _____2026

For *Name of the bidder*



Name and designation of the person holding General Power of Attorney

Accepted

*Name of the authorized signatory in whose name this Power of Attorney is issued
Designation & address*

Date:



ANNEXURE-3

AGREEMENT

(To be executed on Rs.100/- non-judicial stamp Paper)

THIS AGREEMENT is made on the _____day of 2026 between Kamarajar Port Limited at registered office at No:17, Jawahar Building, Rajaji Salai, Near Chennai – 600001 hereinafter called "the Employer" of the one part and _____ (Name of Contractor and mailing address of the contractor) _____ hereinafter called "the Contractor" of the other part. WHEREAS the Employer is desirous that certain tasks be performed viz. "CAPITAL DREDGING FOR CONTAINER TERMINAL PHASE-I, STAGE-II (AECTPL) AND ITS ASSOCIATED DREDGING AT KAMARAJAR PORT " and has accepted a proposal by the "Contractor" as referred in the assignment NOW THIS AGREEMENT WITNESSETH as follows:

In this agreement words and expression shall have the same meaning as are respectively assigned to them in the Conditions of Tender Document hereinafter referred to.

The following documents shall be deemed to form and be read and construed as part of this Agreement, viz. -

The Tender Document for "CAPITAL DREDGING FOR CONTAINER TERMINAL PHASE-I, STAGE-II (AECTPL) AND ITS ASSOCIATED DREDGING AT KAMARAJAR PORT" as issued by the Employer.

All amendments to the Tender Document for "CAPITAL DREDGING FOR CONTAINER TERMINAL PHASE-I, STAGE-II (AECTPL) AND ITS ASSOCIATED DREDGING AT KAMARAJAR PORT "as issued by the Employer prior to submission of the bids.

Acceptance letter issued by the Employer vide No._____ dated.....and all correspondence exchanged between the Employer and the Consultant up to the date of issue of acceptance letter as specifically referred to in the said acceptance letter.

In consideration of the payment to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to execute and complete the works in conformity in all respects with the provisions of the contract.

The Employer hereby covenants to pay the contractor in consideration of the execution, completion, of the works the contract charges/fees at the times and in the manner prescribed in Price bid.



IN WITNESS WHEREOF the parties hereto have caused their respective Common Seals to be hereunto affixed (or have hereunto set their respective hands and seals) the day and year first above written.

SIGNED, SEALED AND DELIVERED

By Said

By Said

Name_____

Name_____

On behalf of the **Contractor**

On behalf of the **Employer**

in the presence of

in the presence of

Name_____

Name_____

Address_____

Address_____

Name_____

Name_____

Address_____

Address_____



ANNEXURE-4

PROFORMA OF BANK GUARANTEE FOR PERFORMANCE SECURITY

This Deed of Guarantee executed this _____ by (*Bank having branch in Chennai with address*) hereinafter called the “Guarantor” on ONE PART in favour of M/s. KAMARAJAR PORT LIMITED having its Registered Office at registered office at No:17, Jawahar Building, Rajaji Salai, Chennai – 600001 (hereinafter called “The Principal”) which expression shall unless excluded by or repugnant to the context be deemed to include its successors or assigns of the OTHER PART.

WHEREAS the Principal has placed a Contract (No.----- for. “CAPITAL DREDGING FOR CONTAINER TERMINAL PHASE-I, STAGE-II (AECTPL) AND ITS ASSOCIATED DREDGING AT KAMARAJAR PORT ” at Kamarajar Port dated _____ against Tender No: KPL/ PPD/ CD (AECTPL)/2026 at Kamarajar Port (hereinafter called “the said contract”) in favour of M/s _____, having their registered office at _____(hereinafter called “the CONTRACTOR”) which expression shall unless excluded by or repugnant to the context be deemed to include its successors and assigns.

WHEREAS the CONTRACTOR in terms of the Contract has agreed to submit to the Principal, Performance Guarantee amounting to Rs _____ /- (Rupees _____ only) in favour of the Principal for a minimum period of for the “CAPITAL DREDGING FOR CONTAINER TERMINAL PHASE-I, STAGE-II (AECTPL) AND ITS ASSOCIATED DREDGING AT KAMARAJAR PORT "en-cashable at Chennai as per Contract referred above, and

WHEREAS, we (*Bank*) the “Guarantor” have been requested by the CONTRACTOR to issue a performance Bank guarantee for Rs _____ (Rupees _____ only) in favour of the Principal and we the Guarantor are in agreement to do so.

NOW THIS DEED WITNESSED that in consideration of the aforesaid promises, we, the Guarantor _____ hereby confirm our agreement and undertake to pay to the Principal upon demand in writing whenever required by them to do so such sum or sums of money not exceeding the said sum of Rs _____ (Rupees _____ only) arising out of any loss or damage suffered or that may be suffered by the Principal due to Non-compliance of the Scope of work only against the said Contract which arise during the agreed period as said above, in the said Contract.

We, the Guarantor hereby agree that upon demand by the Principal we shall honour the claim of the Principal and promptly pay the amount claimed under this Guarantee, without any demur and the Principal shall not be questioned for justification of such demand.

We, the Guarantors further agree that the Guarantee herein contained shall remain in full force for the agreed period as said above and in the event of claims lodged by



the Principal this Guarantee shall continue to remain enforceable till the Principal's claims are fulfilled or discharged as the case may be subjected to the provision that after the lapse of the agreed period, the Principal shall have no right of raising further additional claim under this Guarantee.

We, the said Guarantors do hereby undertake to indemnify and keep indemnified the Principal to the extent of Rs _____ (Rupees _____ only). We, the said Guarantor, further agree that on a demand made by the Principal for honoring the Bank Guarantee, we have no right to refuse or declaim the demand for any reason whatsoever. The fact that there is a dispute between the CONTRACTOR and the Principal is no ground for us, to decline to honour the demand under this Guarantee and the Principal shall always have a right to enforce the Bank Guarantee unconditionally without any reference to the said CONTRACTOR.

We, the Guarantor further agree that a mere demand by the Principal is sufficient for us, to pay the amount covered by the Bank Guarantee without reference to the said CONTRACTOR and any protest by the said CONTRACTOR cannot be valid ground for us, to decline payment to the said Principal.

We, the Guarantor, further agrees that the Guarantee herein contained shall remain in full force and effect for a period up to _____ from the date hereof.

It shall not be necessary for the Principal to proceed against the CONTRACTOR before proceeding against us, the Guarantors and the guarantee herein contained shall be unconditionally enforceable against us, the Guarantor, notwithstanding any security which the Principal may have obtained or obtain from the CONTRACTOR at the time when proceedings are taken against us, the Guarantors, hereunder be outstanding or unrealized.

We, the Guarantor, lastly undertake not to revoke this, Guarantee during its currency except with the previous consent of the Principal in writing and agree that any change in the constitution of the said CONTRACTOR or the Guarantors shall not discharge our liability hereunder.

1. Our Liability under this Bank Guarantee shall not exceed Rs _____ (Rupees _____ Only)
2. This Bank Guarantee shall be valid up to _____ and
3. We are liable to pay the Guarantee amount or any part thereof under this Bank Guarantee only and only if you serve upon us a written claim or demand on or before _____



ANNEXURE-5

**PROFORMA FOR BANK GUARANTEE FOR BID SECURITY/ EARNEST MONEY
DEPOSIT (EMD)**

(To be stamped in accordance with the Stamp Act)

Ref..... Bank Guarantee No.....

Date.....

To
M/s Kamarajar Port Ltd.
No:17, Jawahar Building,
Rajaji Salai,
Chennai – 600001
Tamil Nadu, India

Dear Sir(s),

TENDER NO. KPL/PPD/CD (AECTPL)/ 2026 FOR _____

WHEREAS.....(hereinafter called the Bidder has submitted his Bid no. dated.....for(hereinafter called 'the bid')

KNOW ALL MEN by these presents that WE.....(name of the bank) are bound unto M/s Kamarajar Port Ltd. (herein after called EMPLOYER) IN THE SUM OF.....for which payment well and truly to be made to EMPLOYER encashable at Chennai, the Bank binds itself its successor and assigns by these presents. Sealed with the Common Seal of the Bank this... day of..... 2026

THE CONDITIONS OF THIS OBLIGATION ARE:

1. If the Bidder withdraws his Bid during the period of Bid validity specified by the Bidder on the Bid Form; or
2. If the Bidder, having been notified of the acceptance of his bid by owner during the period of bid validity:
 - a) Fails or refuses to execute the Contract Form, if required; or
 - b) Fails or refuses to furnish the PERFORMANCE SECURITY in accordance with the provisions of bidding document.



We undertake to pay EMPLOYER up to the above amount upon receipt of its first written demand, without EMPLOYER having to substantiate its demand, provided that in its demand EMPLOYER will note that the amount claimed by it is due to it owing to the occurrence of one or both of the two conditions specifying the occurred condition or conditions.

The Guarantee will remain in force upto **Six (6) months** from final bid due date of tender and any demand in respect thereof should reach the BANK not later than the above date.

(Signature of the BANK)

(Signature of the Witness)

Name & Address of Witness:

Date:

INSTRUCTIONS FOR FURNISHING BANK GUARANTEE

1. The Bank Guarantee by bidders will be furnished on non-judicial stamp paper as per stamp duty applicable. The non-judicial stamp paper should be in the name of the issuing bank. In case of foreign bank, the said Bank guarantee to be issued by its correspondent bank at Chennai on requisite non-judicial stamp paper.
2. The expiry date as mentioned in Bid Security should be Six (6) months from final bid due date as specified in the Bid Documents.
3. The bank guarantee submitted by bidders will be given from bank as specified in ITB. Bank Guarantee shall be en-cashable at Chennai branch of the bank.
4. A letter from the issuing bank of the requisite Bank Guarantee confirming that said bank guarantee /all future communication relating to the Bank Guarantee shall be forwarded to the Employer at its address as mentioned at ITB.
5. Bidders must indicate the full postal address of the bank along with the bank's E-mail/ Fax/ from where the earnest money bond has been issued.



ANNEXURE-6

INTEGRITY PACT

(The Integrity Pact agreement shall be executed in Rs 100/- non judicial stamp paper and shall be enclosed along with original financial instrument and reach Kamarajar Port Limited (KPL) corresponding address before opening Technical bid as per date and time given in the Tender.)

GENERAL

This pre-bid pre-contract Agreement (herein after called the Integrity Pact)
BETWEEN

Kamarajar Port Limited, represented by the Chairman and Managing Director,
Kamarajar Port Limited, Chennai hereinafter referred to as “THE PRINCIPAL” /
“EMPLOYER”

AND

..... represented by Shri
..... hereinafter referred to as “The BIDDER /
CONTRACTOR”.

Preamble

The Principal intends to award, under laid down organizational procedures,
contract/s for (Name of the Contract
/ Project / Stores equipment / item). The Principal values full compliance with all
relevant laws and regulations, and the principles of economic use of resources, and
of fairness and transparency in its relations with the Bidder/s and Contractor/s.

In order to achieve these goals, the Principal will appoint an External Independent
Monitor who will monitor the tender process and the execution of the contract for
compliance with the principles mentioned above.

NOW, THEREFORE,

To avoid all forms of corruption by following a system that is fair, transparent and
free from any influence / prejudiced dealings prior to, during and subsequent to the
currency of the contract to be entered into with a view to:-

Enabling the PRINCIPAL/EMPLOYER to obtain the desired said stores / equipment
at a competitive price in conformity with the defined specifications by avoiding the
high cost and the distortionary impact of corruption on public procurement,
and

Enabling BIDDERS / CONTRACTORS to abstain from bribing or indulging in any
corrupt practice in order to secure the contract by providing assurance to them that



their competitors will also abstain from bribing and other corrupt practices and the PRINCIPAL/EMPLOYER will commit to prevent corruption, in any form, by its officials by following transparent procedures.

The parties hereto hereby agree to enter into this Integrity Pact and agree as follows:-

Commitments of the PRINCIPAL/EMPLOYER

The PRINCIPAL/EMPLOYER undertakes that no official of the Principal/Employer connected directly or indirectly with the contract, will demand, take a promise for or accept, directly or through intermediaries, any bribe, consideration, gift, reward, favour or any material or immaterial benefit or any other advantage from the BIDDER / CONTRACTOR, either for themselves or for any person, organization or third party related to the contract in exchange for an advantage in the bidding process, bid evaluation, contracting or implementation process related to the contract.

The PRINCIPAL/EMPLOYER will, during the pre-contract stage, treat all BIDDERS / CONTRACTORS alike, and will provide to all BIDDERS / CONTRACTORS the same information and will not provide any such information to any particular BIDDER / CONTRACTOR which could afford an advantage to that particular BIDDER / CONTRACTOR in comparison to other BIDDER / CONTRACTOR and could obtain an advantage in relation to the tender process or the contract execution.

All the officials of the PRINCIPAL/EMPLOYER will report to the Chairman cum Managing Director / Chief Vigilance Officer of Kamarajar Port Limited any attempted or completed breaches of the above commitments as well as any substantial, suspicion of such a breach.

If the PRINCIPAL/EMPLOYER obtains information on the conduct of any of its employees with full and verifiable facts and the same is prima facie found to be correct which is a criminal offence under the Indian Penal Code / Prevention of Corruption Act, or if there be a substantive suspicion in this regard, the Principal will inform its Chief Vigilance Officer and in addition can initiate disciplinary actions.

Commitments of the BIDDER / CONTRACTOR

The Bidder / Contractor commit himself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the tender process and during the post contract stage.

- a. The Bidder / Contractor will not enter with other Bidder / Contractors into any undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.



- b. The Bidder/Contractor will not commit any offence under the Indian Penal Code, 1860 / Prevention of Corruption Act, 1988 further the Bidder / Contractor will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.
- c. The Bidder / Contractor will not offer, directly or through intermediaries, any bribe, gift, consideration, reward, favour, any material or immaterial benefit or any other advantage, commission, fees, brokerage or inducement to any official of the Principal/Employer, connected directly or indirectly with the bidding process, or to any person, organization or third party related to the contract in exchange for any advantage in the bidding, evaluation, contracting and implementation of the contract.
- d. The Bidder/Contractor further undertakes that it has not given, offered or promised to give directly or indirect any bribe, gift, consideration, reward, favour, any material or immaterial benefit or any other advantage, commission, fees, brokerage or inducement to any official of the Principal/Employer or otherwise in procuring the Contract or forbearing to do or having done any act in relation to the obtaining or execution of the contract or any other contract with the Principal for showing or forbearing to show favour or dis-favour to any person in relation to the contract or any other contract with the Principal.
- e. The Bidder / Contractor of foreign origin shall disclose the name and address of the Agents /representatives in India, if any. Similarly the Bidder/Contractor of Indian Nationality shall furnish the name and address of the foreign principals, if any.
- f. Bidder / Contractors shall disclose the payments to be made by them to agents or any other intermediary, in connection with this bid/contract.
- g. The Bidder / Contractor further confirms and declares to the Principal/ Employer that the Bidder / Contractor is the original manufacturer/integrator/ authorized government sponsored export entity of the stores and has not engaged any individual or firm or company whether Indian or foreign to intercede, facilitate or in any way to recommend to the Principal/Employer or any of its functionaries, whether officially or unofficially to the award of the contract to the Bidder / Contractor, nor has any amount been paid, promised or intended to be paid to any such individual, firm or company in respect of any such intercession, facilitation or recommendation.
- h. The Bidder / Contractor, either while presenting the bid or during pre-contract negotiations or before signing the contract, shall disclose any payments he has made, is committed to or intends to make to officials of the Principal/Employer or their family members, agents, brokers or any other intermediaries in connection with the contract and the details of services agreed upon for such payments.



- i. The Bidder / Contractor will not collude with other parties interested in the contract to impair the transparency, fairness and progress of the bidding process, bid evaluation, contracting and implementation of the contract.
- j. The Bidder / Contractor will not accept any advantage in exchange for any corrupt practice, unfair means and illegal activities.
- k. The Bidder / Contractor shall not use improperly, for purposes of competition or personal gain, or pass on to others, any information provided by the Principal/Employer as part of the business relationship, regarding plans, technical proposals and business details, including information contained in any electronic data carrier. The Bidder / Contractor also undertakes to exercise due and adequate care lest any such information is divulged.
- l. The Bidder / Contractor commits to refrain from giving any complaint directly or through any other manner without supporting it with full and verifiable facts.
- m. The Bidder / Contractor will not instigate third persons to commit offences outlined above or be an accessory to such offences.
- n. If the Bidder/Contractor or any employee of the Bidder/Contractor or any person acting on behalf of the Bidder/Contractor, either directly or indirectly, is a relative of any of the officers of the Principal/Employer, or alternatively, if any relative of an officer of the Principal/Employer has financial interest / stake in the Bidder / Contractor's firm, the same shall be disclosed by the Bidder / Contractor at the time of filing of tender. The term 'relative' for this purpose would be as defined in Section 6 of the Companies Act 1956.
- o. The Bidder / Contractor shall not lend to or borrow any money from or enter into any monetary dealings or transactions, directly or indirectly, with any employee of the Principal/Employer.
- p. The Bidder / Contractor shall not approach the Courts while representing the matters to IEM and he/ she will await their decision in the matter.
- q. In the event of any dispute between the management and the contractor relating to those contracts where Integrity Pact is applicable, in case, both the parties are agreeable, they may try to settle dispute through mediation before the panel of IEMs in a time bound manner. If required, the organizations may adopt any mediation rules for this purpose.

Previous Transgression

The Bidder / Contractor declares that no previous transgression occurred in the last three years immediately before signing of this Integrity Pact, with any other company



in any country in respect of any corrupt practices envisaged hereunder or with any Public Sector Enterprises in India or any Government Department in India that could justify Bidder / Contractor's exclusion from the tender process. If the Bidder / Contractor makes incorrect statement on this subject, the Bidder / Contractor can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason.

Sanction for Violations

Any breach of the aforesaid provisions by the Bidder / Contractor or any one employed by it or acting on its behalf (whether with or without the knowledge of the Bidder / Contractor shall entitle the Principal / Employer to take all or any one of the following actions, wherever required:-

- (i) To immediately call off the pre contract negotiations without assigning any reason or giving any compensation to the BIDDER / CONTRACTOR, However, the proceedings with the other BIDDER / CONTRACTOR (s) would continue.
- (ii) The Earnest Money Deposit (in pre-contract stage) and / or Security Deposit / Performance Bond (after the contract is signed) shall stand forfeited either fully or partially, as decided by the PRINCIPAL/EMPLOYER and the PRINCIPAL/EMPLOYER shall not be required to assign any reason therefore.
- (iii) To immediately cancel the contract, if already signed, without giving any compensation to the BIDDER / CONTRACTOR.
- (iv) To recover all sums already paid by the PRINCIPAL/EMPLOYER, and in case of an Indian BIDDER / CONTRACTOR with interest thereon at 2% higher than the prevailing Prime Lending Rate of State Bank of India , while in case of a BIDDER / CONTRACTOR from a country other than India with interest thereon at 2% higher than the LIBOR. If any outstanding payment is due to the BIDDER / CONTRACTOR from the PRINCIPAL/EMPLOYER in connection with any other contract for any other stores, such outstanding payment could also be utilized to recover the aforesaid sum and interest.
- (v) To encash the advance bank guarantee and performance bond / warranty bond, if furnished by the BIDDER / CONTRACTOR, in order to recover the payments, already made by the PRINCIPAL/EMPLOYER, along with interest.
- (vi) To cancel all or any other Contracts with the BIDDER / CONTRACTOR. The BIDDER / CONTRACTOR shall be liable to pay compensation for any loss or damage to the PRINCIPAL/EMPLOYER resulting from such cancellation/ rescission and the PRINCIPAL/EMPLOYER shall be entitled to deduct the amount so payable from the money(s) due to the BIDDER / CONTRACTOR.
- (vii) To debar the BIDDER / CONTRACTOR from participating in future bidding processes of the Principal for a minimum period of five years, which may be further extended at the discretion of the PRINCIPAL/EMPLOYER.



- (viii) To recover all sums paid in violation of this Pact by BIDDER/CONTRACTOR(s) to any middleman or agent or broker with a view to securing the contract.
- (ix) In cases where irrecoverable Letters of Credit have been received in respect of any contract signed by the PRINCIPAL/EMPLOYER with the BIDDER / CONTRACTOR, the same shall not be opened.
- (x) Forfeiture of Performance Bond in case of a decision by the PRINCIPAL/EMPLOYER to forfeit the same without assigning any reason for imposing sanction for violation of this pact.
- (xi) The Bidder / Contractor accepts and undertakes to respect and uphold the Principal's absolute right to resort to and impose such exclusion and further accepts and undertakes not to challenge or question such exclusion on any ground, including the lack of any hearing before the decision to resort to such exclusion is taken. This undertaking is given freely and after obtaining independent legal advice.
- (xii) If the Bidder / Contractor can prove that he has restored /recouped the damage caused by him and has installed a suitable corruption prevention system, in such a case, it will be discretion of the Principal to revoke the exclusion prematurely.
- (xiii) The PRINCIPAL/EMPLOYER will be entitled to take all or any of the actions mentioned at Para (i) to (xii) above of this Pact also on the Commission by the BIDDER / CONTRACTOR or any one employed by it or acting on its behalf (whether with or without the knowledge of the BIDDER / CONTRACTOR), of an offence as defined in Chapter IX of the Indian Penal code, 1860 or Prevention of corruption Act, 1988 or any other statute enacted for prevention of corruption.
- (xiv) The decision of the PRINCIPAL / EMPLOYER to the effect that a breach of the provisions of this Pact has been committed by the BIDDER / CONTRACTOR shall be final and conclusive on the BIDDER / CONTRACTOR. However, the BIDDER / CONTRACTOR can approach the Independent Monitor (s) appointed for the purposes of this Pact.

Fall Clause

The BIDDER / CONTRACTOR undertakes that it has not supplied / is not supplying similar product / systems or subsystems at a price lower than that offered in the present bid in respect of any other Ministry / Department of the Govt. of India or PSU and if it is found at any stage that similar product / systems or subsystems was supplied by the BIDDER / CONTRACTOR to the Principal at a lower price, then that very price, with due allowance for elapsed time, will be applicable to the present case and the difference in the cost would be refunded by the BIDDER / CONTRACTOR to the PRINCIPAL / EMPLOYER, if the contract has already been concluded.

Independent Monitors

The Principal/Employer has appointed two Independent External Monitors (hereinafter referred to as Monitors)

1. Shri Jatinderbir Singh, IAS (Retd)

House No. 1186, Sector 77, Mohali-140 308



Punjab
Email: jatinderbir@gmail.com

2. Shri. Muvvala Kondala Rao, IFoS (Retd)

201, Kalakunj-B,
Co-operative Society , Lane-6,
Dahanukar Colony, Kothrud,
Pune-411038
Email: mkraomuvvala@gmail.com

- (a) The task of the Monitors shall be to review independently and objectively, whether and to what extent the parties comply with the obligations under this Pact.
- (b) The Monitors shall not be subject to instructions by the representatives of the parties and perform their functions neutrally and independently.
- (c) Both the parties accept that the Monitors have the right to access all the documents relating to the project / procurement, including minutes of meetings.
- (d) As soon as the Monitor notices, or has reason to believe, a violation of this pact, he will so inform the authority designated by the Principal and the Chief Vigilance Officer of Kamarajar Port Limited.
- (e) The BIDDER / CONTRACTOR(s) accepts that the Monitor has the right to access without restriction to all Project documentation of the PRINCIPAL including that provided by the BIDDER / CONTRACTOR. The BIDDER / CONTRACTOR will also grant the Monitor, upon his request and demonstration of a valid interest unrestricted and unconditional access to his project documentation. The same is applicable to Subcontractors. The Monitor shall be under contractual obligation to treat the information and documents of the Bidder / Contractor / Subcontractor(s) with confidentiality.
- (f) The Principal / Employer will provide to the Monitor sufficient information about all meetings among the parties related to the Project provided such meetings could have an impact on the contractual relations between the Principal and the Contractor. The parties offer to the Monitor, the option to participate in such meetings.
- (g) The Monitor will submit a written report to the designated Authority of Principal / Employer / Chief Vigilance Officer of Kamarajar Port Limited within 8 to 10 weeks from the date of reference or intimation to him by the Principal / Employer / Bidder / Contractor and should the occasion arise, submit proposals for correcting problematic situation.
- (h) As soon as the Monitor notices, or believes to notice, a violation of this agreement, he will so inform the Management of the Principal and request the Management to discontinue or to take corrective action, or to take other relevant action. The Monitor can in this regard submit non-binding recommendations. Beyond this, the Monitor has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action.
- (i) If the Monitor has reported to the Principal substantiated suspicion of an offence under the Indian Penal Code, 1860 / Prevention of Corruption Act, 1988 and the



Principal / Employer has not, within reasonable time, taken visible action to proceed against such offence or reported to the Chief Vigilance Officer, the Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.

- (j) The word 'Monitor' would include both singular and plural.

Facilitation of Investigation

In case of any allegation of violation of any provisions of this Pact or payment of commission, the PRINCIPAL / EMPLOYER or its agencies shall be entitled to examine all the documents including the Books of Accounts of the BIDDER / CONTRACTOR and the BIDDER / CONTRACTOR shall provide necessary information and documents in English and shall extend all possible help for the Purpose of such examination.

Other Provisions

Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.

If the Contractor is a partnership or a consortium, this agreement must be signed by all partners or consortium members.

Law and Place of Jurisdiction

This Pact is subject to Indian Law. The place of performance and jurisdiction is the seat of the PRINCIPAL / EMPLOYER.

Other Legal Actions

The actions stipulated in this Integrity Pact are without prejudice to any other legal action that may follow in accordance with the provisions of the extant law in force relating to any civil or criminal proceedings.

Validity

The validity of this Integrity Pact shall be from date of its signing and extend up to 5 years or the complete execution of the contract to the satisfaction of both the PRINCIPAL and the Bidder / Contractor including warranty period whichever is later. In case Bidder / Contractor is unsuccessful, this Integrity Pact shall expire after six months from the date of the signing of the contract.

If any claim is made/lodged during this time, the same shall be binding and continue to be valid despite the lapse of this pact as specified above, unless it is discharged/determined by the Kamarajar Port Limited.

Should one or several provisions of this Pact turn out to be invalid, the remainder of this Pact shall remain valid. In this case, the parties will strive to come to an agreement to their original intentions.

Equal treatment of all Bidders / Contractors /Sub-Contractors

- (a) The Bidder / Contractor undertake to demand from all sub-contractors a commitment in conformity with this Integrity Pact, and to submit it to the Principal before contract signing.



- (b) The Principal will enter into agreements with identical conditions as this one with all Bidders / Contractors and Sub-Contractors.
- (c) The Principal will disqualify from the tender process all Bidder / Contractors who do not sign this pact or violate its provisions.

The parties hereby sign this Integrity Pact at _____ on _____.
 The Principal represented _____ BIDDER / CONTRACTOR
 by the MD, Kamarajar Port Limited

Name of the Officer
 Designation

Name
 Designation

Witness 1
 Name & address

Witness 1
 Name & address

Witness 2
 Name & address

Witness 2
 Name & address

Place:
 Date:

Place:
 Date:



ANNEXURE-7

DETAILS OF PAST EXPERIENCE OF CONTRACTOR FOR SIMILAR DREDGING WORK

SI No	Name of Project	Location	Employer's Address	Commencement Date	Completion Date		Value	Dredged Quantity	Duration of Contract
					Scheduled	Actual			

Note: Successfully completed certificates issued by the Client / Employer shall be enclosed as per the Clause 2.2 of Instruction to Bidders. A separate completion certificate for each project either as "original" or duly "Notarized" to fulfil the eligibility criteria shall be enclosed.

SIGNATURE OF BIDDER



ANNEXURE-8

(i) CONCURRENT COMMITMENTS OF THE BIDDER

Sl. No	Name of the Project	Employer's Address	Value of Work	Dredge Quantity	Scheduled Date of		Expected Completion
					Commencement	Completion	

SIGNATURE OF BIDDER



ANNEXURE-9

LIST OF DREDGERS AND OTHER MAJOR EQUIPMENT PROPOSED FOR THE
WORK

Sl. No	Work	Dredger/Craft Equipment / Land Equipment Proposed (with registration)	Capacity/size/ loaded/ draft Speed of vessel dredge pump RPM/ position fixing system/load recording instrument/speed of the vessel/diameter & length of shore pipe etc.	Year of built / Keel laid date	Whether Owned or Chartered	Remarks
1.	Dry Excavation Equipment					
2.	Capital dredging equipment near shore along berth					
3.	Equipment's proposed for Capital dredging					

Note: The bidder is requested to give all relevant and complete information as required and if required he can use separate sheets.

SIGNATURE OF BIDDER



ANNEXURE-10

COMPANY GENERAL INFORMATION

Bidder to submit company information including

- Addresses
- Contact numbers
- Mail id
- Financial statements
- Solvency certificate
- And others.



ANNEXURE-11

METHOD STATEMENT

The Bidder shall submit (enclose) Method Statement i.e. a write up with full technical particulars indicating the method of execution of the Works and to provide documentary evidence for completion of works in time as per capacity of the deployed equipment

Signature _____

Name _____

Designation _____

Date _____



ANNEXURE-12

PROPOSED SITE ORGANIZATION

1. PRELIMINARY SITE ORGANIZATION CHART (1)
2. CV of Key personnel
3. NARRATIVE DESCRIPTION OF SITE ORGANIZATION CHART
4. DESCRIPTION OF RELATIONSHIP BETWEEN HEAD OFFICE AND SITEMANAGEMENT

Note:

(1) Indicate clearly the responsibilities for dredging operations, logistics and contract administration as separate areas and clearly define the relationship between managers of these areas.

(2) Indicate clearly which responsibility and what authority will be delegated to local site management in respect of dredging operations, personnel administration, procurement, contract administration such as purchasing local supplies, acceptance of change orders, billings, assignment of staff, etc.

[Name(s) and Signature
Of authorized representative (s)]

Date: _____



ANNEXURE-13

WORK SCHEDULE& HISTOGRAM

The bidder shall submit the following along-with the bid with sufficient details to enable evaluation of their grasp of the work and ability to execute it within the timeframe.

Execution Schedule

1. This shall consist of a detailed Bar Chart showing in sufficient details deployment of equipment and the date and order in with the Bidder proposes to carry out different parts of the works. In preparation of the programme appropriate allowance should be made for any loss of time due to inclement weather, site conditions other constraints if mentioned elsewhere in these documents. The Bidder to provide equipment and approximate manpower Histogram
2. In addition, detailed technical data and the expected production rates calculated for all relevant items of the works shall be furnished for each dredger proposed to be mobilized to site.

Signature: _____

Name: _____

Designation: _____

Date: _____



ANNEXURE-14

Format for Pre bid queries by Bidders

(To be submitted in Bidder's Letter head)

Name of Bidder:

Date of Submission:

Pre – Bid Queries

Sl No.	Section No. Clause and Sub Clause No.	Page No.	Details of Queries

Note: Queries to be sent by Fax/Mail/E-mail – Two days prior to date of Pre-Bid meeting

BIDDER'S SIGNATURE



ANNEXURE-15

UNDERTAKING

Sub: CAPITAL DREDGING FOR CONTAINER TERMINAL PHASE-I, STAGE-II (AECTPL) AND ITS ASSOCIATED DREDGING AT KAMARAJAR PORT

Tender No. KPL/ PPD/ CD (AECTPL)/2026

1. We hereby give an undertaking that I / We have not made any payment or illegal gratification to any person / authority connected with the bid process so as to influence the bid process and have not committed any offence under the Prevention of Corruption Act in connection with the above subject bid.
2. We hereby also give an Undertaking that I / We have not been blacklisted / banned by Port Authority, Central / State Governments in connecting with dredging work.

[Name(s) and Signature
of authorized representative (s)]
Seal of the Company.

Dated:



ANNEXURE-16

Security Clearance

DETAILS TO BE FURNISHED BY THE BIDDERS

**FOR THE PURPOSE OF OBTAINING SECURITY CLEARANCE FROM THE
MINISTRY**

Name of the Project: CAPITAL DREDGING FOR CONTAINER TERMINAL PHASE-I, STAGE-II (AECTPL) AND ITS ASSOCIATED DREDGING AT KAMARAJAR PORT

Details of Companies / Bidders / Consortium Partner(s)

Name of the Company/Consortium Members and their address, including Address of Indian subsidiary or branch /liaison office etc.

List of Promoters / Board of Directors of bidders / Consortium members with particulars like Name, Address – Permanent & Present, Nationality etc.,

Nature of the company, whether private or state-owned entity.

Shareholding details with particulars of entities / individuals having more than 5% stake with ownership details to the last layer indicating the promoting individuals name.

Parental organization and sister concerns viz. Number of foreign national likely to be required for the execution of the project and their likely locations / deployment.

Presence of the investing companies / Bidders / Consortium partners and shareholders in the countries across the world, including collaborations with other foreign companies.

(i) Proposed – For individuals (Board of Directors)



Information for Security Clearance

(i) Details in respect of Company / Firm (Indian / Foreign)

Sl.No	Name of Firms/Bidders	Date of Registration of the company	Address of Head office, Regional Offices and Registered Office	Previous name of the company if any	Details of earlier approvals, if any (ref no & date)
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(ii) Details in respect of Director

Sl.No	Full Name of Board of Directors	Present position held with date (since when)	Date of Birth	Parentage	Present & Permanent Address	Nationality	Passport Nos. and issue date, if any	Contact Address & telephone number, if any
-------	---------------------------------	--	---------------	-----------	-----------------------------	-------------	--------------------------------------	--

(iii) Details of shareholders of applicant company (All firms/ companies/ entities / individuals having shareholding more than 10%)

Sl.No	Full Name	Parentage / Father / Mother	Date of Birth	Permanent Address	Present Address	Present position held in the company if any	Nationality (if holding dual nationality, both must be clearly mentioned)	% of shares held in the company
-------	-----------	-----------------------------	---------------	-------------------	-----------------	---	---	---------------------------------



(IV) Details of criminal cases, if any against the Company/ Director (s)

Self-declaration for company of Director(s) for whom security clearance is sought

- a) Name and address and registration number of the company
- b) Name and address of owners, promoters and directors of the company.
 - 1.
 - 2.
 - 3.
 - 4.
- c) Is the company owners, promoters or directors listed above the subject if any
 1. Preventive detention proceedings (PSA/NSA etc) : Yes/No
 2. Criminal Proceedings : Yes/No
- d) If, yes please provide following details
 1. Detention/Case/FIR/Warrant number :
 2. Police station/District/Agency :
 3. Section of law :
 4. Name and place of the court :
- e) The above-mentioned details are in respect of both India and any other foreign country.

Note: The above self-declaration is required to be filled and signed by the authorized signatory of the company



ANNEXURE-17

**Bid Submission Letter
(On letter head of the bidding firm/JV lead member)**

Ref No.____

date_____

To

Sub: Execution of “Capital Dredging for Container Terminal phase-I, stage-II (AECTPL) and its associated dredging at Kamarajar Port”

Dear Sir,

With reference to your Tender Document dated, I/we, having examined all relevant documents and understood their contents, hereby submit our offer for the execution of **“Capital Dredging for Container Terminal phase-I, stage-II (AECTPL) and its associated dredging at Kamarajar Port”**.

1. The offer is unconditional and unqualified.
2. All information provided in the offer and in the Appendices is true and correct and all documents accompanying such Proposal are true copies of their respective originals.
3. I/We shall make available to the Authority any additional information it may deem necessary or require for supplementing or authenticating the offer.
4. I/We certify that in the last three years, we or any of our Associates have neither failed to perform on any contract, as evidenced by imposition of a penalty by an arbitral or judicial authority or a judicial pronouncement or arbitration award against the Applicant, nor been expelled from any project or contract by any public authority nor have had any contract terminated by any public authority for breach on our part.
5. I/We declare that
 - a. I/We have examined and have no reservations to the Tender Documents, including any Addendum issued by the Authority;
 - b. I/We have not directly or indirectly or through an agent engaged or indulged in any corrupt practice, fraudulent practice, coercive practice, undesirable practice



or restrictive practice, in respect of any tender issued by or any agreement entered into with the Authority or any other public sector enterprise or any government, Central or State; I/We hereby confirm providing undertaking as per Annexure – 14 as per Prevention of Corruption Act

6. I/We understand that Employer reserves the right to accept any tender in full or part or to reject any tender without assigning any reason thereof. We also hereby waive our rights to challenge the same on any account whatsoever.
7. I/We declare that we/any member of the consortium, are/is not a Member of a/any other Consortium applying for the above-mentioned works.
8. I/We certify that no investigation by any regulatory authority is pending either against us or against our Associates or against our CEO or any of our Directors/Managers/ employees which may affect performance of the project
9. The Bid Security in the form of declaration is attached, in accordance with the Tender document.

I/We agree and understand that the proposal is subject to the provisions of bid document. In no case, shall I/We have any claim or right to of whatsoever nature if the Project is not awarded or our proposal is rejected at any stage.

10. I/We agree to keep this offer valid for 180 (one hundred and Eighty) days from the Due Date specified in the tender document.
11. A Power of Attorney in favour of the authorised signatory to sign and submit this Proposal and documents is attached herewith in accordance with Annexure 2 of the tender document

In the event of our firm/ consortium being selected as the Contractor, I/we agree to enter into an Agreement in accordance with the Annexure 3 of the tender document. We agree not to seek any changes in the aforesaid form and agree to abide by the same.

12. I/We have studied tender document and all other documents carefully and also surveyed the Project site. We understand that except to the extent as expressly set forth in the Agreement, we shall have no claim, right or title arising out of any documents or information provided to us by the Authority or in respect of any matter arising out of or concerning or relating to the Selection Process including the award of Contract.



13. The Financial Proposal has been submitted separately in online as per Cover 2. This Technical Proposal and the Financial Proposal, if any submitted in accordance with provision of this tender document shall constitute the Application, which shall be binding on us.

14. I/We agree and undertake to abide by all the terms and conditions of the Tender Document.
I/we submit this Technical Proposal under and in accordance with the terms of the Tender Document.

Yours faithfully,

(Signature, name and designation of the authorised signatory) (Name and seal of the Applicant / Lead



ANNEXURE-18

Financial Turnover of the Firm / Company

SL.NO	Financial Year	Annual Turnover Amount in Rs.
1	2022-23	
2	2023-24	
3	2024-25	
Average Turnover		

Note: The Audited Balance Sheet shall be enclosed as per the Clause 2.1 of Instruction to Bidders.

Signature of Bidder



ANNEXURE-19

LIST OF DRAWINGS*

SL.NO	TITLE	DRAWING NO.
1	Dredging Area / Boundary	NTCPWC/KPL/CD-VI (A)/001
2	Bathymetry of Dredging Area	

***Note: For Drawings, refer Attachment -1.**



ANNEXURE-20

DISPUTES REVIEW BOARD AGREEMENT

(To be Executed on Rs.100/- Non-Judicial Stamp Paper)

THIS AGREEMENT, made and entered into this
Day of2026 between **The Kamarajar Port** (“the Employer/Board”) and
..... (“the Contractor”), and the Disputes Review Board (“the
DRBoard”) consisting of One/three DRBoard Members, (Members from either party, i.e.
contractor and Employer/ Board)(1)

.....
(2).....
(3).....

WITNESSETH, that

WHEREAS, the Employer/ Board and the Contractor have contracted for the execution
of **Capital Dredging for Container Terminal phase-I, stage-II (AECTPL) and its
associated dredging at Kamarajar Port** (the “Contract”) and WHEREAS, the contract
provides for the establishment and operation of the DR Board NOW THEREFORE, the
parties hereto agree as follows:

1. The parties agree to the establishment and operation of the D R Board in accordance with this DR Board Agreement.
2. Except for providing the services required hereunder, the DR Board Members should not give any advice to either party or to the Engineer or his nominee concerning conduct of the Works.

The DR Board Members:

- (a) shall have no financial interest in any party to the contract or the Engineer or his nominee, or a financial interest in the contract, except for payment for services on the DR Board.
- (b) shall have had no previous employment by, or financial ties to, any party to the contract, or the Engineer or his nominee, except for fee based consulting services on other projects, all of which must be disclosed prior to appointment to the DR Board.
- (c) shall have disclosed in writing to the parties prior to signature of this Agreement any and all recent or close professional or personal or personal relationships with any director, officer, or employee of any party to the contract, or the Engineer or his nominee, and any and all prior involvement in the project to which the contract relates;



(d) shall not, while a DRBoard Member, be employed whether as a consultant or otherwise by either party to the contract, or the Engineer or his nominee, except as a DRBoard Member.

(e) shall not, while a DRBoard Member, engage in discussion or make any agreement with any party to the contract, or with the Engineer or his nominee, regarding employment whether as a consultant or otherwise either after the contract is completed or after services as a DRBoard Member is completed;

(f) shall be and remain impartial and independent of the parties and shall disclose in writing to the Employer/ Board, the Contractor, the Engineer or his nominee, and one another any fact or circumstances which might be such to cause either the Port or the Contractor to question the continued existence of the impartiality and independence required of DRBoard Members.

3. Except for its participation in the DRBoard's activities as provided in the contract and in this Agreement none of the Employer/ Board, the Contractor, the Engineer or his nominee, and one another any fact or circumstances which might be such to cause either the Employer/ Board or the Contractor to question the continued existence of the impartiality and independence required of DRBoard Members.

4.The Contractor shall:

- a. Furnish to each DRBoard Members one copy of all documents which the DRBoard may request including contract documents, progress reports, variation orders, and other documents, pertinent to the performance of the Contract.
- b. In co-operation with the Employer, co-ordinate the Site visits of the DRBoard, including conference facilities, and secretarial and copying services.

5.The DRBoard shall serve throughout the operation of the contract. It shall begin operation following execution of this Agreement, and shall terminate its activities after issuance of the taking over Certificate and the DRBoard's issuance of its Recommendations on all disputes referred to it.

6. DRBoard Member, shall not assign or subcontract any of their work under this Agreement.

7. The DRBoard Members are independent and not employees or agents of either the Employer/ Board or the Contractor.

8.The DRBoard Members are absolved of any personal or professional liability arising from the activities and the Recommendations of the DRBoard.



9. Fees and expenses of the DRBoard Member[s] shall be agreed to and shared equally by the Employer/ Board and the Contractor. If the DRBoard requires special services, such as accounting, data research, and the like, both parties must agree and the costs shall be shared by them as mutually agreed.

10. DRBoard Site visits:

- a. The DRBoard shall visit the Site and meet with representatives of the Employer/ Board and the Contractor and the Engineer or his nominee at regular intervals, at times of critical construction events, and at the written request of either party. The timing of Site visiting agreement shall be fixed by the DRBoard.
- b. Site meetings shall consist of an informal discussion of the status of the construction of the works followed by an inspection of the works, both attended by personnel from the Employer/ Board, the Contractor and the Engineer or his nominee.
- c. If requested by either party or the DRBoard, the Employer/ Board will prepare minutes of the meetings and circulate them for comments of the parties and the Engineer or his nominee.

11. Procedure for disputes referred to the DRBoard:

- a. If either party objects to any action or inaction of the other party or the Engineer or his nominee, the objecting party may file a written Notice of Dispute to the other party with a copy to the Engineer or his nominee stating that it is given pursuant to Clause [19 number] and stating clearly and in detail the basis of the dispute.
- b. The party receiving the Notice of Dispute will consider it and respond in writing within 7 days after receipt.
- c. This response shall be final and conclusive on the subject, unless a written appeal to the response is filed with the responding party within 7 days of receiving the response. Both parties are encouraged to pursue the matter further to attempt to settle the dispute. When it appears that the dispute cannot be resolved without the assistance of the DRBoard either party may refer the dispute to the DRBoard by written Request for Recommendation to the Board, the other party and the Engineer or his nominee stating that it is made pursuant to [clause 19].
- d. The Request for recommendation shall state clearly and in full detail the specific issues of the dispute to be considered by the DRBoard.
- e. When a dispute is referred to the DRBoard, and the DRBoard is satisfied that the dispute requires the DRBoard's assistance, the DRBoard shall decide when to conduct a hearing on the dispute. The DRBoard may request that written



documentation and arguments from both parties be submitted to each DRBoard Members before the hearing begins. The parties shall submit insofar as possible agreed statements of the relevant facts.

- f. During the hearing, the Contractor, the Employer and the Engineer or his nominee shall each have ample opportunity to be heard and to offer evidence.

The DRBoard's Recommendations for resolution of the dispute will be given in writing, to the Employer/ Board, the Contractor and the Engineer or his nominee as soon as possible, and in any event not more than 28 days after the DRBoard's final hearing on the dispute.

12. Conduct of Hearings:

- a. Normally hearing will be conducted at the Site, but any location that would be more convenient and still provide all required facilities and access to necessary documentation may be utilised by the DRBoard. Private sessions of the DRBoard may be held at any location convenient to the DRBoard.
- b. The Employer/ Board, the Engineer or his nominee and the Contractor shall have representatives at all hearings.
- c. During the hearings, no DRBoard Member shall express any opinion concerning the merit of any facet of the case.
- d) After the hearings are concluded, the DRBoard shall meet privately to formulate its Recommendations. All DRBoard deliberations shall be conducted in private, with all individual views kept strictly confidential. The DRBoard's Recommendations, together with an explanation of its reasoning shall be submitted in writing to both parties and to the Engineer or his nominee. The Recommendations shall be based on the pertinent contract provisions, applicable laws and regulations, and the facts and circumstances involved in the dispute.

The DRBoard shall make every effort to reach a unanimous Recommendation. If this proves impossible, the majority shall decide, and the dissenting member any prepare a written minority report for submission to both parties.

13. If during the contract period, the Employer/ Board and the Contractor are of the opinion that the Dispute Review Board is not performing its functions properly, the Employer/ Board and the Contractor may together disband the Disputes Review Board. In such an event, the disputes shall refer to Arbitration straightaway.

The Employer/ Board and the Contractor shall jointly sign a notice specifying that the DRBoard shall stand disbanded with effect from the date specified in the notice. The notice shall be posted by a registered letter with AD or delivery of the letter, even if he refuses to do so.



ANNEXURE-21
DETAILS OF GST

The tendered shall furnish the following details along with a photocopy of the registered GSTIN No. While submitting online.

Sl. No	GSTIN Details	Data to be filled up
1.	Name of the Firm	
2.	Type of vendor whether registered under GSTIN or not	Supplier of Goods/ Supplier of service / both (Tick relevant)
3.	Whether registered under	Yes/No
4.	Name & Address as registered in GSTIN	
5.	GSTIN No. [copy should be enclosed]	
6.	State of registration of GSTIN	
7.	Status of GSTIN registered customer whether SEZ/EOU/DTA/ Govt/Local Authority	
8.	PAN No. [copy should enclose]	
9.	Mobile No./Fax No.	
10.	e-mail id	
11.	Contact person	
12.	Contact Landline No	

Place:
Date:

Seal and signature of consultant



ANNEXURE-22

E-PAYMENTFORM

To

General Manager (Finance),
Port Administrative Building,
KamarajarPort Limited,
No:17, Jawahar Building,
Rajaji Salai,
Chennai – 600120.

Through: General Manager (CS & BD)

Sir,

We hereby give particulars for payment of the Works bill /Advance etc.

Sl.No	Particulars	
1	Name of the Contractor	
2	Address of the Contractor	
3	Name of the for which payment is made	
4	Agreement dated: Work order No.	
5	Name of the bank in which Contractoroperating account.	
6	Address of the Bank	
7	Branch Code No	
8	Type of Account (Whether SB A/c or Current A/c	
9	Account No :	
10	PAN No.	
11	GST Registration No.	

Yours Sincerely

(Signature of Contractor)



ANNEXURE-23

CHECKLIST

CHECKLIST FOR TECH. BID (COVER 1) & FINANCIAL BID (PRICE BID) (COVER 2)

Bidder is requested to fill this checklist and ensure that all details / documents are as mentioned in the tender document submitted along with their bid. Please tick and ensure compliance and specify the page no. of the bid submitted.

TECHNICAL BID - (COVER – 1)

Sl. No.	Details / documents	Check box (Please tick)	Page no. of bid document
1.	Bid Submission Letter (Annexure-17)	<input type="checkbox"/>	
2.	This checklist duly filled in & stamped	<input type="checkbox"/>	
3.	Exceptions and Deviations (Annexure – 1)	<input type="checkbox"/>	
4.	EMD (Annexure – 5)	<input type="checkbox"/>	
5.	Letter of Power of Attorney – (Annexure – 2)	<input type="checkbox"/>	
6.	Integrity pact (Annexure – 6)	<input type="checkbox"/>	
7.	Details of past experience – (Annexure - 7)	<input type="checkbox"/>	
8.	Reference from the clients	<input type="checkbox"/>	
9.	Concurrent commitments – (Annexure -8)	<input type="checkbox"/>	
10.	List of dredgers, equipment –(Annexure-9)	<input type="checkbox"/>	
11.	Company Information – (Annexure- 10)	<input type="checkbox"/>	
12.	Company profile	<input type="checkbox"/>	
13.	Registration of firm	<input type="checkbox"/>	
14.	Income Tax registration details	<input type="checkbox"/>	
15.	Annual turnover (Annexure-18)	<input type="checkbox"/>	
16.	Balance sheet, P & L account	<input type="checkbox"/>	
17.	Method Statement – (Annexure – 11)	<input type="checkbox"/>	
18.	Site Organization, CV (Annexure – 12)	<input type="checkbox"/>	
19.	Work Schedule & Histogram (Annexure – 13)	<input type="checkbox"/>	
20.	Undertaking (Annexure – 15)	<input type="checkbox"/>	
21.	Security Clearance (Annexure – 16)	<input type="checkbox"/>	
22.	Dispute Review Board Agreement (Annexure-20)	<input type="checkbox"/>	
23.	Details of GST (Annexure-21)	<input type="checkbox"/>	
24.	E-Payment form (Annexure-22)	<input type="checkbox"/>	
25.	Blank Tender document with addendum duly signed and stamped on each page and enclosed in ORIGINAL	<input type="checkbox"/>	
26.	Any other document	<input type="checkbox"/>	



**ANNEXURE-24
GEOTECHNICAL INVESTIGATION AND SIDE SCAN SONAR SURVEY**

**MULTIBEAM BATHYMETRY SURVEY, SIDE SCAN SONAR SURVEY,
SUB BOTTOM PROFILING SURVEY AND TOPOGRAPHIC SURVEY
AT KPL - AECT DREDGING AREA AT KAMARAJAR PORT LIMITED,
CHENNAI**

PROJECT CODE: 1020012526

JANUARY 2026



CLIENT



**KAMARAJAR PORT LIMITED
CHENNAI**

SURVEYED BY



INDOMER COASTAL HYDRAULICS (P) LTD.

(ISO 9001: 2015 CERTIFIED, QCI – NABET & NABL ACCREDITATED)
63, GANDHI ROAD, ALWAR THIRUNAGAR, CHENNAI 600 087.

Tel: + 91 44 2486 2482 to 84 (M) 96000 56652

Web www.indomer.com. E-mail: ocean@indomer.com

**INDOMER COASTAL HYDRAULICS (P) LTD.**

(ISO 9001: 2015 CERTIFIED, QCI-NABET & NABL ACCREDITATED)

63, Gandhi Road, Alwar Thirunagar, Chennai 600 087.

Tel: + 91 44 2486 2482 to 84 (M) 96000 56652

Web site: www.indomer.com, E-mail: ocean@indomer.com

Client	Kamarajar Port Limited, Chennai.				
Project Title	Multibeam bathymetry survey, side scan sonar survey, sub bottom profiling survey and topographic survey at KPL - AECT dredging area at Kamarajar Port Limited.				
Project Code	1020012526				
Abstract	<p>Kamarajar Port Limited (KPL) wanted to take up the Multibeam bathymetry, Shallow seismic and Sidescan surveys and Topographic survey for KPL – AECT dredging area in the harbour basin in order to identify the status of the seafloor and available depth. KPL asked Indomer Coastal Hydraulics (P) Ltd., Chennai to undertake the surveys at the interested KPL – AECT dredging area.</p> <p>Accordingly, Indomer has conducted seabed surveys from 14.01.26 to 21.01.26. This report presents the methodology and results of the surveys carried out.</p>				
Foreword	<p>The materials presented in this seabed report carry the copyright of KPL and Indomer and should not be altered or distorted or copied or presented in different manner by other organizations without the written consent from KPL and Indomer.</p>				
Document type	Controlled				
References	Work Order ref. no: KPL/MS/S&D/1-2026				
Date	Report type	Originator(s)	Checked by	Approved by	Approver's sign
02.02.2026	FINAL	A. Baskaran	Dr. J. Guru Prasath	Dr. P. Chandramohan	
	Project Code	1020012526		Text pages	40
	File Location	F:/2026 Projects/Jan 26/KPL		Figures	24

TEAM

Name	Qualification
Dr. P. Chandramohan	Ph. D. (Ocean Engineering) Managing Director (Former Scientist, CSIR-NIO, Goa)
Dr. J. Guru Prasath	Ph.D. (Ocean Engineering) Director (Former Chief Engineer, MEO Class I)
Dr. Terry Machado	Ph.D. (Marine Geology) Associate Director (Former Scientist, NCESS, Trivandrum)
Mr. R. C. Bragath	M. Tech. (Coastal Management) Ph. D. (Ocean Engineering) Director
Mr. A. Baskaran	B.Tech. (Civil Engineering) Assistant Director
Mr. C. Mahendran	B.E. (Civil Engineering) Senior Project Officer
Mr. V. Saravanan	B. E. (Electronics and Instrumentation Engineering) Senior Project Officer

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LIST OF ABBREVIATIONS

DGPS	Differential Global Position System
DSP	Digital signal processor
DSU	Data Storage Unit
EGNOS	European Geostationary Navigation Overlay Service
FM	Frequency Modulations
GGA	Global Positioning System Fix Data
GLL	Geographic Lat /Long
GNSS & GLONASS	Global Navigation Satellite System
GPS	Global Position System
GRS	GPS Range Residuals
GSA	Overall Satellite data
GST	GPS Pseudo range Noise Statistics
GSV	Detailed Satellite data
Hz	Hertz
kHz	Kilohertz
kPa	Kilo Pascal
KW	Kilo watt
LED	Light-Emitting Diode
MSL	Mean Sea Level
NMEA	National Marine Electronics Association
ppm	Parts Per Million
RMS	Root – Mean – Square
RTCM	Radio Technical Commission for Maritime Services
UTM	Universal Transverse Mercator
VBS	Virtual base station
VDC	Direct Current Voltage
W	Watts
WAAS	Wide Area Augmented System
WGS	World Global System
ZDA	Date and Time

1. INTRODUCTION

Kamarajar Port Limited (KPL) wanted to take up the multibeam bathymetry, shallow seismic and side scan sonar surveys and topographic survey for KPL – AECT dredging area in the harbour basin in order to identify the status of the seafloor and available depth. KPL asked Indomer Coastal Hydraulics (P) Ltd., Chennai to undertake the surveys at the interested KPL – AECT dredging area.

Accordingly, Indomer has conducted seabed surveys from 14.01.26 to 21.01.26. This report presents the methodology and results of the surveys carried out.

Indomer Coastal Hydraulics (P) Ltd., Chennai is an ISO 9001:2015 organization and QCI - NABET accredited organization vide for the sectors Sector 27: Oil & Gas Transportation pipeline (crude and refinery/ petrochemical products), passing through national parks/ sanctuaries/ coral reefs/ ecologically sensitive areas including LNG Terminal Sector 33: Ports, harbours, jetties, marine terminals, breakwaters and dredging. Indomer also has its own NABL accredited laboratory in-house.

This report presents the methodology and results of the various surveys carried out. The survey area is shown in **Fig. 1.1**.

All calendar dates are referred in Indian style as dd.mm.yy. (e.g. 14.01.2026 for 14th January 26) and the time is referred to Indian Standard Time in 24-hour clock, e.g. 3 P.M. is written as 1500 hrs. SI units are followed for fundamental and derived units. The depths are referred with respect to Chart Datum. The UTM coordinates are indicated in WGS 84 spheroid - Zone 44N.

2. SCOPE OF WORK

- i) to carry out bathymetry survey covering an area of 0.35 km x 0.35 km in the Harbour basin at 30 m grid by using Multibeam echosounder,
- ii) to carry out shallow seismic survey covering an area of 0.35 km x 0.35 km in the Harbour basin at 25 m grid for identifying the layers of sediment or rock under the seafloor,
- iii) to carry out side scan survey covering an area of 0.35 km x 0.35 km in the Harbour basin at 30 m overlapping for seafloor mapping extending to a water depth of 15 m CD, to understand the geology of the seabed and to identify submerged obstructions if any,
- iv) to measure tides and apply tidal correction,
- v) to estimate the quantity of dredging with respect to the slope and the required dredging tolerance, and
- vi) to prepare and submit the report.

3. METHODOLOGY

3.1. Reference spheroid

The World Geodetic System (WGS 84) spheroid – Zone 44N has been followed for the surveys and for the presentation in the report.

3.2. Horizontal control

Reference station: The DGPS Beacon Transmitter installed by Department of Lighthouse and Navigation at "Pulicat lake Light House" was taken as reference station. The transmitting frequency of this reference station DGPS Beacon transmitter is 319 kHz.

Hemisphere is based in Scottsdale, AZ, USA, with offices located around the globe, and is part of Beijing UniStrong Science & Technology Co., Ltd. Vector V1000 is Hemisphere GNSS' premiere multi GNSS, multi-frequency receiver designed specifically for the professional marine market. Providing precise heading, Athena RTK positioning, and full Atlas capability, its rugged design is compliant to IP67, MILSTD810G, MIL-STD-202F, and IEC 60068-2 standards. The V1000 supports antenna separations up to 10 meters, offering heading accuracy to 0.01 degrees RMS in addition to RTK position accuracy and full support for Hemisphere GNSS' Atlas worldwide L-band corrections.



The VS1000 supports the use of Athena RTK (Real Time Kinematic) technology. Athena RTK requires the use of two separate receivers: a stationary base station (primary receiver) that broadcasts corrections over a wireless link to the rover (secondary receiver). The localized corrections are processed on the rover to achieve superior accuracy and repeatability. Performance testing has shown positioning accuracy at the centimeter level. Alternatively, RTK corrections can be brought in over a GNSS network (NTRIP) if one is available in your area.

Athena RTK has the following benefits:

- Improved Initialization time - Performing initializations in less than 15 seconds at better than 99.9% of the time.
- Robustness in difficult operating environments - Extremely high productivity under the most aggressive of geographic environments.
- Atlas L-band corrections, the positioning accuracy does not degrade as a function of distance to a base station, as the data content is not composed of a single base station's information, but an entire network's information.
- The VS1000 provides accurate and reliable heading and position information at high update rates. To accomplish this task, the VS1000 uses a high performance GNSS receiver and two

antennas for GNSS signal processing. One antenna is designated as the primary GNSS antenna and the other is the secondary GNSS antenna

- Positions computed by the VS1000 are referenced to the phase center of the primary GNSS antenna. Heading data references the vector formed from the primary GNSS antenna phase center to the secondary GNSS antenna phase center.

Atlas L-band has the following benefits:

- Positioning accuracy - Competitive positioning accuracies down to 2cm RMS in certain applications.
- Positioning sustainability - Cutting edge position quality maintenance in the absence of correction signals, using patented technology.
- Scalable service levels - Capable of providing virtually any accuracy, precision, and repeatability level in the 4 to 50 RMS range.
- Convergence time - Industry-leading convergence times of 10-40 minutes.

3.3. Vertical Control

Benchmark (BM): The reference benchmark was given by Kamarajar Port Limited which has been used as vertical control for the entire surveys. Benchmark Description: BM is situated on the western corner of the Finger jetty No.3. The reference Level of the benchmark is given as (+) 3.496 m CD.

Details of Benchmark

Description	Geographical Coordinates Spheroid - WGS 84		UTM - Zone 44 N		RL w.r.t. CD (m)
	Latitude, N	Longitude, E	X (m)	Y (m)	
BM <i>(Top level of Finger jetty No. 3.)</i>	13° 15'27.36"N	80° 20'29.06"E	428654.618	1465717.628	(+) 3.496

3.4. Tides

The tide measurement was carried out at Kamarajar port jetty during the survey period. The location map of the tide measurement is shown in **Fig. 3.1**.

Methodology

Aanderaa Seaguard Water Level Recorder: The Aanderaa Seaguard Water Level Recorder is manufactured by Aanderaa Data Instruments, Norway. It is a high precision recording instrument for measuring the variation of water level in the sea. The Pressure Sensor 4647 is a compact, yet intelligent sensor designed to be used in this measuring systems. The sensor is based on a silicon

piezo-resistive bridge sample and temperature compensated by an advanced Digital Signal Processor. The tide measurement is an average of the hydrostatic pressure measured over a time period of 10 seconds to 8 minutes (Optional). The recording interval is selected between 2 seconds and 2 Hrs. The output parameters are Tide pressure, Tide level, Pressure and Temperature. Tide levels are preliminary, internally calculated estimates, based on fixed, selectable values of atmospheric pressure. Tide pressure is an average of hydrostatic pressure over the integration time. The data are stored on SD card.



The instrument is housed in a pressure case that is closed by two C-clamps. All external and internal parts are fastened to the top end plate so that the whole instrument can be removed from the pressure case as one unit. In addition to carrying the combined handle and protection ring, the acoustic transducer and sensor inlet, the top end plate is furnished with a watertight receptacle. This terminal permits remote triggering and real-time reading of data by connecting cable.

Technical Specifications:

Top-End Plate	:	Multiparameter platform
Recording system	:	Data Storage on SD card/DSU
Storage Capacity	:	≤ 4GB
Battery	:	2 batteries inside the instrument
	:	Alkaline 3988 9V, 15Ah (nominal 12.5Ah; 20W down to 6V at 4°C)
Supply voltage	:	6 to 14VDC
	:	Parallel 2 Alkaline battery (each 9.0 VDC)
Operating temperature	:	-5 – +40°C (23 – 104°F)
Deployment depth	:	Up to 300 m depending on sensor
Dimensions	:	OD: 139mm; H: 356mm
Weight in air	:	6.3kg
Weight in water	:	1.8kg
Materials	:	PET, Titanium, Stainless Steel 316, Epoxy
Pressure	:	4647B Range: 0 – 700kPa (101 psia) 60 m depth
	:	Resolution: 0.0001% FSO
	:	Accuracy: ±0.04% FSO
	:	Pressure connection: Swagelok™ 1/8 inch
	:	Inlet port (reference): top of the pressure port
	:	Pressure parameters: Pressure in kPa, Pressure raw data in LSB
Temperature	:	Range: 0 – 36°C (32 – 96.8°F)
	:	Resolution: 0.001°C (0.0018°F)
	:	Accuracy: ±0.4°C (0.72°F)
	:	Response Time (63%): < 2 min
	:	Temperature parameters: Temperature in °C, Temperature raw data in LSB
Tide	:	Integration time: 10s - 8 minutes
	:	Tide parameters: Tide pressure in kPa,
	:	Tide level in meter

3.5. Topographic survey

Area of survey: Topographic survey was carried out along the shore front area using Leica RTK GPS instruments. The location map of the topographic survey area of is shown in **Fig. 3.2**.

3.5.1. Methodology

Sokkia Auto Level : Sokkia Auto Level is an improved levelling instrument manufactured by Sokkia, Japan. This instrument was used for measuring the elevation and transfer of reference levels from a given Benchmark to any required points. This instrument has a telescope of 215 mm and a minimum focusing distance of 200 m length. It has a levelling accuracy of ± 1.0 mm for 1 km double run levelling Using AutoCAD the measured cross sections were processed and presented.

LEICA RTK GS14 : Leica GS12& GS14 GNSS RTK, and Sokkia Auto Level were used for conducting the topographic survey. Leica GS12& GS14 GNSS RTK: Leica RTK (Real Time Kinematic) satellite navigation is a technique used in inland survey and in hydrographic survey based on the use of carrier phase measurements of the GPS signals where a single reference station provides real-time corrections, providing up to centimetre-level accuracy. When referring to GPS in particular, the system is also commonly referred to as Carrier-Phase Enhancement, CPGPS. RTK systems use a single base station receiver and a number of mobile units. The base station re-broadcasts the phase of the carrier that it measured, and the mobile units compare their own phase measurements with the ones received from the base station. There are several ways to transmit a correction signal from base station to mobile station.



The most popular way to achieve real-time, low-cost signal transmission is to use a radio modem, typically in the UHF band. This allows the units to calculate their relative position to millimetres, although their absolute position is accurate only to the same accuracy as the position of the base station. RTK systems are available in dual-frequency and single-frequency versions. Leica GS12& GS14 GNSS RTK that used for the survey contains dual frequency requires antenna and controller to suit any surveying task with a wide range of functionality. Leica GS12& GS14 GNSS RTK Rover is extremely light-weight and cable free rover is comfortable to use and withstand even for rough use and topple over.

The base station re-broadcasts the phase of the carrier that it measured, and the mobile units compare their own phase measurements with the ones received from the base station. So, that centimetre level accuracy can be achieved from latitude, longitude and altitude. RTK technique, in terms of general navigation, is perfectly suited to roles like surveying. In this case, the base station is located at a well-known surveyed location, often a Benchmark, and the mobile units can then

produce a highly accurate map by taking fixes relative to that point. RTK has also found uses in auto drive/autopilot systems, precision farming and similar roles.

Technical Specifications:

GNSS TECHNOLOGY	Measurement Engine	
	Leica patented Smart Track+ technology	<ul style="list-style-type: none"> • Excellent low elevation tracking technology • Very low noise GNSS carrier phase measurements with <0.5 mm precision • Minimum acquisition time
	No. of channels	<ul style="list-style-type: none"> • 120 channels
	Reacquisition time	<ul style="list-style-type: none"> • <1 sec
	Satellite Reception	<ul style="list-style-type: none"> • Dual frequency
	Satellite signals tracking	<ul style="list-style-type: none"> • GPS: L1, L2, L2C (C/A, P, C Code) • GLONASS: L1, L2 (C/A, P narrow Code)
Measurement Performance	Accuracy	
	DGPS/RTCM	<ul style="list-style-type: none"> • Typically, 25 cm (rms)
	RTK Rapid static (phase)	<ul style="list-style-type: none"> • Horizontal: 5mm + 0.5ppm(rms) • Vertical: 10 mm +0.5ppm(rms)
	RTK Kinematic (phase)	<ul style="list-style-type: none"> • Horizontal: 10mm + 0.5ppm(rms) • Vertical: 20 mm +0.5ppm(rms)
	Post processing (phase) Static with long observations	<ul style="list-style-type: none"> • Horizontal: 3mm + 0.5ppm(rms) • Vertical: 6 mm +0.5ppm(rms)
	Post processing (phase) Rapid static mode	<ul style="list-style-type: none"> • Horizontal: 5mm + 0.5ppm(rms) • Vertical: 10 mm +0.5ppm(rms)
Hardware	Physical	
	Weight	<ul style="list-style-type: none"> • 1.05kg including battery
	Dimension (diameter x height)	<ul style="list-style-type: none"> • 186mm x 89 mm
	Power management	
	Supply Voltage	<ul style="list-style-type: none"> • Nominal 12 V DC, Range 10.5-28 V DC
	Power consumption	<ul style="list-style-type: none"> • Typically: 1.8 W, 150mA
	Internal Power supply	<ul style="list-style-type: none"> • Removable & rechargeable Li-ion battery, GE211 2.2Ah / 7.4 V or GE212 2.6 Ah / 7.4 V

3.6. Multibeam bathymetry survey

Area of survey: The Multibeam bathymetry survey was carried out covering an area of 0.35 km x 0.35 km in the Harbour basin at 30 m spacing. The planned survey lines are shown in **Fig. 3.3**.

3.6.1. Methodology

Ping DSP 3DSS-iDX bathymetry sonar is a superior hydrographic survey performance in shallow water manufactured by PING DSP, Inc, Canada. The iDX-450 integrates SVT and MRU sensors into the sonar head for turnkey operation. A Universal Sonar Interface Unit provides ultra-portable, easy operation with just a laptop and a battery or easy interface to external MRU, GNSS and INS systems on a fully equipped survey launch or ASV.

Ping DSP 3DSS-iDX Multibeam head was mounted 1.5 m below the sea surface on the star board side of the survey vessel MFV SANGHAVI. It was connected to the sonar interface unit through the LAN cable. The Gyro DGPS antenna was mounted on the mast vertically in line with the tow fish so that it records the exact coordinates of the locations where the tow fish collects the seabed reflection characteristics. The necessary inputs were given in HYPACK data collection software before the commencement of the survey.



The planned track lines were displayed on the monitor at wheel for navigation. The data were continuously recorded at onboard PC along each transect. Using the Ping DSP DSS-DX control survey software, we interfaced the coordinates of the DGPS and the seabed reflection characteristics. The real time data includes time, date, latitude and longitude. The collected data were stored in "XTF format with the help of CODA GEOSURVEY and HYPACK & HYSWEEP software.

Ping DSP 3DSS-iDX is manufactured by Ping DSP, Inc., Canada. It is an Integrated shallow water Mapping/Imaging system designed to be latest, more accurate, high resolution, ultra-wide swath and 3D imagery, with integrated real-time surface sound velocity, high accuracy INS position/altitude with a 3-Dimensional look at the seafloor. It represents the latest sonar technology that incorporates a multi-array transducer and solving for multiple angles of arrival for a 3-dimensional image.

Simultaneous Real-time 3D Imagery: Geometrically correct, co-located 3D side scan imagery augments bathymetry and extends 2D side scan resolution to three dimensions. 3DSS real-time 3D software displays, captures and allows accurate measurement in three dimensions of features on the seabed and in the water-column including pipes, cables, pilings, wrecks, subsea structures hazards, ecological habitats, and other features not well defined in bathymetry.

Patented array signal processing technology: It is a patented signal processing methodology that extends the single angle-of-arrival principle used in interferometric systems to accommodate multiple simultaneous backscatter arrivals.

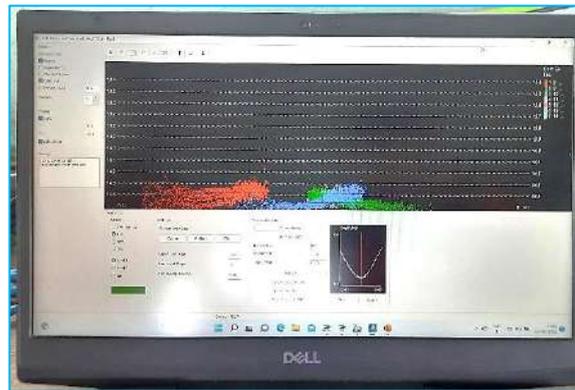
Soft sonar™ technology: At the heart of the 3DSS-DX sonar is Ping DSP's state-of-the-art Soft sonar™ electronics technology with ultra-low noise, wide dynamic range receivers, state-of-the-art acoustic transducer arrays, Gigabit Ethernet, easy-to-use software interface, and integrated support for a wide range of third-party survey software and hardware.

Technical specifications

Sonar Model	3DSS-iDX-450
Sonar Specifications	
Operating Frequency	450 kHz
Transmit Waveforms	CW, Broadband
Pulse Lengths	10 – 200 cycles
Horizontal Beamwidth (2 way)	0.4°
Vertical Beamwidth (selectable)	19° - 125°
Mech. Transducer Tilt (fixed)	20°
Electronic Transmit Tilt	-45° to 45°
Max. Ping Rep. Rate	~45 Hz
2D Side scan (2D Imagery) Specifications	
Data Output	Range and Amplitude
2D Imaging Swath Width	10 to 20 times sonar altitude, varies with sound velocity profile, geometry and seabed type
Max Range	200 m per side
Max Range Resolution	1.67 cm
3D Side scan (3D Imagery) Specifications	
Data Output	Range, Angle, and Amplitude
3D Imaging Swath Width	8 to 14 times sonar altitude, varies with sound velocity profile, geometry and seabed type
Max 3D Imaging Range per Side	100m per side
Max Resolution	1.67 cm
Integrated Sensor Specifications	
SBG Ellipse2-E.	Pitch and roll <0.05°(ppk), <0.1° (real time), heading <0.5°, heave <5cm (see www.sbg-systems.com)
AML MicroX.	1375m/s – 1600m/s SV range, 20ms response, 0.025m/s accuracy (see https://amloceanographic.com)
GNSS	External
Interface Specifications	
Control Input / Data Output	Gigabit Ethernet, sonar software provides control GUI and TCP data server
Time Reference	Time aligned to GNSS time
Additional Communication Ports	RS-232 or Ethernet, for external MRU, GNSS or INS,
Additional Inputs	PPS (SMA), Ext. Trigger (SMA)
Computer Requirements	PC (Quad Core, 8GB, Discrete GPU (e.g., Nvidia), MS Windows 7,8, 10 (64 bit)
3rd Party Software Support	Hypack, SonarWiz, QINSy, PDS2000, Caris HIPS/SIPS



Mooring arrangements of tow fish



Installation of Ping DSP 3DSS Tow fish

Patch test calibration

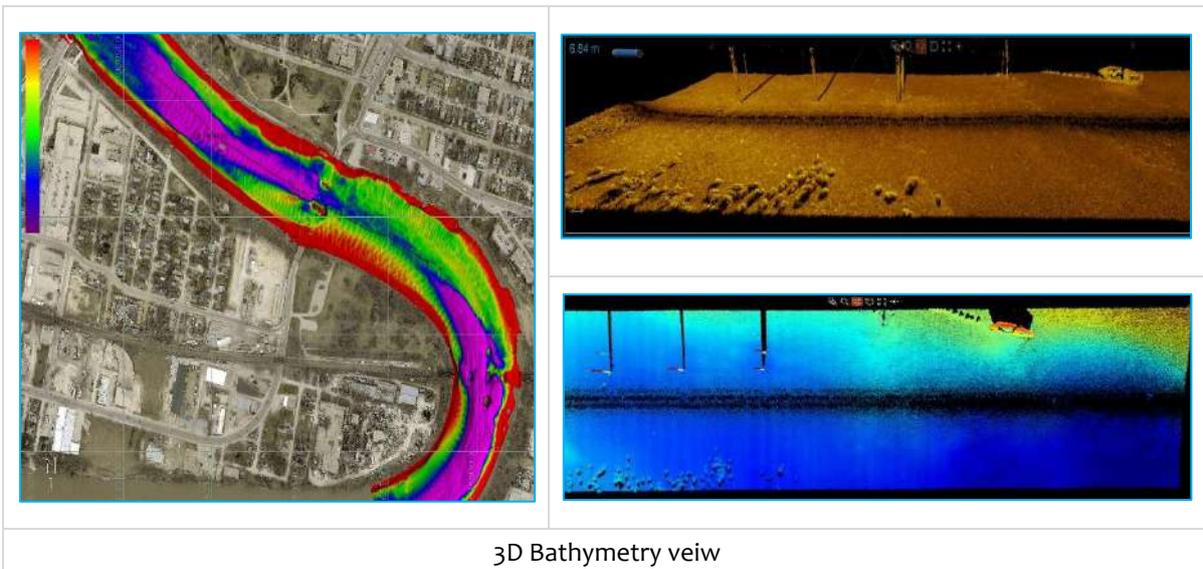
System features

- Wide horizontal scan areas covered with 1026 adjacent beams and 150° swath width.
- Very high resolution achieved by narrow beam width and efficient side lobe suppression due to directional transmitting and receiving.
- High operating frequency giving clearly defined seabed features.
- Dynamic ships motion compensation for roll and correction for pitch and heave, yaw and ships speed.
- Online storage of raw and pre-processed data for post processing using a proprietary or an external post processing system.

The Data collection, pre and post processing are carried out using HYSWEEP software developed by HYPACK INC., USA. This has the facilities on:

- Online Processing and graphic output.
- Online processing provides different charts of the seabed along the ships track.
- The side scan view shows the amplitude values of the received signals in a grey scale display.
- The map view allows to view the position data plot and to detect gaps in the surveyed area.

- The bathymetry view with various modes for depth, amplitude, travel time, quality, heave, roll and pitch data display.
- The data from the bottom detection circuits undergo various online corrections before being displayed:
- Geometrical beam “fan” corrections (roll, pitch, yaw and heave).
- Tide level correction and sound velocity profile corrections based on tables.
- Digital Terrain Mode.
- Track plot and Seabed Chart.
- 3-D Presentation.
- Cross Track profile.



Hydrographic Survey Software: HYSWEEP survey software was used for data collection and processing. It is integrated, first generation hydrographic survey software developed by Coastal Oceanographical INC., USA. It works in MS Windows operating environment. The HYPACK's design program allows to import background map in CAD's DFX or Microsoft's DGN format. It enables to quickly create planned survey lines, plotting sheets and bottom coverage grids in a graphical environment. It gives the flexibility to support multiple navigational systems (GPS, range/range, range/ azimuth), echo sounders (single and dual frequency), magnetometers, ROV-tracking systems, telemetry tide systems and many other devices. It contains the post processing module to analyse and prepare the chart. The survey tracks were planned using this software for accurate manoeuvring of the vessel and to keep the accuracy of the track. The post processing of the survey data and preparation of map were carried out using this software.



Data recording: The echosounder, heave compensator and Gyro DGPS receiver were interfaced through Hysweep software with onboard PC. The entire system was supported by AC Power Generator installed onboard. The position and depth were recorded along the preplanned transect at 500 millisecond intervals continuously.

Multibeam Features

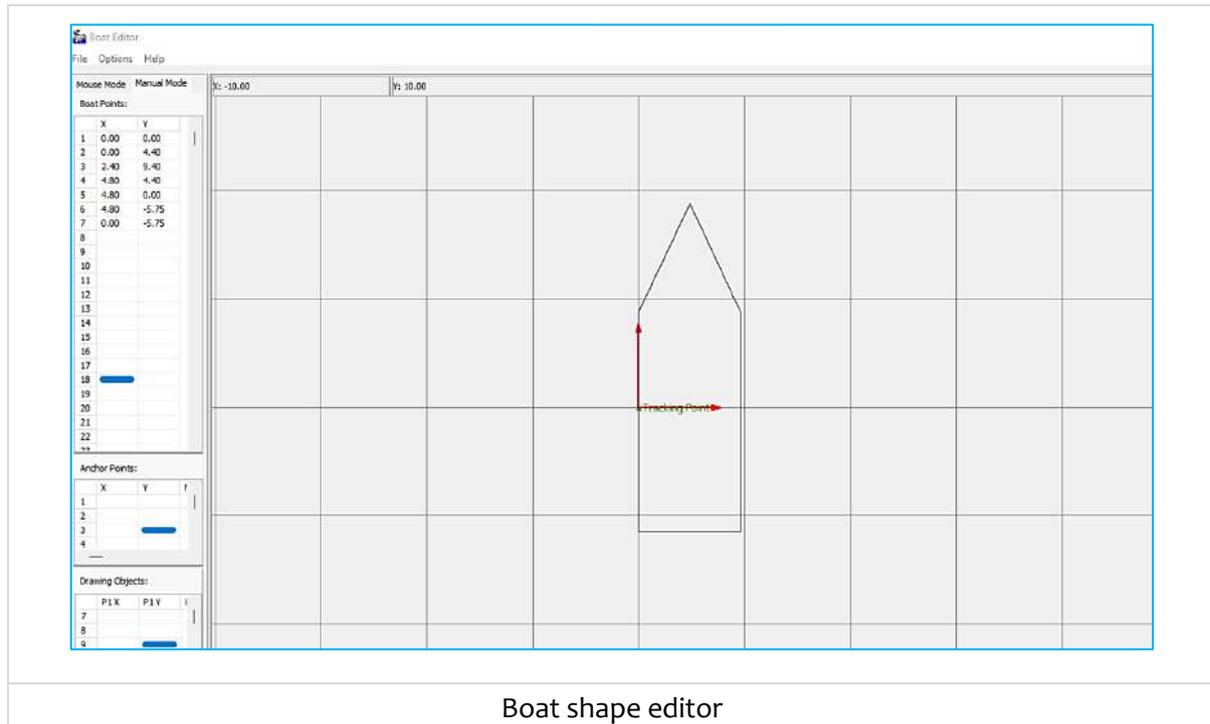
- ✓ Fully integrated AML MicroX Sound Velocity Sensor
- ✓ Fully integrated SBG Ellipse2-E with GNSS Aiding
- ✓ Fully Integrated or external GNSS
- ✓ Proven Bathymetry Accuracy and Repeatability (IHO Exclusive Order).
- ✓ High Resolution True 3D Imagery.
- ✓ Real-time 3D point cloud display and target capture software.
- ✓ Simultaneous 3D Side-scan, 2D Side-scan, and Bathymetry data outputs.
- ✓ Wide swath coverage, up to 14 times water depth.
- ✓ Patented processing techniques as well as beamforming eliminates multipath and surface reflection interference.
- ✓ Support for 3rd party hydrographic survey hardware and software.
- ✓ Compact, Low Power, easy-to-use. Suitable for ASV and AUV applications.

Calibration of multibeam Echosounder

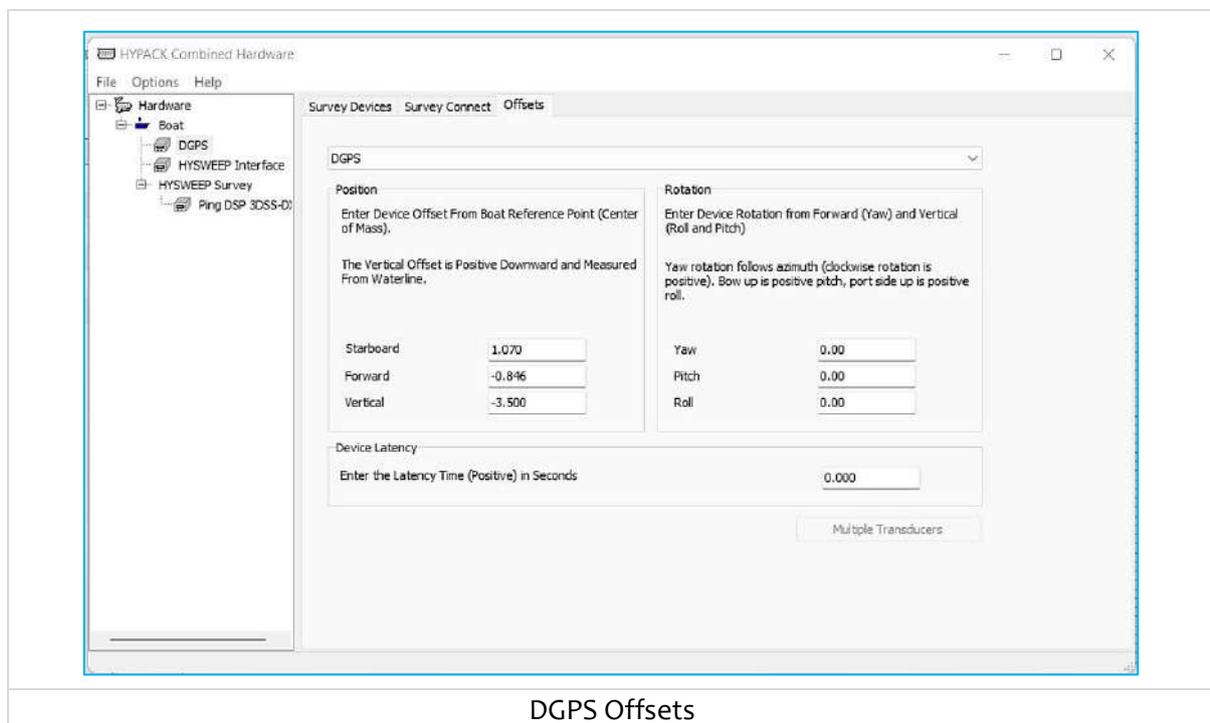
- ✓ The various configurations of different components were arranged in the boat.
- ✓ The boat was run in a slope bed to calibrate the transducer settings. The program was run in calibration mode, and the calibration coefficients were collected for the transducer.
- ✓ The boat was run in flat bed, and the motion sensor was calibrated by running test lines. The program was run in calibration mode, and the calibration coefficients were collected.
- ✓ All the collected calibration coefficients were fed into data collection program which formed as a set up for the data collection program.
- ✓ Data collection commenced after feeding the calibration coefficients.
- ✓ Data were cross checked by parallelly running Single beam Echo sounder CEESCOPE, it is This 'All in One' compact unit features integrated RTK GNSS positioning, a dual channel echo sounder, with full water column recording,
- ✓ Calibration of horizontal position were cross checked at known point place at fishing harbour.

Tidal corrections: The necessary tidal corrections were applied for the collected bathymetry data using measured tides at Kamarajar Port Limited.

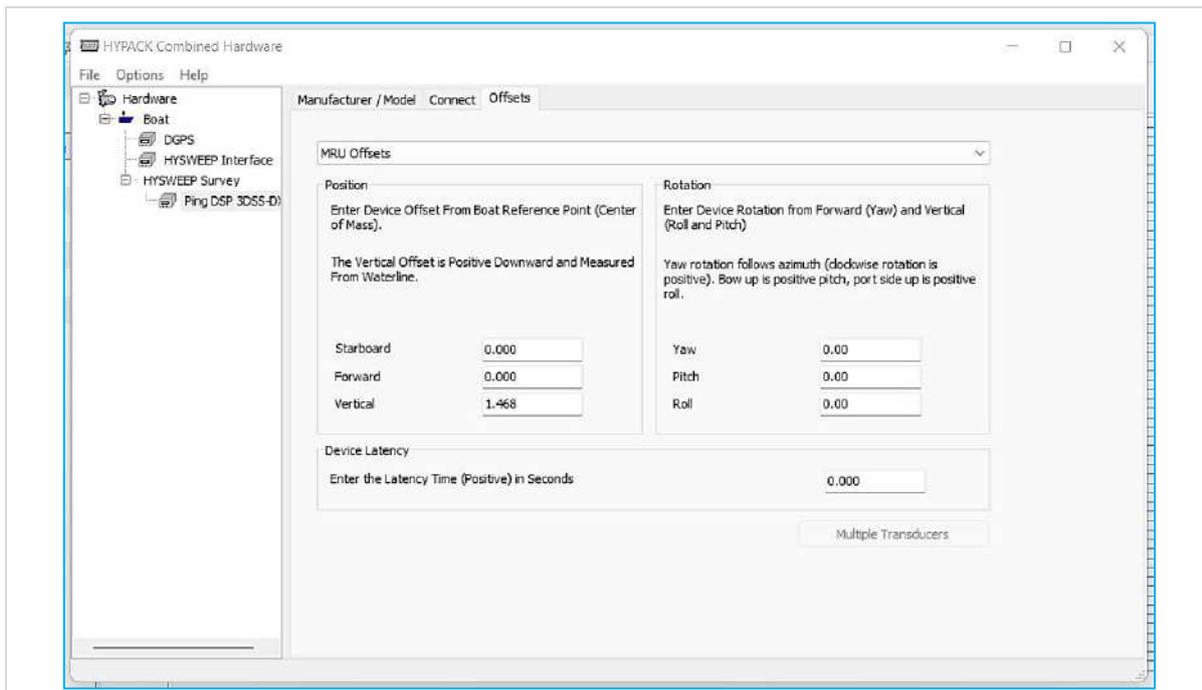
Details of multibeam offsets



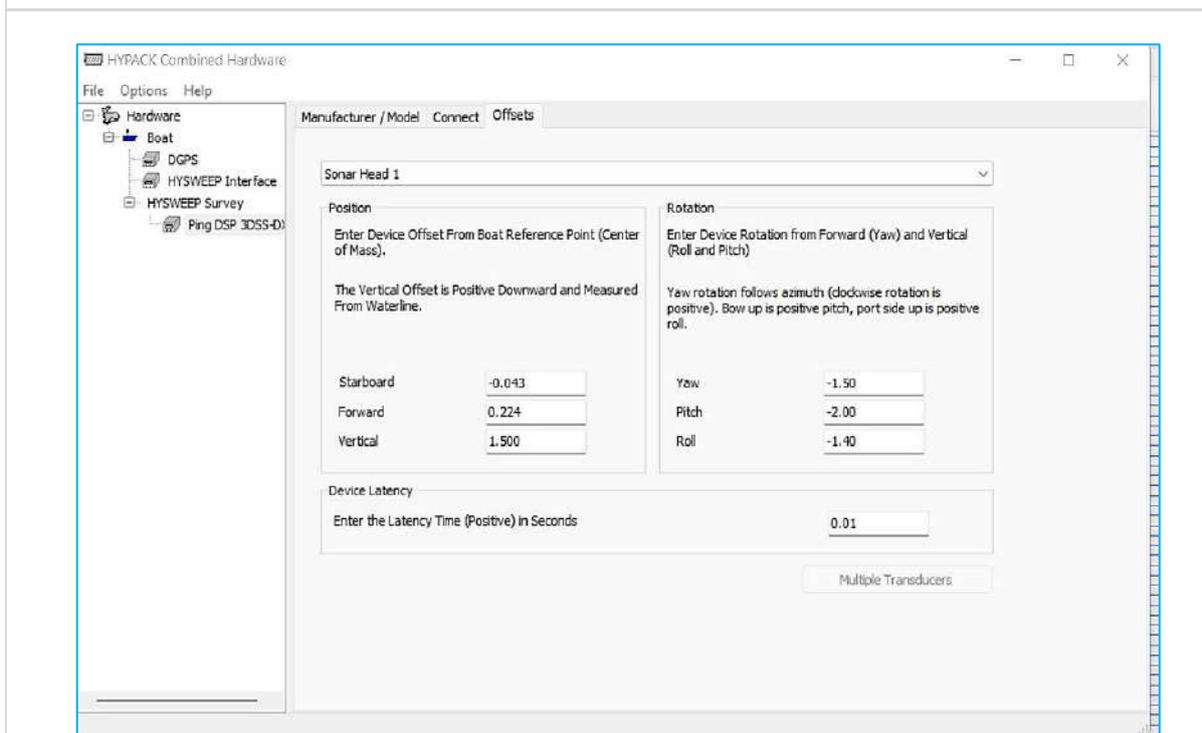
Boat shape editor



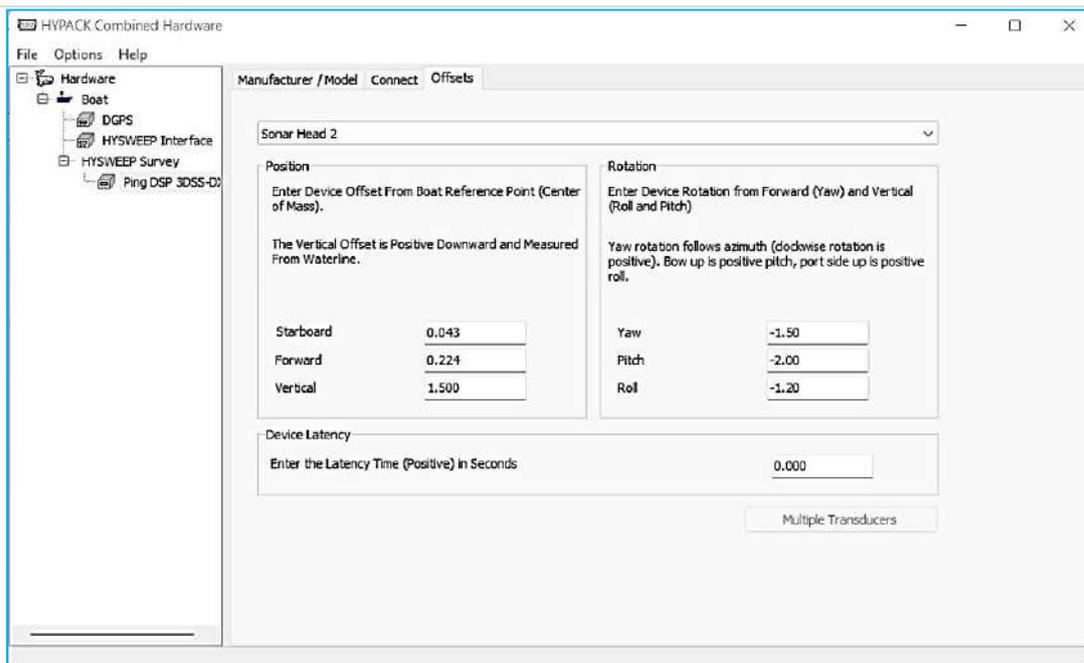
DGPS Offsets



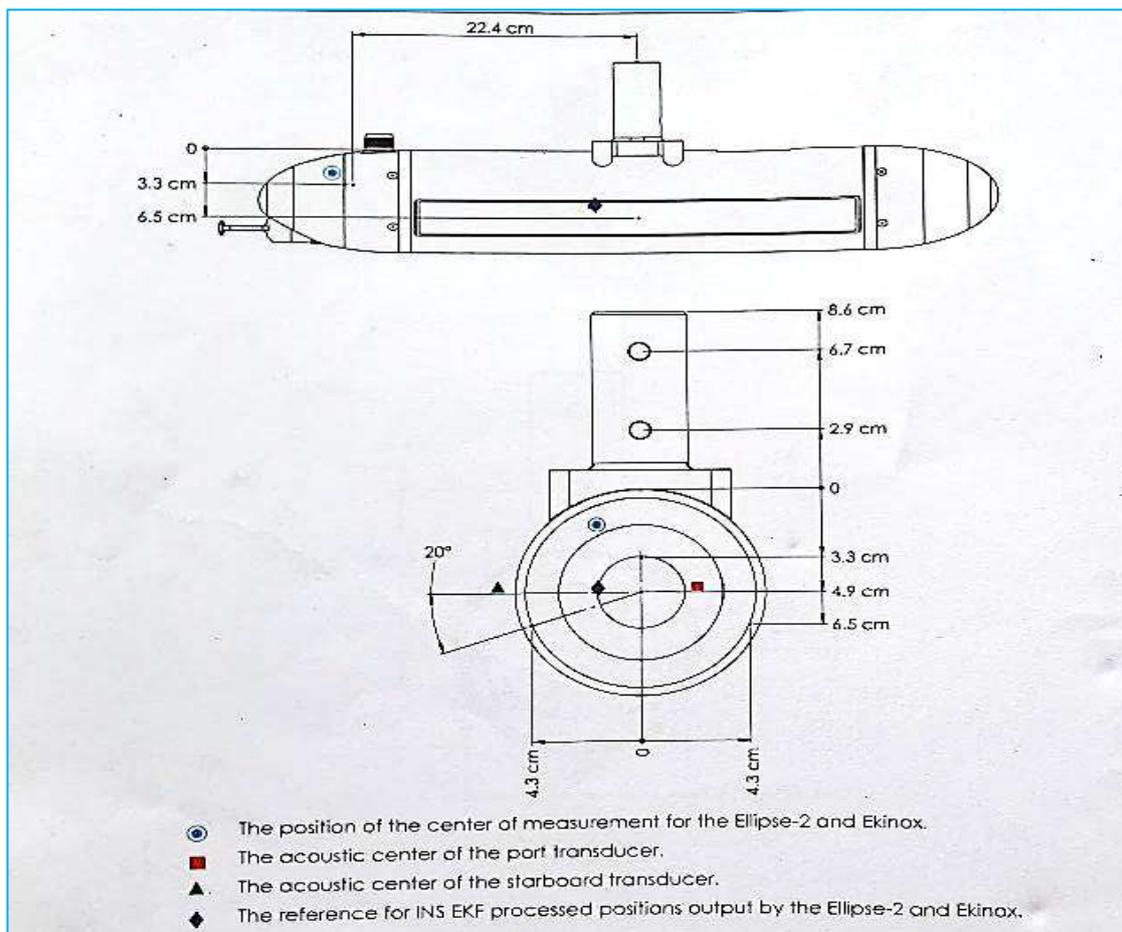
MRU Offsets



Sonar Head- 1 Offsets



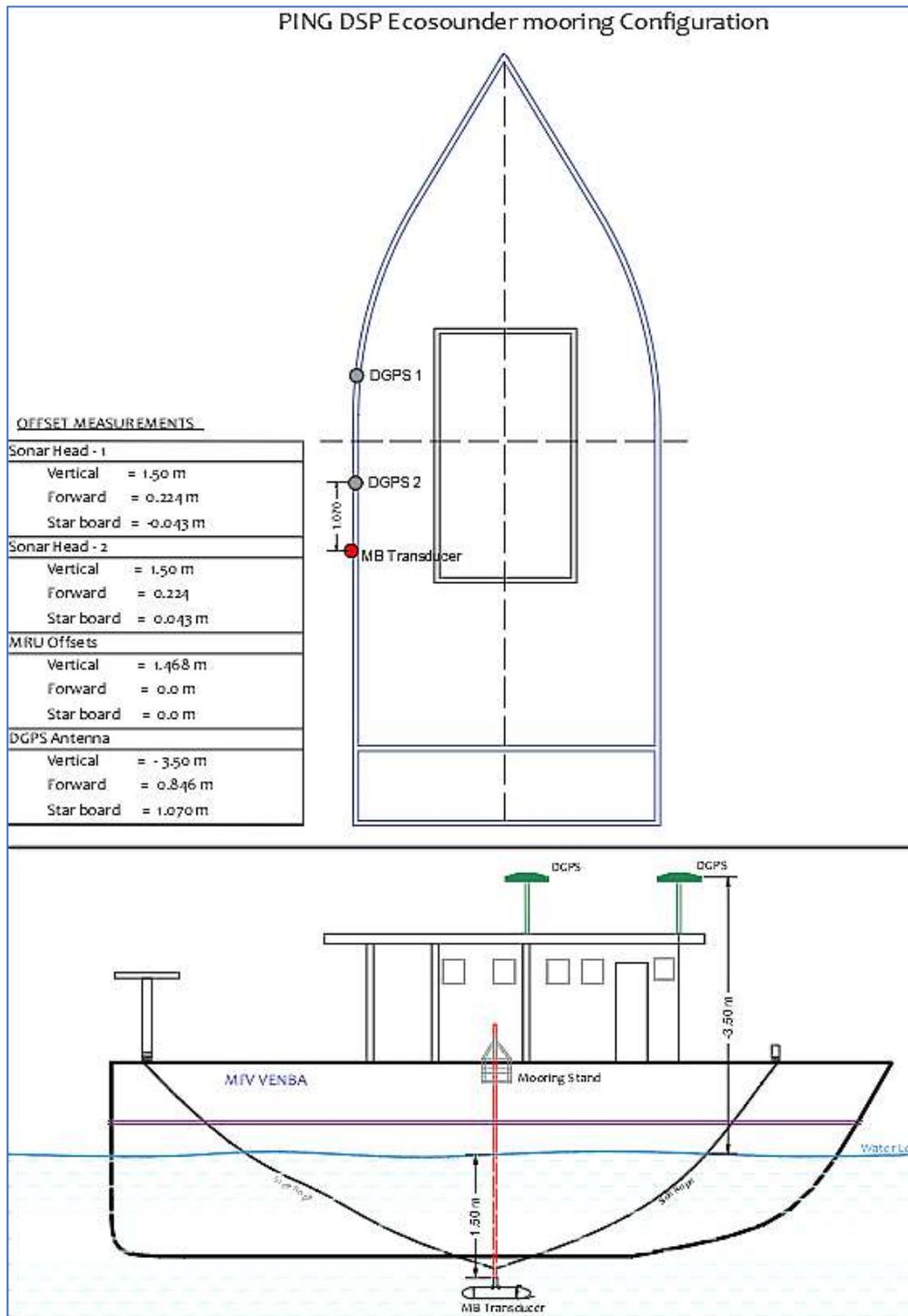
Sonar Head- 2 Offsets



Transducer offsets

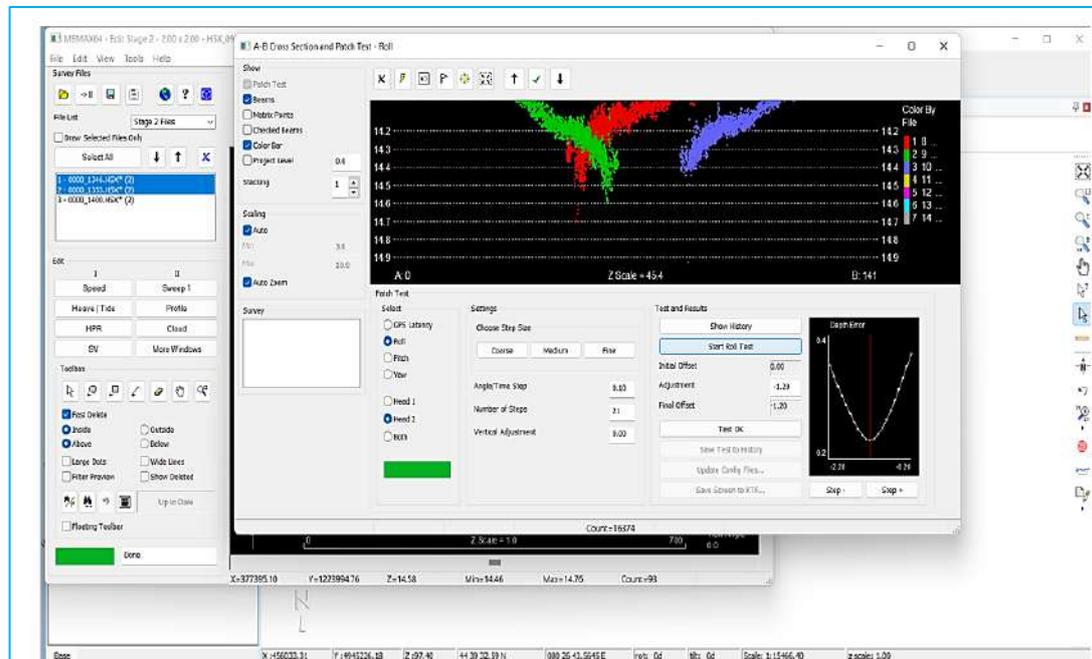
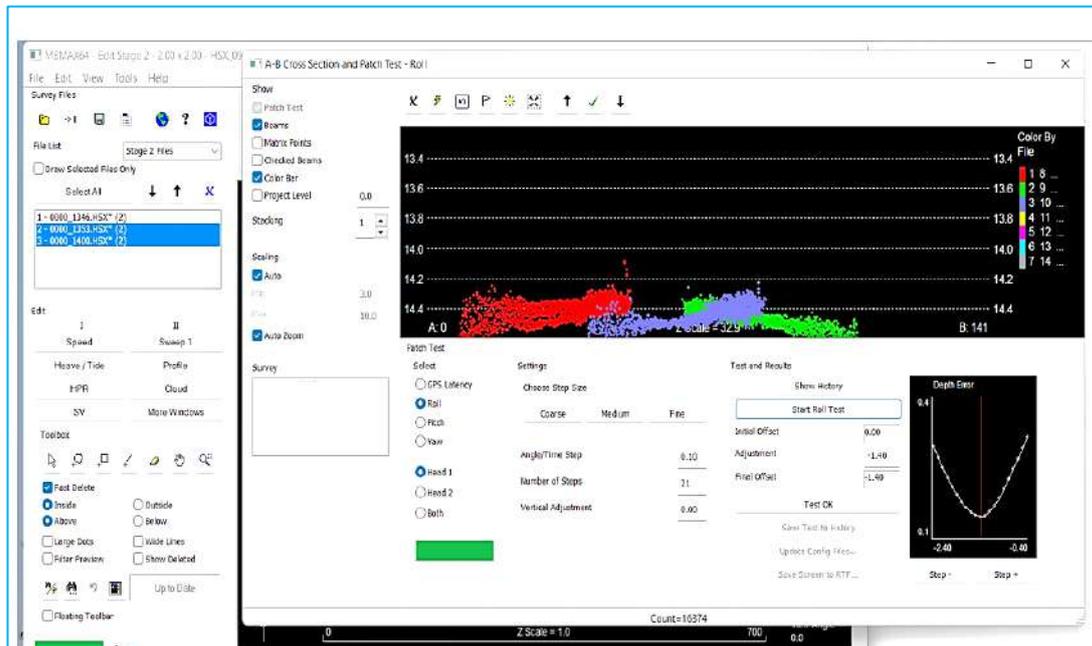
3.6.2. Survey boat and instruments arrangement

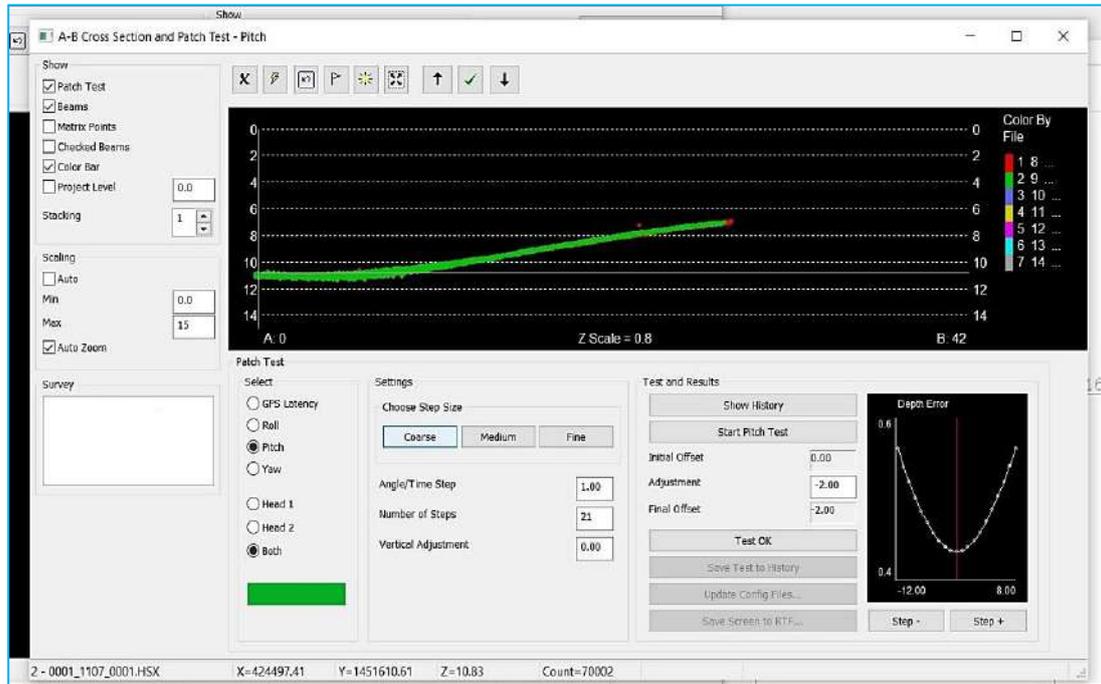
The Multibeam bathymetry survey was carried out using the survey vessel **MFV SANGAVI** fitted with Multi-channel VHFR/T, Ship-to-Shore R/T, Gyro compass, Marine radar, Loud hailer, Hull mounted Multibeam transducer, DGPS positioning system and the VHF communication system etc.



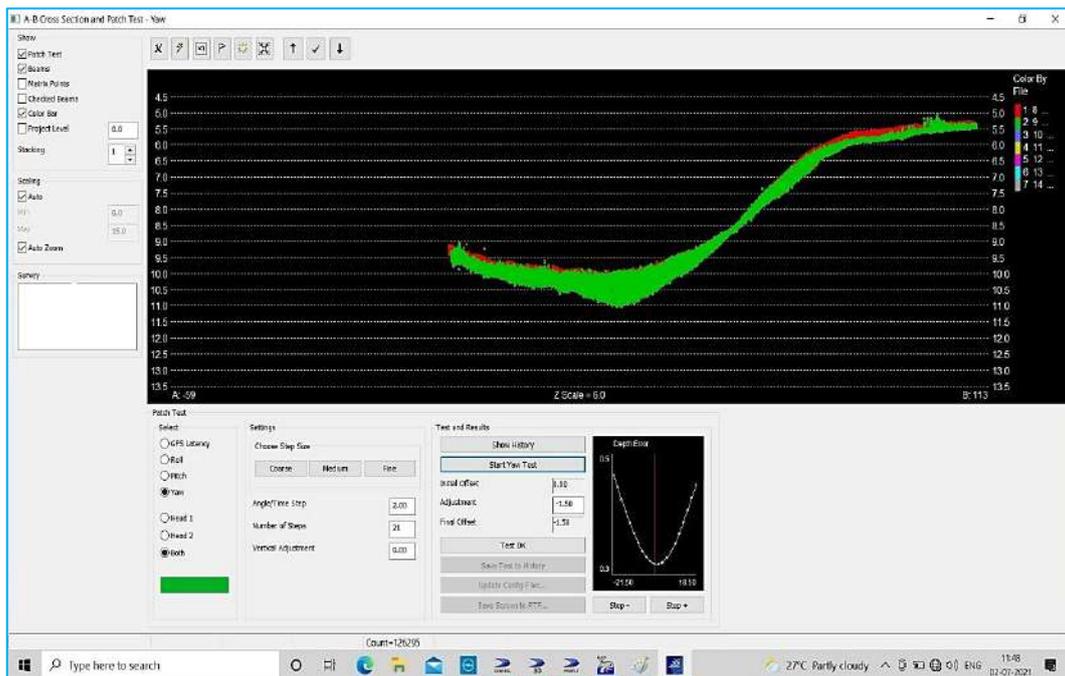
Survey boat and instruments arrangement

3.6.3. Multibeam patch test calibration



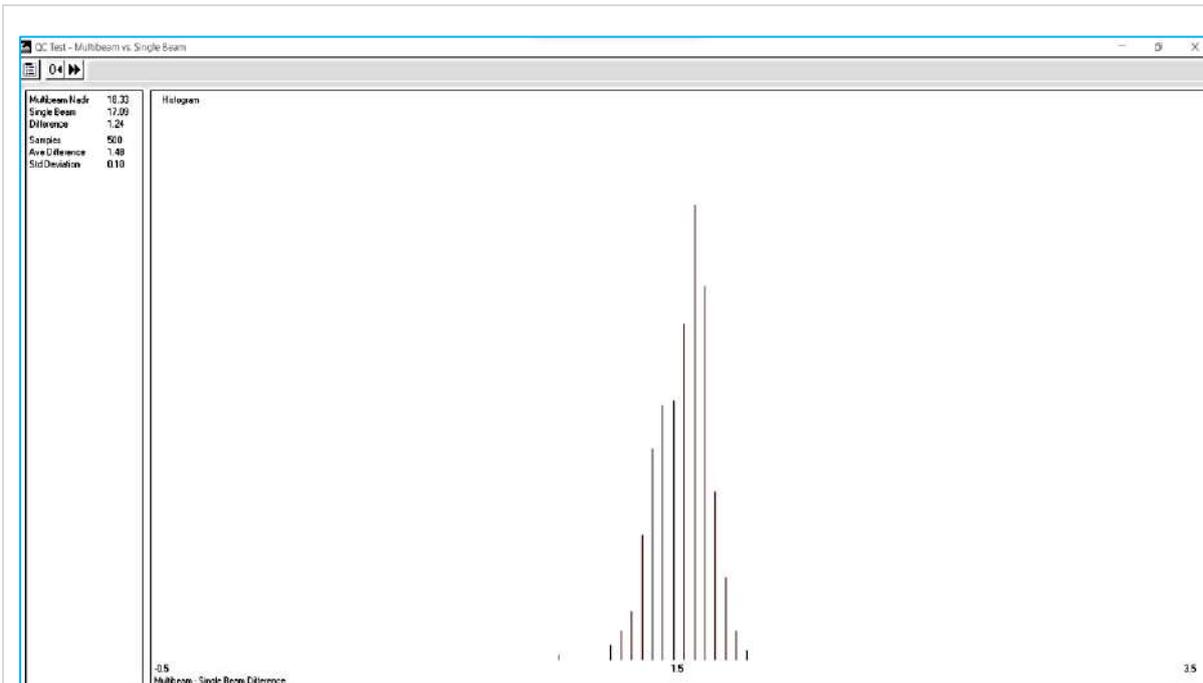


Pitch test – Both head
Offset value: 4.00

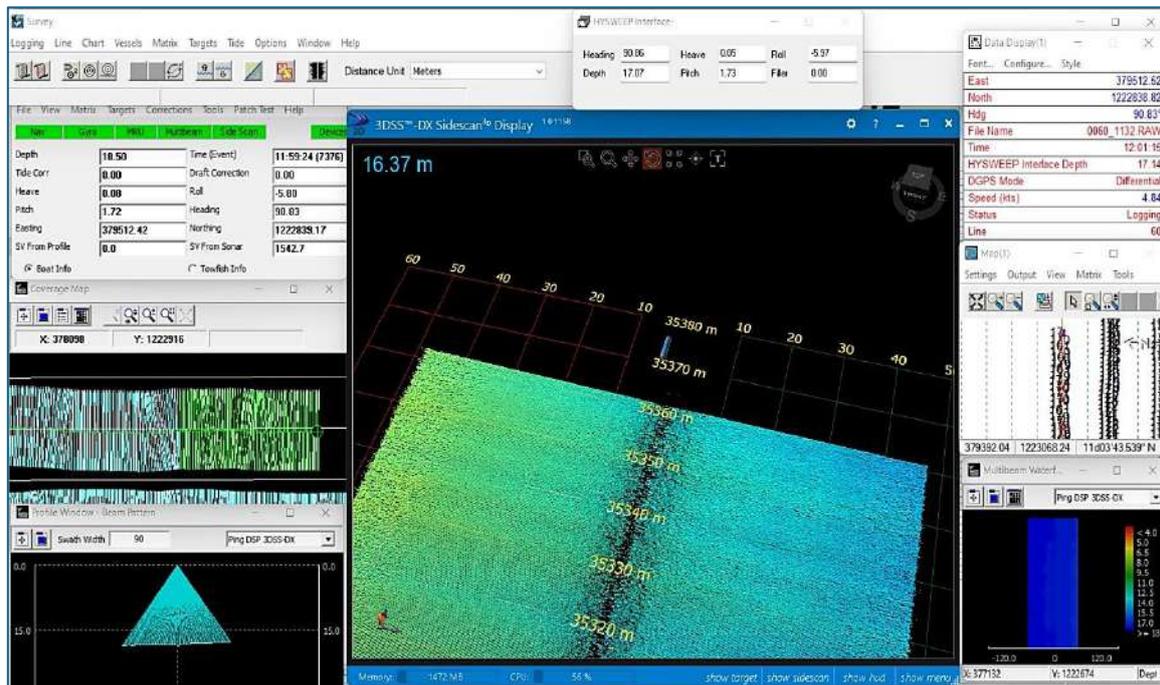


Yaw test – Both head
Offset value: 6.00

Quality control test for Multibeam vs Single beam data



Standard deviation for single beam and multibeam: 0.10 m



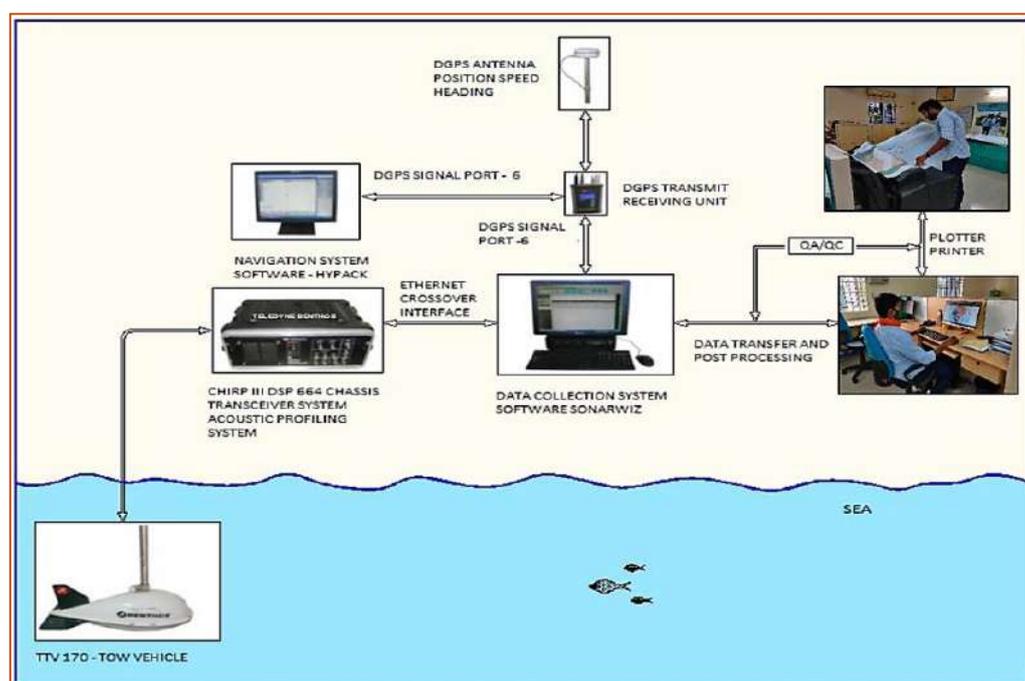
On board multibeam data collection

3.7. Shallow seismic survey

Area of survey: Shallow seismic survey was carried out covering an area of 0.35 km x 0.35 km for Harbour Basin at 25 m line spacing c/c by using Sub-Bottom Profiler CAP 6600 Chirp III systems. The planned survey lines are shown in **Fig. 3.4**.

Description of Equipment

The configuration of various devices and arrangements for conducting the shallow seismic survey is shown below.



The tow fish was mounted 1.0 m below the sea surface on the starboard side of the survey vessel **MFV SANGHAVI**. It was connected to the transceiver unit through the LAN cable. The DGPS antenna was mounted on the mast vertically in line with the Tow fish so that it records the exact coordinates of the locations where the tow fish collects the seismic information on the seafloor. The necessary inputs were given in HYPACK data collection software before the commencement of the survey. The planned track lines were displayed on the monitor at the wheel for navigation. Watch guards were positioned at bow, tow vehicle/antenna and at rear end.

The data were continuously recorded at onboard PC along each transect. After that day data collection was made, entire data were downloaded to external hard disc and stored. Using the SONARWIZ MAP survey software, we interfaced the coordinates of the DGPS and the sub bottom characteristics. The real time data also included time, date, latitude, longitude. The collected data were stored in "SGY" format. During the processing of data, it was converted into "COD" format with the help of CODA GEOSURVEY software.

Benthos CAP 6600 Chirp III Acoustic Sub-Bottom Profiler CAP 6600 Chirp III single frequency acoustic Sub-Bottom Profiler manufactured by TELEDYNE BENTHOS, Inc., USA was used for carrying out the shallow seismic survey. The seabed penetration was carried out in two bands of Chirp frequency, i.e., low frequency with 2 to 7 kHz.

The system uses advanced Chirp technology to produce high resolution sub-bottom profiles of both the shallow and deep sub bottom layers. The system is modular in design as it can be configured with a variety of tow vehicles, as well as hull mounted transducer arrays. The system comprises the CAP 6600 Chirp III Workstation and a Tow vehicle TTV-170. The tow vehicle TTV 170 system includes dual frequency (AT-471) transducers, which operate in the 2 kHz to 7 kHz band and 10 kHz to 20 kHz band. The hydrophone arrays arranged in a dipole configuration and are housed in a compact aluminum and fiberglass body. The transducers are wired through junction box that connects to the Remote Controlled Transmit / Receive module and workstation. This boat mount system does not use separate hydrophones as the transducers performs both as the transmitter and receiver functions, through a T/R network in the module.

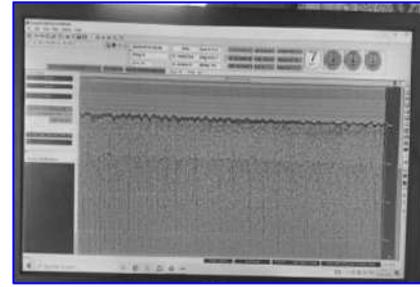


DSP-664 Transceiver generates the Chirp waveforms, processes, and displays the sub-bottom sonar data and monitor and controls system performance. The DSP-664 Processor generates multiple views of the sonar data as the information is collected and recorded on high-density storage media. Chirp sonar technology uses digitally produced linear FM transmitted signals along with digital signal processing for matched-filter processing of reflected energy to produce high resolution images. In Chirp technology, a greater dynamic range is attained as long FM pulses provide an additional 20 dB to 30 dB of dynamic range over conventional sub-bottom sonar systems. Enhanced resolution is achieved with matched filter processing and the transmitted wave forms are repeatable.

The pulse characteristics are programmable, as the pulse length, span of frequency sweep and phase/amplitude calibration of the transmitted waveform can be varied without hardware changes. The sonar data can be stored for off-line processing in SEG-Y format.

Together with the processor, the software and the transceiver serve to process, to display and to store both channels of sub-bottom sonar data. The CAP-6600 Chirp III workstation also integrates and stores navigation data from the ships navigation system and can generate output through a variety of user-configurable formats. In addition, the processor provides remote programmable receiver gain control of the remote controlled transmit/ receive module.

The DSP-664 Transceiver incorporates two power amplifiers as well as filtering for separating the received signals. The Chirp waveforms are input to the transceiver from the processor and are amplified by the power amplifiers which drive the transducers. Received signals are input to the transceiver, filtered and then output to the processor. The transceiver also includes a pre-amplifier with adjustable gain for amplifying the output of non-Chirp systems.



Technical specifications

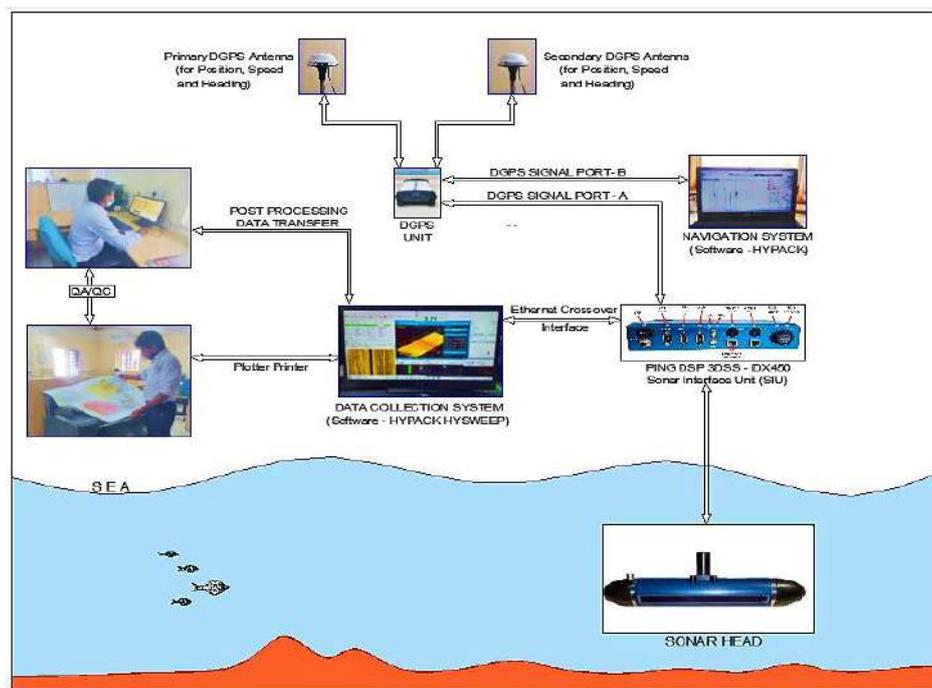
Main Process	:	PC based sonar workstation with high resolution graphics engine.
DSP Sonar Signal Processing	:	Two DSP Channels, 16-bit A/D, continuous FFT each transmission, each channel
Data Storage	:	Stores raw data in SEG-Y format
Ping rate	:	15 pings /second maximum
Pulse Length	:	User selectable from 5 to 50 Mrs. pulse waveforms stored in memory
Output Power	:	4 KW each channel max
Transmitting frequency	:	Chirp band (Low): 2 kHz to 7 kHz, Chirp band (High): 10 kHz to 20 kHz.
Cable	:	Kevlar electrical umbilical cable
Operation Depth	:	TTV 170: 600 m maximum
Navigation Annotation	:	NMEA 0183 interface, event / fix marks, external interrupt
Operator Controls	:	HW gain channel; tow stage TVG; bottom tracking; smoothing; horizontal / vertical zoom; display gain control; repetition rate control; custom FM waveform design.
Operator Displays	:	Bathymetry display; reflectivity and hardness display; signal to noise ratio display; voltage display; custom color palette selection; color rotation; navigation map display.

3.8. Side scan sonar survey

Area of survey: Side scan sonar survey was carried out covering an area of 0.35 km x 0.35 km at line spacing 40 m c/c into the sea covering the entire sea floor. The planned survey lines are shown in **Fig. 3.5**.

Description of Equipment

The configuration of various devices and arrangements for conducting the side scan sonar survey is shown below.



CONFIGURATION OF PING DSP 3DSS-IDX450 FLOW CHART

Side Scan Sonar will be conducted using Ping DSP 3DSS-iDX Sidescan and bathymetry sonar. Ping DSP 3DSS-iDX Sidescan and bathymetry sonar head will be mounted 2.0 m below the sea surface on the star board side of the survey vessel. It will be connected to the sonar interface unit through the LAN cable. The two DGPS antenna will be mounted on the mast vertically in line with the tow fish so that it records the exact coordinates of the locations where the tow fish collects the seabed reflection characteristics. The necessary inputs will be given in HYPACK data collection software before the commencement of the survey. The planned track lines gets displayed on the monitor at wheel for navigation. Watch guards will be positioned at bow, tow vehicle /antenna and at rear end. The data will be continuously recorded at onboard PC along each transect. After that day data collection has been made, entire data will be downloaded to external hard disc and stored. Using the Ping DSP DSS-DX control survey software. we will interface the coordinates of the DGPS and the seabed reflection characteristics. The real time data will also include time, date, latitude and longitude. The collected Sidescan data will be stored in ".XTF" and Bathymetry data will be stored in ".HSX" format with the help of CODA GEOSURVEY and HYPACK & HYSWEEP software.

Ping DSP 3DSS-iDX Integrated Shallow Water Mapping System has been an accurate, high resolution, ultra-wide swath echo-sounding and 3D imagery, with integrated real-time surface sound velocity, high accuracy INS position / attitude, optional RTK and PPK, provides



superior hydrographic survey performance in shallow water, manufactured by PING DSP, Inc; Canada and carries out high resolution side scan imagery with a 3-Dimensional look at the seafloor. The 3DSS-iDX450 is manufactured to the highest quality and reliability. It represents the latest

sonar technology with patented technology that incorporates a multi-array transducer and solving for multiple angles of arrival for a 3-dimensional image.

Simultaneous Real-time 3D Imagery: Geometrically correct, co-located 3D Sidescan imagery augments bathymetry and extends 2D Sidescan resolution to three dimensions. 3DSS real-time 3D software displays, captures and allows accurate measurement in three dimensions of features on the seabed and in the water-column including pipes, cables, pilings, wrecks, subsea structures hazards, ecological habitats, and other features not well defined in bathymetry or 2D side scan.

Patented array signal processing technology: It is a patented signal processing methodology that extends the single angle-of-arrival principle used in interferometric systems to accommodate multiple simultaneous backscatter arrivals. When combined with the 3DSS-iDX Multibeam Echo-Sounder Signal Processing Engine, the result is unsurpassed resolution and bathymetric accuracy over swath widths that can exceed 14 times water depth.

Soft sonar™ technology: At the heart of the 3DSS-DX sonar is Ping DSP's state-of-the-art Soft Sonar™ electronics technology with ultra-low noise, wide dynamic range receivers, state-of-the-art acoustic transducer arrays, Gigabit Ethernet, easy-to-use software interface, and integrated support for a wide range of third-party survey software and hardware.

4. RESULTS

4.1. Tides

The design tide levels with respect to Chart Datum (CD) are followed as per the Chennai tide presented in Indian Tide Table - 2026 published by Surveyor General of India and the details are given below.

Tides	Level w.r.t. CD (m)
Mean High Water Spring (MHWS)	(+) 1.15
Mean High Water Neap (MHWN)	(+) 0.84
Mean Sea Level (MSL)	(+) 0.65
Mean Low Water Neap (MLWN)	(+) 0.43
Mean Low Water Spring (MLWS)	(+) 0.14

The variation of the measured tides at KPL Finger Jetty No.3 is shown in **Fig. 4.1**.



Deployment of tide recorder

4.2. Topographic survey

Benchmark (BM): The reference benchmark was given by Kamarajar Port Limited which has been used as vertical control for the entire surveys. Benchmark Description: BM is situated on the western corner of the Finger jetty No.3. The reference Level of the benchmark is given as (+) 3.496 m CD.

Details of Benchmark

Description	Geographical Coordinates Spheroid - WGS 84		UTM - Zone 44 N		RL w.r.t. CD (m)
	Latitude, N	Longitude, E	X (m)	Y (m)	
BM (Top level of Finger jetty No. 3.)	13° 15'27.36"N	80° 20'29.06"E	428654.618	1465717.628	(+) 3.496



Benchmark

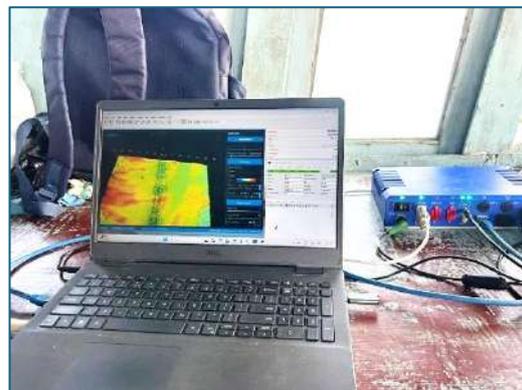
Topographic survey was carried out along the shore front area using RTK GPS. The topographic elevations are presented with respect to Chart Datum (CD). The topographic data are combined with bathymetry data and presented in the bathymetry map.

4.3. Multibeam bathymetry survey

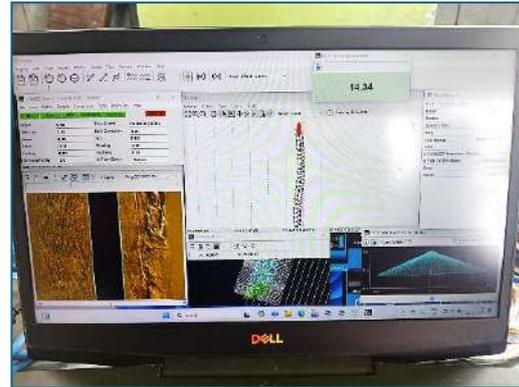
The bathymetry chart is prepared in WGS84 spheroid with UTM 44N coordinates supplemented by Geographical coordinates indicating the latitude and longitude. The depths are presented with respect to Chart Datum (CD). The bathymetry chart combined with topographic data covering entire area is prepared in 1:1000 scale at 5 m x 5 m interval is presented in **Fig. 4.2**.

The bathymetry of this region indicates that the variation of depth is slightly irregular due to the ongoing dredging activities in the harbour basin. The proposed area noticed depth varying between 0 to 14.5 m CD. The maximum depth noticed at TC (Turning Circle) is 17 m to 18 m CD.

The XYZ data of bathymetry survey data are presented in XYZ in **Annexure I**.



Multibeam Echosounder mounting & Installation



On board data collection

4.4. Shallow seismic survey

The processed seismic data showing the existing sediment thickness above the acoustic basement are presented in isopach map. The isopach map is prepared in WGS 84 spheroid with UTM coordinates (Zone 44 N) along with geographical coordinates indicating the latitude and longitude. The Isopach map prepared in 1:1000 scale is shown in **Fig. 4.3**.

Isopach map: The inferred results were used to prepare isopach maps and construct vertical sections of sub-seabed along each transect line. The isopach map thus prepared explains the configuration of minimum sediment thickness i.e., the sediment thickness between seabed and acoustic basement. For example, the isopach contour of 5 m implies that the sediment column is present for at least 5 m thickness without the presence of any hard strata in between.

Acoustic basement: In the seismic records, the maximum penetration limit of the acoustic wave is defined by the acoustic basement. The penetration of the acoustic wave is controlled by the compactness of the sediments/rock formations that occur below the seabed and the water depth in which signals are transmitted causing multiple reflections. It does not penetrate down the consolidated sediments/ bedrocks. So, the recorded data signifies the nature of the sedimentary formations occurred between the seabed and acoustic basement.

Seabed characteristics based on shallow seismic survey

The shallow seismic survey shows that the sub-bottom of the survey area presence of sediment deposition comprises of fine sand. In general, while interpreting the high resolution shallow seismic sections, the acoustic continuous and impervious facies, which typically represents acoustic basement, or hard rock has a highly reflective upper surface and is interpreted as the limit for depth of penetration of the shallow seismic survey.

The Isopach map showing the thickness of sediments present in the survey area (**Ref. Fig. 4.3.**) The shallow seismic survey shows that the sub-bottom of the survey area consists of sediment formations predominantly with sand and fine sand particles.

Inferences: The formation of thick sediment within the survey boundary varies from 10 m to 19 m below the seabed. It is observed that in general, the entire survey region is composed of single layer of accumulation of sediments. The Isopach contours in the study region are almost parallel to depth contours, i.e., the thick sediment below sea floor increases with depth towards offshore. The survey and the further interpretation show that the survey region is present with uniform composition of single layer of sediments. This region is found to be free from formation of any hard strata like rocks within the limit of penetration.

Description of seabed on survey lines

The shallow seismic survey was conducted along 12 survey lines (**Ref. Fig. 3.4.**) In order to understand the subsurface nature of the seabed, the geological description of seabed strata beneath each transect, i.e., the vertical sections for each seismic transect are shown in **Fig. 4.4 to 4.15**



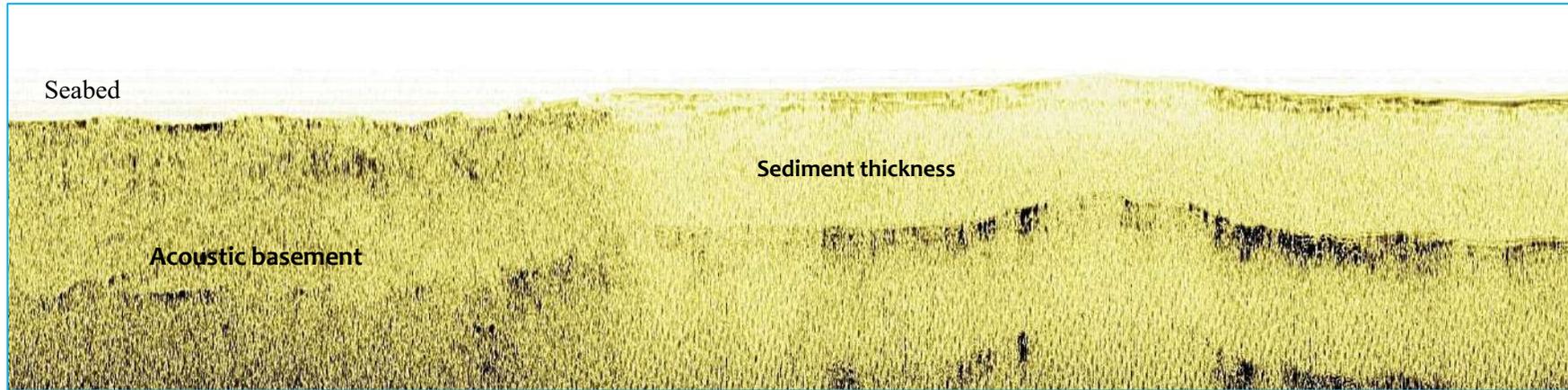
Installation of seismic tow fish



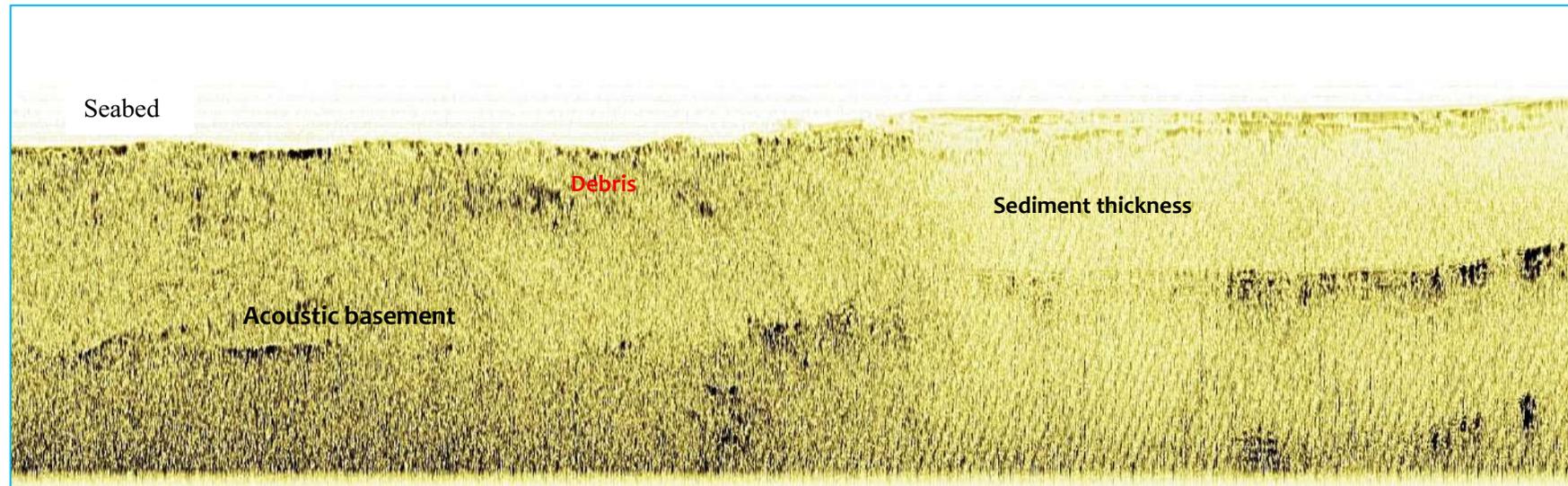
Deployment of seismic tow fish



Onboard data collection



Typical seismic records along Line – 05



Typical seismic records along Line – 08

4.5. Side scan sonar survey

Side scan sonar mosaic portrays an acoustic image of the sea floor. When combined with shallow seismic and bathymetric data, it helps to interpret the seabed geology. The side scan sonar data acquired in the field were processed using CODA GEOKIT software in the laboratory. Several geophysical signal processing techniques such as low pass, high pass and band pass filters were adopted to eradicate the noise on side scan sonar records. The processed data were interpreted using various image interpretation techniques like tone, texture, pattern, alignment, etc. The data collected were analyzed, and the results were used to infer the geological features of the surface of the seabed.

The mosaic and seabed maps are prepared in WGS 84 spheroid with UTM coordinates (Zone-44 N) supplemented by geographical coordinates indicating the latitude and longitude. Based on the data derived from the side scan sonar records on different transects, the mosaic map of the entire survey area is prepared in 1:1000 scale is shown in **Fig. 4.16** and seabed map based on side scan sonar survey is shown in **Fig. 4.17**.

Geological characteristics of seabed as deciphered from side scan sonar

The digital images on the shape, size, tone, texture, pattern and associated shade of features were interpreted to draw the features of the seabed. On-site confirmation and correlation for surface sediment types were done by grab sampling.

The side scan sonar data reveals that the seabed of the project area is characterized predominantly by high and low energy backscatter returns. This signature suggests that in general the seabed is carpeted with fine sand. A major part of the seabed within the survey area is noticed with fine sediments.

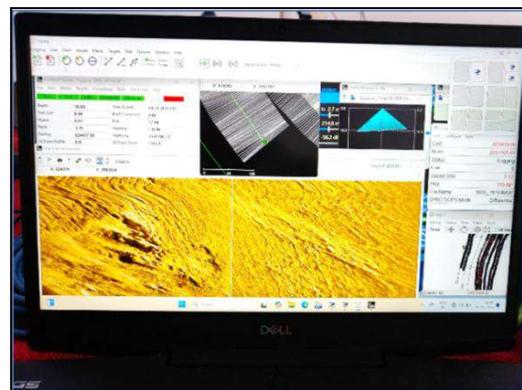
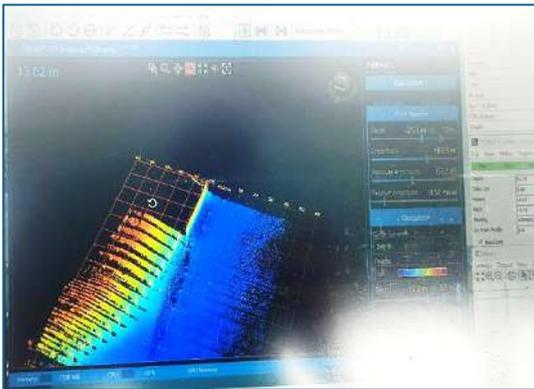
Inferences: In general, the study area constitutes fine to very fine sand. The sea floor sediment of the proposed AECT area is mainly made up of silty sand and fine sand. Near GCB jetty and general Existing AECT the bottom sediment is mostly of silty sand. A few patches of debris are noticed on the southern side of the survey area (**Ref. Fig. 4.17.**) Dredging marks are widely noticed on the southeastern boundary inside the survey location.



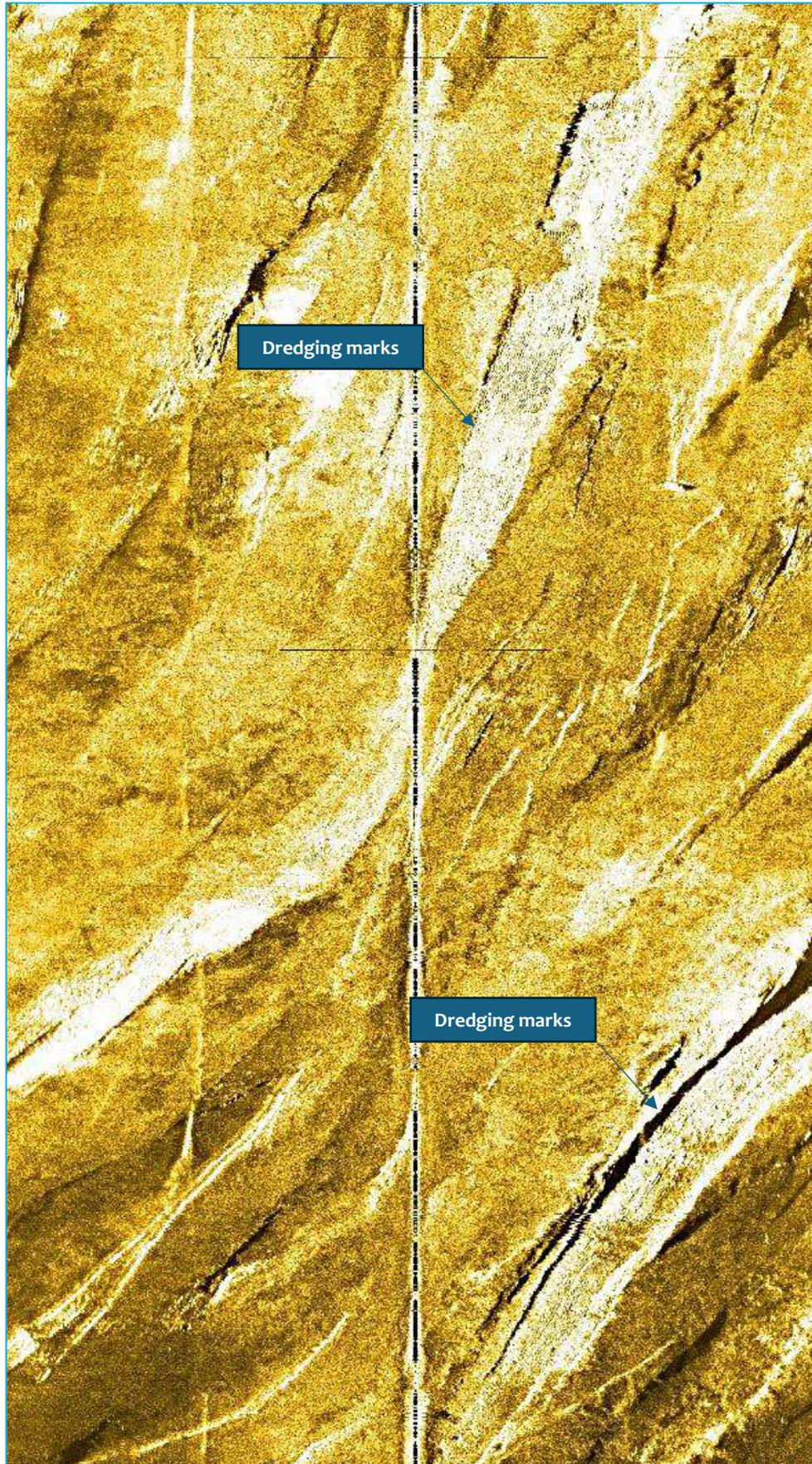
Installation of Ping DSP 3DSS-iDX side scan



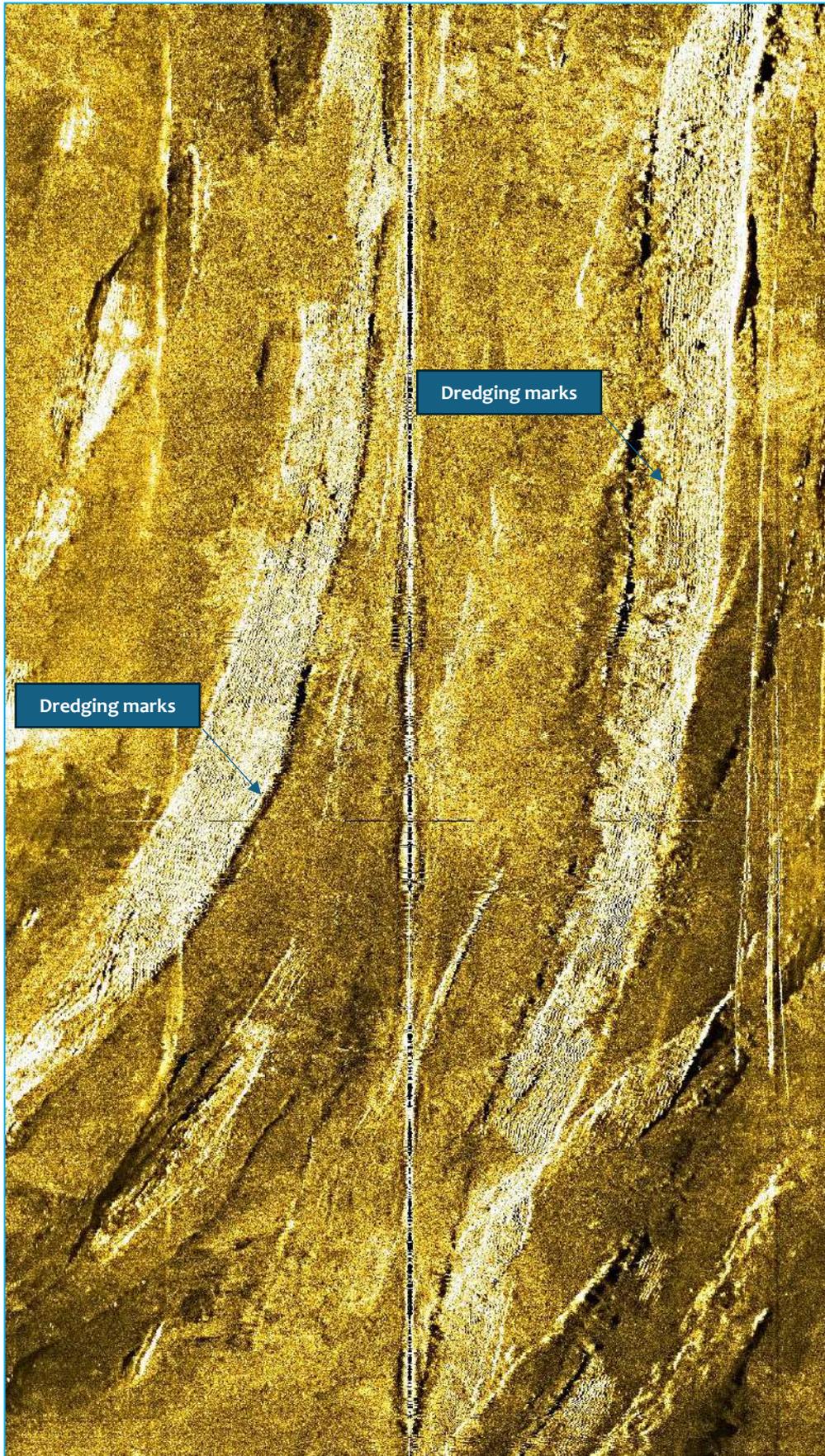
Deployment of Ping DSP 3DSS-iDX side scan



Onboard side scan data collection



Typical side scan sonar records along Line – 6



Typical side scan sonar records along Line - 7

4.6. Dredging volume

The dredging volume boundary is shown in **Fig. 4.18**. The volume of sediment to be dredged to attain the design depth (-) 16.0 m CD & (-) 16.5 m CD are estimated to be using HYPACK TIN MODEL. The estimated volume of dredging is calculated to be 6,52,000 m³ and the details are given below.

Sl. No.	Location	Design Depth w.r.t CD (m)	Slope 1:5 Qty. (m ³)	Dredging Qty. (m ³)	Total dredging Qty. (m ³)
1	AECT Berth Pocket	(-) 16.0	61,000	3,06,000	3,67,000
2	Approaches	(-) 16.5	47,000	2,38,000	2,85,000
Gross Total Volume (m³)					6,52,000

5. CONCLUSION

Multibeam bathymetry survey was carried out covering an area of 0.35 km x 0.35 km in the Harbour basin at 30 m spacing. The bathymetry of this region indicates that the variation of depth is slightly irregular due to the ongoing dredging activities in the harbour basin. The proposed area noticed depth varying between 0 to 14.5 m CD. The maximum depth noticed at TC (Turning Circle) is 17 m to 18 m CD.

Shallow seismic survey was carried out covering an area of 0.35 km x 0.35 km for Harbour Basin at 25 m line spacing c/c by using Sub-Bottom Profiler CAP 6600 Chirp III systems. The formation of thick sediments within the survey boundary varies from 10 m to 19 m below the seabed. It is observed that in general, the entire survey region is composed of single layer of accumulation of sediments. The survey region is found to be free from formation of any hard strata like rocks within the limit of penetration.

Side scan sonar survey was carried out covering an area of 0.35 km x 0.35 km at line spacing 40 m c/c into the sea covering the entire sea floor. The survey area constitutes fine to very fine sand. The sea floor sediment of the proposed AECT area is mainly made up of silty sand and fine sand. Near GCB jetty and general Existing AECT the bottom sediment is mostly of silty sand. A few patches of debris are noticed on the southern side of the survey area. Dredging marks are widely noticed on the southeastern boundary inside the survey location.

All survey soft copies, (i) tide data, (ii) topographic data, (iii) multibeam data, (iv) sub-bottom profiler data, and (v) side-scan sonar data were provided on a enclosed pen drive.

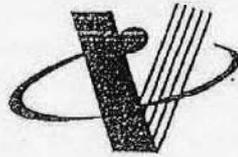
Detailed Project Report on Development of Container Terminal

Annexure-C

Details of Geotechnical Report

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FINAL REPORT

CLIENT: M/S. ADANI ENNORE CONTAINER TERMINAL PVT LTD

VELCITI CONSULTING ENGINEERS (P) LTD.
No. 4A, 4th Cross Street, Dhandeeswaram,
Velachery, Chennai – 600 042.
Phone : (044) 2243 5659 / 22432659
Email : velciti@gmail.com

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1. INTRODUCTION

Purpose and scope:

Geo-technical investigation was carried out at ENNORE. This work was referred to us by M/S. Adani Ennore Container Terminal Pvt Ltd., The primary purpose of this investigation was to obtain data to develop foundation design recommendations for the proposed structure. The location of borings were selected by client's representatives. To accomplish these purposes, the following tasks were performed:

1. Detailed nine number of soil borings were done up to hard strata to explore the subsurface stratigraphy and obtain soil samples for laboratory testing.
2. Field and laboratory tests were conducted to evaluate the index and engineering properties of the soils.
3. Engineering analyses were performed to develop foundation design information for the proposed structure.

2. FIELD INVESTIGATIONS

Rotary Boring

Rotary boring was performed at nine boreholes at one location in accordance with IS: 1892.

In this method, borings is effected by the cutting action of a rotating bit which is kept in firm contact with the bottom of the hole. The bit is attached to the lower end of a hollow drill rod which is rotated by a suitable chuck.

Drilling mud [usually Bentonite] is continuously forced down the hollow drill rods. The mud returning upwards through the annular space between the drill rods and the side of the hole brings the cuttings to the surface.

Standard Penetration Test:

It is now the most commonly used in situ test. The test measures the penetration resistance of the split-spoon sampler, when it is driven into the soil, at the bottom of a bore hole in a standard manner. The N-value, which is the number of blows required to achieve 300 mm penetration of the soil, indicates the relative density of a sand or gravel, the consistency of other soils such as silts or clays and the strength of weak rocks. The test is described in IS 2131 - 1981. The split spoon sampler is attached to stiff drill rod and lowered to the bottom of the bore hole. A standard blow consists of dropping a mass of 63.5 kg free fall through 750 mm on to an anvil at the top of the rods and ensuring that this amount of dynamic energy is transferred to the sampler as much as possible. The number of blows required to achieve each 150 mm penetration is recorded for a full penetration of 450 mm.

The initial 150 mm penetration is referred to as seating drive and the blows required for this penetration are not considered as this zone is in disturbed soil. The next 300 mm of penetration is referred to as the test drive and the number of blows required to achieve this fully is termed the penetration resistance or N-value.

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Sampling:

The soil that is being removed during drilling of boreholes is regularly examined for changes in the soil stratification.

At fixed regular intervals and at levels where there is change in soil type samples are collected for closer examination in the laboratory.

The types of samples collected can be grouped under the following two categories.

1. Disturbed samples
2. Undisturbed samples

In disturbed samples there is considerable disturbance in the natural structural arrangement of the soil particles. For meaningful results to be obtained from disturbed samples they must be **representative samples**. That is, the soil sample must contain all the mineral constituents that are present in the soil at the depth from which the sample has been taken and there should not be intermixing of minerals from various depths. Disturbed soil samples can be collected from split spoon sampler used in standard penetration test and also from soil retained in auger.

3. LABORATORY INVESTIGATION

The operations to be performed in the laboratory depend upon the type of the nature of data required for the problem at hand. In case of cohesion less material, like sand, the laboratory tests are usually minimum and the design parameters are worked out from field test data such as from SPT-N value, core resistance.

For cohesionless soil

- a) Specific gravity
- b) Sieve analysis
- c) Direct shear test

For cohesive soil

- a) Specific gravity
- b) Natural moisture content
- c) Atterberg's limits
- d) Sieve Analysis
- e) UCC test

4. FOUNDATION ANALYSIS

Soil profile:

In order to obtain the soil profile of the site, nine boreholes at one location has been bored. The soil profile reveals that it consists of medium to fine sand/ silty medium to fine sand /silty clay / silty sandy clay / sandy silt /fine to medium sand with gravel / silty clayey sand /silty fine sand stratum. The detailed borelog and laboratory test results are enclosed in the annexure.

Safe Bearing Capacity:

The SBC calculations are made based on the information obtained from one borehole at one location. Extrapolating information from just one borehole may be misleading the designs. However, this may be overlooked by way of conforming the uniformity of soil (with borelog data), during execution of the foundation. And also the Dynamic Analysis for wind load should be considered during Structural Design of the structure.

The bearing capacity of granular soil depends upon the unit weight and angle of internal friction of the soil. These two properties of granular soils are determined by standard penetration tests. The following SBC calculation is made based on Static Analysis.

5. ELECTRICAL RESISTIVITY TEST

Principle of the Test

Wenner's four electrode methods have been considered for the earth resistivity measurements as per IS 3043-1987. In this method a four terminal tester is used. These four terminals are connected by leads to four electrodes driven in the soil.

The four electrodes are driven into the earth along a straight line at equidistant horizontal spacing (a). The depth of the electrodes (d) shall be 15cm. The current is passed through the two outer electrodes and the earth and the voltage difference observed between the two inner electrodes.

The current I flowing into the earth produces an electric field proportional to its density and to the resistivity of the soil. The Voltage V measured between the inner electrodes is therefore proportional to the field. Consequently the resistivity shall be proportional to the ratio of the voltage to current.

Procedure of the Test:

The procedure for the electrical resistivity test was followed at site as per IS: 3043 - 1987. At a Test site, in the chosen direction, four electrodes were driven into the earth along a straight line at equal intervals, 'a'. The depth of the electrodes had been 15cm. The readings for a station were taken in eight directions (E-W, N-S, NE-SW and NW-SE directions).

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The interval of electrodes are chosen as per IS: 3403 -1987. Thus with these points and the stated eight directions, the entire site is covered for resistivity measurements.

Measurement of the resistivity:

The earth resistivity meter crm-500, used gives the value of the resistivity as: $\rho = 2\pi a R$,

Wherein

' ρ ' is the resistivity of the soil in ohm – meters

' a ' is the distance between the successive electrodes in meters.

' R ' is the reading in ohms.

As the depth of the electrodes is 15cm, the resistivity obtained as per the above formula is the average soil resistivity at a depth equal to the horizontal spacing ' a ' between the electrodes. The Test Results are enclosed in the annexure. The resistivity vs distance graphs are also enclosed in the annexure.

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6. SAFE BEARING CAPACITY OF SOIL - CALCULATION SHEET

(BASED ON SHEAR CRITERIA)

CLIENT :	: M/S AdaniContainer Terminal Pvt Ltd.,	
LOCATION :	Ennore	
BORE HOLE NUMBER :	BH - 01	(For BH1,4&5 Locations)
TYPE OF FOUNDATION :	Strip	
LENGTH OF FOOTING, L =	1.00	M
WIDTH OF FOOTING, B =	1.50	M
DEPTH OF FOOTING, D _f =	0.67	M
COHESION, C IN kg/sq.cm =	0	
ANGLE OF INTERNAL FRICTION, φ =	23	
SPECIFIC GRAVITY OF SOIL, G =	2.65	
CORRECTION FOR WATER TABLE =	0.5	
DRY DENSITY =	1.90	
SUBMERGED DENSITY =	0.90	
FACTOR OF SAFETY, FS =	2.5	
VOID RATIO, e _o =	< 0.55	

BEARING CAPACITY FACTORS	
N _c =	26.372
N _q =	15.304
N _γ =	17.792

SHAPE FACTORS	
s _c =	1.00
s _q =	1.00
s _γ =	1.00

DEPTH FACTORS	
d _c =	0.88
d _q =	1.00
d _γ =	1.00

INCLINATION FACTORS	
i _c =	1.00
i _q =	1.00
i _γ =	1.00

THEREFORE THE FAILURE IS A GENERAL SHEAR FAILURE

ULTIMATE BEARING CAPACITY OF SOIL (q_u):

$$q_u = cN_c S_c d_c i_c + q(N_q - 1) S_q d_q i_q + 0.5 B \gamma N_\gamma S_\gamma d_\gamma i_\gamma W'$$

$$= 14.6301 \quad t/m^2$$

SAFE BEARING CAPACITY OF SOIL (q_s):

FOS = 2.5

$$= 5.8520 \quad t/m^2$$

SAFE BEARING CAPACITY OF SOIL (q _s):	
q _s =	5.850 t/m ²

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SETTLEMENT CALCULATION

DATA
PROJECT : Soil Investigation for Jetty & Backup Area
CLIENT : Adani Ennore Container Terminal Pvt Ltd,
BH No. : BH - 01
DEPTH OF FOOTING, Df= 0.67 m
LENGTH OF FOOTING, L= 1.00 m **TYPE OF FOUNDATION :** Strip
WIDTH OF FOOTING, B = 1.50 m

Soil Properties

Layer	From (m)	To (m)	Type	Thickness (m)	N	Sp wt (kN/m ³)	Phi (φ) (degrees)	c (kg/cm ²)	Es (MPa)
1	0.000 -	10.000	SILTY MEDIUM TO FINE SAND	10.00	27 - 62	20.0	30	-	25
2	10.000 -	11.200	SILTY CLAYEY SAND	1.20	10	19.0	26	-	20
3	11.200 -	19.000	SILTY MEDIUM TO FINE SAND	7.80	11 - 27	19.5	28	-	25
4	19.000 -	22.000	SILTY CLAY	3.00	11	18.5	-	0.10	15
5	22.000 -	30.000	SILTY CLAYEY SAND WITH LIME	8.00	34 - 43	20.5	33	-	75

Intensity at Bottom Of Footing 5.85 t/m²

SETTLEMENT OF THE FOUNDATION (AS PER IS 8009 - PART 1) :

Total Settlement = Si + Sc

Immediate settlement :

Es = 23.333 Mpa (AVERAGE)
 233.33 kg/cm²

Given,

$\sigma = 5.850 \text{ t/m}^2$
 $\mu = 0.3$
 $B = 1.50 \text{ m}$
 $l = 1$
 $E = 2333.33 \text{ t/m}^2$

$S_i = S_{elastic} = \sigma B (1-\mu^2) / E_s$
 0.0034223 m or 3.42225 mm

Immediate Settlement (Si) 3.42225 mm

Consolidation Settlement (Sc) 0 mm

Total settlement (S) 3.42225 mm	Corresponding to SBC 5.85 kN/m ²
---------------------------------	---

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SAFE BEARING CAPACITY OF SOIL - CALCULATION SHEET

(BASED ON SHEAR CRITERIA)

CLIENT : M/S AdaniContainer Terminal Pvt Ltd.,
 LOCATION : Ennore
 BORE HOLE NUMBER : BH - 01 (For BH1,4&5 Locations)
 TYPE OF FOUNDATION : Square
 LENGTH OF FOOTING, L = 2.00 M
 WIDTH OF FOOTING, B = 2.00 M
 DEPTH OF FOOTING, D_f = 1.50 M
 COHESION, C IN kg/sq.cm = 0
 ANGLE OF INTERNAL FRICTION, Φ = 30
 SPECIFIC GRAVITY OF SOIL, G = 2.65
 CORRECTION FOR WATER TABLE = 0.5
 DENSITY = 2.00
 SUBMERGED DENSITY = 1.00
 FACTOR OF SAFETY, FS = 2.5
 VOID RATIO, e_s = < 0.55

BEARING CAPACITY FACTORS	
N _c =	30.14
N _q =	18.4
N _γ =	22.4

SHAPE FACTORS	
sc =	1.30
sq =	1.20
s _γ =	0.80

DEPTH FACTORS	
dc =	1.01
dq =	1.00
d _γ =	1.00

INCLINATION FACTORS	
ic =	1.00
i _q =	1.00
i _γ =	1.00

THEREFORE THE FAILURE IS A GENERAL SHEAR FAILURE

ULTIMATE BEARING CAPACITY OF SOIL (q_u):

$$q_u = cN_c S_c d_c i_c + q(N_q - 1)S_q d_q i_q + 0.5B_\gamma N_\gamma S_\gamma d_\gamma i_\gamma W'$$

$$= 40.2800 \quad t/m^2$$

SAFE BEARING CAPACITY OF SOIL (q_s):

FOS = 2.5

$$= 16.1120 \quad t/m^2$$

SAFE BEARING CAPACITY OF SOIL (q_s):

$$q_s = 16.112 \quad t/m^2$$

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CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.

VELCITI CONSULTING ENGINEERS PVT. LTD

SETTLEMENT CALCULATION

DATA
 PROJECT : Sub - Soil Investigation for Jetty & Backup Area
 CLIENT : Adani Ennore Container Terminal Pvt Ltd.,
 BH No. : BH - 01
 DEPTH OF FOOTING, Df = 1.50 m
 LENGTH OF FOOTING, L = 2.00 m
 WIDTH OF FOOTING, B = 2.00 m
 TYPE OF FOUNDATION : Square

Soil Properties

Layer	From (m)	To (m)	Type	Thickness (m)	N	Sp wt (kN/m ³)	Phi (φ) (degrees)	c (kg/cm ²)	Es (MPa)
1	0.000 -	10.000	SILTY MEDIUM TO FINE SAND	10.00	27 - 62	20.0	30	-	25
2	10.000 -	11.200	SILTY CLAYEY SAND	1.20	10	19.0	26	-	20
3	11.200 -	19.000	SILTY MEDIUM TO FINE SAND	7.80	11 - 27	19.5	28	-	25
4	19.000 -	22.000	SILTY CLAY	3.00	11	18.5	-	0.10	15
5	22.000 -	30.000	SILTY CLAYEY SAND WITH LIME	8.00	34 - 43	20.5	33	-	75

Intensity at Bottom Of Footing 16.112 t/m²

SETTLEMENT OF THE FOUNDATION (AS PER IS 8009 - PART 1) :

Total Settlement = Si + Sc

Immediate settlement :

Es = 25.000 Mpa (AVERAGE)
 250.00 kg/cm²

Given,

$\sigma = 16.112 \text{ t/m}^2$
 $\mu = 0.3$
 $B = 2.00 \text{ m}$
 $l = 1.12$
 $E = 2500.00 \text{ t/m}^2$

$Si = S_{elastic} = \sigma B (1-\mu^2) l / Es$
 0.0131371 m or 13.13708032 mm

Immediate Settlement (Si) 13.13708032 mm
 Consolidation Settlement (Sc) 0 mm

Total settlement (S) 13.13708032 mm Corresponding to SBC 16.112 kN/m²

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CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.

SAFE BEARING CAPACITY OF SOIL - CALCULATION SHEET
(BASED ON SHEAR CRITERIA)

CLIENT : M/S AdaniContainer Terminal Pvt Ltd.,
 LOCATION : Ennore
 BORE HOLE NUMBER : BH - 02 (For BH 2&3 Locations)
 TYPE OF FOUNDATION : Rectangle
 LENGTH OF FOOTING, L = 3.00 M
 WIDTH OF FOOTING, B = 2.00 M
 DEPTH OF FOOTING, D_f = 1.50 M
 COHESION, C IN kg/sq.cm = 0
 ANGLE OF INTERNAL FRICTION, Φ = 31
 SPECIFIC GRAVITY OF SOIL, G = 2.65
 CORRECTION FOR WATER TABLE = 0.5
 DENSITY = 2.00
 SUBMERGED DENSITY = 1.00
 FACTOR OF SAFETY, FS = 2.5
 VOID RATIO, e₀ = < 0.55

BEARING CAPACITY FACTORS	
N _c =	33.336
N _q =	21.38
N _γ =	27.526

SHAPE FACTORS	
sc =	1.13
sq =	1.13
sγ =	0.73

DEPTH FACTORS	
dc =	1.10
dq =	1.00
dγ =	1.00

INCLINATION FACTORS	
ic =	1.00
iq =	1.00
iγ =	1.00

THEREFORE THE FAILURE IS A GENERAL SHEAR FAILURE

ULTIMATE BEARING CAPACITY OF SOIL (q_u):

$$q_u = cN_c S_c d_c i_c + q(N_q - 1) S_q d_q i_q + 0.5 B \gamma N_\gamma S_\gamma d_\gamma i_\gamma W'$$

$$= 44.7389 \text{ t/m}^2$$

SAFE BEARING CAPACITY OF SOIL (q_s):

FOS = 2.5

$$= 17.8955 \text{ t/m}^2$$

SAFE BEARING CAPACITY OF SOIL (q _s):	
q _s =	17.896 t/m ²

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CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.,

VELCITI CONSULTING ENGINEERS PVT. LTD

SETTLEMENT CALCULATION

DATA
 PROJECT : Sub - Soil Investigation for Jetty & Backup Area
 CLIENT : Adani Ennore Container Terminal Pvt Ltd.,
 BH No. : BH - 02
 DEPTH OF FOOTING, Df = 1.50 m
 LENGTH OF FOOTING, L = 3.00 m
 WIDTH OF FOOTING, B = 2.00 m
 TYPE OF FOUNDATION : Rectangle

Soil Properties

Layer	From (m)	To (m)	Type	Thickness (m)	N	Sp wt (kN/m ³)	Phi (φ) (degrees)	c (kg/cm ²)	Es (MPa)
1	0.000 -	16.000	SILTY MEDIUM TO FINE SAND	16.00	22 ->100	20.0	31-34	-	30
2	16.000 -	19.000	SILTY FINE SAND	3.00	18 - 21	19.5	30	-	22
3	19.000 -	25.000	SILTY MEDIUM TO FINE SAND	6.00	36 ->100	20.5	33	-	40
4	25.000 -	30.000	SANDY SILTY CLAY	5.00	>100	21.0	-	1.50	75

Intensity at Bottom Of Footing 17.8955466666667 t/m²

SETTLEMENT OF THE FOUNDATION (AS PER IS 8009 - PART 1):

Total Settlement = Si + Sc

Immediate settlement:

Es = 30.000 Mpa (AVERAGE)
 300.00 kg/cm²

Given,

$\sigma = 17.896 \text{ t/m}^2$
 $\mu = 0.3$
 $B = 2.00 \text{ m}$
 $l = 1.36$
 $E = 3000.00 \text{ t/m}^2$

$S_i = S_{elastic} = \sigma B (1-\mu^2) l / E_s$
 0.0147650 m or 14.7650190364444 mm

Immediate Settlement (Si) 14.7650190364444 mm
 Consolidation Settlement (Sc) 0 mm

Total settlement (S) 14.7650190364444 mm Corresponding to SBC 17.8955466666667 kN/m²

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CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.,

SUMMARY (FOR BH1, BH4 & BH5)

Adani Ennore Container Terminal Pvt Ltd.,

BH No.	SOIL LAYER	TYPE OF FOOTING	WIDTH OF FOOTING (M)	DEPTH OF FOOTING (M)	SBC OF SOIL (T/M^2)	TOTAL SETTLEMENT IN MM	Geotechnical parameters (REF BOWLES, 1988)	
							MODULUS OF ELASTICITY (Mpa)	Poisson's ratio
1	SAND	STRIP	1.5	0.67	5.85	3.42	23.33	0.30
1	SAND	SQUARE	2.00	1.50	16.11	13.14	25.00	0.30
1	SAND	SQUARE	3.00	1.50	17.90	21.90	25.00	0.30
1	SAND	SQUARE	4.00	1.50	19.70	32.12	25.00	0.30
1	SAND	SQUARE	2.00	2.00	20.29	16.54	25.00	0.30
1	SAND	SQUARE	3.00	2.00	22.08	27.00	25.00	0.30
1	SAND	SQUARE	4.00	2.00	23.87	38.93	25.00	0.30

CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT.LTD.,

SUMMARY (FOR BH2, BH3)

Adani Ennore Container Terminal Pvt Ltd.,

BH No.	SOIL LAYER	TYPE OF FOOTING	SIZE OF FOOTING (M)	DEPTH OF FOOTING (M)	SBC OF SOIL (T/M ²)	TOTAL SETTLEMENT IN MM	Geotechnical parameters	
							MODULUS OF ELASTICITY [Mpa]	Poisson's ratio
2	SAND	RECTANGULAR	3.0 X 2.0	1.50	17.90	14.765	30.00	0.30
2	SAND	RECTANGULAR	4.0 X 3.0	1.50	19.84	23.534	30.00	0.30
2	SAND	SQUARE	3.0 X 3.0	1.50	21.28	21.688	30.00	0.30
2	SAND	SQUARE	4.0 X 4.0	1.50	23.48	31.910	30.00	0.30
2	SAND	RECTANGULAR	3.0 X 2.0	2.00	22.52	18.576	30.00	0.30
2	SAND	RECTANGULAR	4.0 X 3.0	2.00	24.53	29.093	30.00	0.30
2	SAND	SQUARE	3.0 X 3.0	2.00	26.17	26.674	30.00	0.30
2	SAND	SQUARE	4.0 X 4.0	2.00	28.37	38.557	30.00	0.30
2	SAND	RECTANGULAR	3.0 X 2.0	2.50	31.26	25.795	30.00	0.30

MS-0111

SUMMARY (FOR BH2.BH3) M/s. ADANI ENMORE CONTAINER TERMINAL PVT LTD.,
Adani Enmore Container Terminal Pvt Ltd.,

2	SAND	RECTANGULAR	4.0 X 3.0	2.50	33.72	39.994	30.00	0.30
2	SAND	SQUARE	3.0 X 3.0	2.50	35.87	36.557	30.00	0.30
2	SAND	SQUARE	4.0 X 4.0	2.50	38.48	52.293	30.00	0.30
2	SAND	RECTANGULAR	3.0 X 2.0	3.00	36.56	30.163	30.00	0.30
2	SAND	RECTANGULAR	4.0 X 3.0	3.00	39.09	46.366	30.00	0.30
2	SAND	SQUARE	3.0 X 3.0	3.00	41.47	42.271	30.00	0.30
2	SAND	SQUARE	4.0 X 4.0	3.00	44.09	59.911	30.00	0.30

CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT.LTD.

SUMMARY BORELOGS, ERT, CBR

BH No.	Location (Co ordination)		R.L. at Borehole Top	Termination Depth (M)	Water Level b.g.l (M)	Start Date	End Date
	East	North					
1	427839.938	1467504.984	4.721 MCD	30.00	3.1 Below EGL	30-06-2014	3-07-2014
2	427919.595	1466980.146	4.253 MCD	30.00	2.8 Below EGL	05-07-2014	08-07-2014
3	428146.595	1466975.146	4.175 MCD	15.00	2.8 Below EGL	05-07-2014	06-07-2014
4	428111.448	1467590.483	3.935 MCD	15.00	2.6 Below EGL	26-06-2014	27-06-2014
5	428111.448	1467040.892	4.236 MCD	15.00	3.1 Below EGL	20-06-2014	21-06-2014
6	428317.595	1467617.146	3.785 MCD	50.00	3.0 Below EGL	26-06-2014	29-06-2014
7	428282.595	1467417.146	3.925 MCD	50.00	3.0 Below EGL	22-06-2014	04-07-2014
8	428317.595	1467217.146	3.739 MCD	50.00	2.9 Below EGL	15-06-2014	25-06-2014
9	428282.595	1467017.146	3.825 MCD	50.00	3.0 Below EGL	14-06-2014	20-06-2014

ELECTRIC RESISTIVITY TEST

1	428250.134	1467298.521	4.329	20.00	-	19-07-2014	19-07-2014
2	428004.673	1466980.146	4.255	20.00	-	20-07-2014	20-07-2014
3	427990.995	1467319.566	4.056	20.00	-	20-07-2014	20-07-2014

CBR

1	428133.336	1467171.007	4.100	TP - C1	-	22-07-2014	22-07-2014
2	427959.318	1467552.318	4.336	TP - C2	-	22-07-2014	22-07-2014

CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL, PVT. LTD.,

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Location : Ennore - BH - 01
 CO-ORDINATES : E - 427839.038 N - 1467504.984

LAYER NO	SOIL DESCRIPTION	TOP LEVEL	BOTTOM LEVEL	THICKNESS	N VALUE	AVG SPT (Corrected)
1	Brownish grey medium to fine sand	0	10	10	44	38
2	Brownish grey silty medium to fine sand	10	19	9	18	17
3	Brownish grey silty medium to fine sand	19	22.5	3.5	31	23
4	Brownish grey silty medium to fine sand	22.5	25	2.5	28	37
5	Brownish grey silty clay	25	30	5	-	-

Location : Ennore - BH - 04
 CO-ORDINATES : E - 428111.448 N - 1467590.483

LAYER NO	SOIL DESCRIPTION	TOP LEVEL	BOTTOM LEVEL	THICKNESS	N VALUE	AVG SPT (Corrected)
1	Greyish brown medium to fine sand	0	11.6	11.6	30	24

Location : Ennore - BH - 05
 CO-ORDINATES : E - 428111.448 N - 1467040.892

LAYER NO	SOIL DESCRIPTION	TOP LEVEL	BOTTOM LEVEL	THICKNESS	N VALUE	AVG SPT (Corrected)
1	Reddish brown silty medium to fine sand	0	7.5	7.5	37	45
2	Greyish silty medium to fine sand	7.5	15	7.5	30	34

CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.,

BUILDING CORRIDOR LOCATION

Location : Ennore - BH - 02
 CO-ORDINATES : E - 427919.595 N - 1466980.146

LAYER NO	SOIL DESCRIPTION	TOP LEVEL	BOTTOM LEVEL	THICKNESS	N VALUE	AVG SPT (Corrected)
1	Brownish grey silty medium to fine sand	0	16	16	51	30
2	Brownish grey silty fine sand	16	19	3	20	23
3	Brownish grey silty medium to fine sand	19	25	6	65	44
4	Greyish silty sandy clay	25	30	5	-	-

Location : Ennore - BH - 03
 CO-ORDINATES : E - 428146.595 N - 1466975.146

LAYER NO	SOIL DESCRIPTION	TOP LEVEL	BOTTOM LEVEL	THICKNESS	N VALUE	AVG SPT (Corrected)
1	Brownish grey medium to fine sand	0	15	11.6	48	34
2	Greyish sandy silt	11.6	13	1.4	-	-
3	Greyish silty medium to fine sand	13	15	2	23	29

CLIENT: M/s. ADANI ENCORE CONTAINER TERMINAL PVT LTD.,

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JETTY AREA LOCATION

Location : Ennore - BH - 06
 CO-ORDINATES : E - 428317.595 N - 1467617.146

LAYER NO	SOIL DESCRIPTION	TOP LEVEL	BOTTOM LEVEL	THICKNESS	N VALUE	AVG SPT (Corrected)
1	Brownish grey silty medium to fine sand	0	25	25	53	38
2	Brownish grey silty clay	25	34	9	-	-
3	Brownish grey fine to medium sand	34	44.6	10.6	100	50
4	Brownish grey fine to medium sand with gravel	44.6	50	5.4	100	50

Location : Ennore - BH - 07
 CO-ORDINATES : E - 428282.595 N - 1467417.146

LAYER NO	SOIL DESCRIPTION	TOP LEVEL	BOTTOM LEVEL	THICKNESS	N VALUE	AVG SPT (Corrected)
1	Brownish silty medium to fine sand	0	26.5	26.5	33	25
2	Brownish grey silty clay with sand	26.5	35.5	9	-	-
3	Brownish grey fine to medium sand	35.5	50	14.5	100	50

CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.,

Location : Ennore - BH - 08
 CO-ORDINATES : E - 428317.595 N - 1467217.146

LAYER NO	SOIL DESCRIPTION	TOP LEVEL	BOTTOM LEVEL	THICKNESS	N VALUE	AVG SPT (Corrected)
1	Brown silty fine sand with shells	0	0.3	0.3	-	-
2	Brownish silty medium to fine sand	0.3	8.7	8.7	37	35
3	Greyish silty medium to fine sand	8.7	15	6	20	22
4	Greyish silty clayey sand	15	18.2	3.2	-	-
5	Brownish grey silty fine to medium sand	18.2	24	5.8	49	37
6	Brownish grey silty clay with sand	24	30	6	-	-
7	Greyish silty sand	30	34.5	4.5	-	-
8	Greyish silty clay	34.5	37.5	3	-	-
9	Brownish grey silty fine to medium sand	37.5	50	12.5	100	50

Location : Ennore - BH - 09
 CO-ORDINATES : E - 428282.595 N - 1467017.146

LAYER NO	SOIL DESCRIPTION	TOP LEVEL	BOTTOM LEVEL	THICKNESS	N VALUE	AVG SPT (Corrected)
1	Brownish silty medium to fine sand	0	2.6	2.6	27	35
2	Brownish fine to medium sand	2.6	3.7	1.1	37	53
3	Brownish silty medium to fine sand with gravel	3.7	4.6	0.9	100	50

CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL. PVT LTD.,

LAYER NO	SOIL DESCRIPTION	TOP LEVEL		BOTTOM LEVEL	THICKNESS	N VALUE	AVG SPT (Corrected)
		4.6	13.5				
4	Brownish silty fine to medium sand	4.6	13.5	13.5	8.9	76	40
5	Greyish silty medium to fine sand	13.5	19.5	19.5	6	7	9
6	Greyish silty fine sand	19.5	21	21	1.5	-	-
7	Greyish silty fine sand	21	25.3	25.3	4.3	-	-
8	Greyish silty clay	25.3	29.4	29.4	4.1	-	-
9	Greyish silty medium to fine sand	29.4	31	31	1.6	100	50
10	Greyish silty clay	31	40	40	9	-	-
11	Greyish brown silty fine to medium sand	40	46	46	6	100	50
12	Greyish brown silty fine to medium sand	46	50	50	4	100	50

ANNEXURE

»» LOG OF BORINGS

»» LABORATORY TEST RESULTS

»» PILE CALCULATIONS

»» CBR RESULTS

»» GRADATIONS

»» ERT READINGS & GRAPH

»» LOCATION MAP

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CLIENT: M/S. ADANI ENNORE CONTAINER TERMINAL PVT LTD.

VELCITI CONSULTING ENGINEERS PVT. LTD.,									
(Soil Exploration and Foundation Design Division)									
BORE LOG									
Client		: Adani Ennore Container Terminal Pvt Ltd.,			Date of Started : 30-06-2014				
Project		: Sub - Soil Investigation for Jetty & Backup Area			Date of Completed: 03-07-2014				
Location		: Ennore - BH - 01		SL No - 07		Ground Water Level : 3.10 M Below EGL			
CO-ORDINATES : E - 427839.938 N - 1467504.984					RL : 4.721 - M CD				
LAYERS	Depth Below C.L.	Soil Profile	Description of Soil	Thickness of layer (m)	Standard Penetration Test Data			Graphical Representation of Penetration Resistance	Remarks
					Depth at which test is conducted	N-Value	Relative density / Consistency		
								0 20 40 60 80 100	
1	10.00		Brownish grey medium to fine sand	10.00	0.20				
					1.50	27 [10/12/15]	Medium		
					3.00	51 [19/24/27]	Very dense		
					4.50	55 [17/26/29]	Very dense		
					6.00	62 [21/28/34]	Very dense		
					7.50	42 [15/20/22]	Dense		
					9.00	27 [10/12/15]	Medium		
2			Brownish grey silty medium to fine sand		10.50	10 [04/05/05]	Medium		
					12.00	11 [05/05/06]	Medium		
					13.50	14 [05/07/07]	Medium		
					15.00	27 [10/12/15]	Medium		
					16.50	27 [11/13/14]	Medium		

Contd...

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CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.,

VELCITI CONSULTING ENGINEERS PVT. LTD.,										
(Soil Exploration and Foundation Design Division)										
BORE LOG										
Client		: Adani Ennore Container Terminal Pvt Ltd.,				Date of Started : 30-06-2014				
Project		: Sub - Soil Investigation for Jetty & Backup Area				Date of Completed: 03-07-2014				
Location		: Ennore - BH - 01		SL No - 07		Ground Water Level : 3.10 M Below EGL				
CO-ORDINATES : E - 427839.938 N - 1467504.984					RL : 4.721 - MCD					
LAYERS	Depth Below G.L.	Soil Profile	Description of Soil	Thickness of layer (m)	Standard Penetration Test Data			Graphical Representation of Penetration Resistance	Remarks	
					Depth at which test is conducted	N-Value	Relative density / Consistency			
								0 20 40 60 80 100		
3	19.00	[Pattern]	Brownish grey silty medium to fine sand	9.00	18.00	31 [13/13/16]	Dense	[Graphical Representation]		
4	22.50				Brownish grey silty medium to fine sand	3.50	19.50		11 [05/05/06]	Medium
				21.00			UDS			SNR
5	25.00	[Pattern]	Brownish grey silty medium to fine sand	2.50	22.50	27 [10/12/15]	Medium			
							24.00		29 [10/13/16]	Medium
6	30.00	[Pattern]	Brownish grey silty clay	5.00	25.50	33 [13/14/19]	Dense			
							27.00	34 [10/14/20]	Hard	
							28.50	41 [14/19/22]	Hard	
							30.00	43 [15/18/25]	Hard	
Borehole Terminated @ 30.00M										

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CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.

VELCITI CONSULTING ENGINEERS PVT. LTD.,									
(Soil Exploration and Foundation Design Division)									
BORE LOG									
Client		: Adani Ennore Container Terminal Pvt Ltd.,			Date of Started : 05-07-2014				
Project		: Sub - Soil Investigation for Jetty & Backup Area			Date of Completed: 08-07-2014				
Location		: Ennore - BH - 02		SL No - 09		Ground Water Level : 2.80 M Below EGL			
CO-ORDINATES : E - 427919.595 N - 1466980.146				RL : 4.255 - MCD					
LAYERS	Depth Below G.L.	Soil Profile	Description of Soil	Thickness of layer (m)	Standard Penetration Test Data			Graphical Representation of Penetration Resistance	Remarks
					Depth at which test is conducted	N-Value	Relative density / Consistency		
								0 20 40 60 80 100	
1	16.00		Brownish grey silty medium to fine sand	16.00	1.50	22 [08/10/12]	Medium		
					3.00	28 [10/13/15]	Medium		
					4.50	>100 23/29/50 _{10cm}	Very dense		
					6.00	>100 25/50 _{15cm}	Very dense		
					7.50	51 [19/23/28]	Very dense		
					9.00	58 [21/26/32]	Very dense		
					10.50	31 [10/13/18]	Dense		
					12.00	37 [12/15/22]	Dense		
					13.50	36 [13/16/20]	Dense		
					15.00	43 [14/18/25]	Dense		
			Brownish grey silty fine sand	16.50	18 [06/08/10]	Medium			

Contd...

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CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.,

VELCITI CONSULTING ENGINEERS PVT. LTD.,									
(Soil Exploration and Foundation Design Division)									
BORE LOG									
Client		Adani Ennore Container Terminal Pvt Ltd.,			Date of Started : 05-07-2014				
Project		Sub - Soil Investigation for Jetty & Backup Area			Date of Completed: 08-07-2014				
Location		Ennore - BH - 02		SL No - 09		Ground Water Level : 2.80 M below EGL			
CO-ORDINATES : E - 427919.595 N - 1466980.146				RL : 4.255 M CD					
LAYERS	Depth Below G.L.	Soil Profile	Description of Soil	Thickness of layer (m)	Standard Penetration Test Data			Graphical Representation of Penetration Resistance	Remarks
					Depth at which test is conducted	N-Value	Relative density / Consistency		
								0 20 40 60 80 100	
2	19.00		Brvnsh grey silty fine sand	3.00	18.00	21 [07/09/12]	Medium		
3	25.00		Brownish grey silty medium to fine sand	6.00	19.50	36 [10/16/20]	Dense		
					21.00	41 [13/19/22]	Dense		
					22.50	46 [15/21/25]	Dense		
					24.00	>100 25/50 _{15cm}	Very dense		
	25.50	>100 29/50 _{13cm}	Very dense						
4	30.00		Greyish silty sandy clay	5.00	27.00	>100 34/50 _{12cm}	Hard		
					28.50	>100 39/50 _{10cm}	Hard		
					30.00	>100 42/50 _{9cm}	Hard		

Borehole Terminated @ 30.00M

VELCITI

CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.

VELCITI CONSULTING ENGINEERS PVT. LTD.,									
(Soil Exploration and Foundation Design Division)									
BORE LOG									
Client		Adani Ennore Container Terminal Pvt Ltd.,			Date of Started : 05-07-2014				
Project		Sub - Soil Investigation for Jetty & Backup Area			Date of Completed: 06-07-2014				
Location		Ennore - BH - 03		SE No - 08		Ground Water Level : 2.80 M Below EGL			
CO-ORDINATES : E - 428146.595 N - 1466975.146					RL : 4.175 - MCD				
LAYERS	Depth Below G.L.	Soil Profile	Description of Soil	Thickness of layer (m)	Standard Penetration Test Data			Graphical Representation of Penetration Resistance	Remarks
					Depth at which test is conducted	N-Value	Relative density / Consistency		
								0 20 40 60 80 100	
1	11.60		Greyish brown medium to fine sand	11.60	1.50	24 [01/10/14]	Medium		
					3.00	38 [15/18/20]	Dense		
					4.50	50 [18/23/27]	Very dense		
					6.00	>100 50 _{20cm}	Very dense		
					7.50	52 [20/24/28]	Very dense		
					9.00	55 [22/26/29]	Very dense		
					10.50	18 [07/08/10]	Medium		
2	13.00		Greyish sandy silt	1.40	12.00	23 [09/11/12]	Medium		
3	15.00		Greyish silty medium to fine sand	2.00	13.50	21 [08/10/11]	Medium		
					15.00	25 [09/12/13]	Medium		

Borehole Terminated @ 15.00M

VELCITI

CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.

VELCITI CONSULTING ENGINEERS PVT. LTD.,									
(Soil Exploration and Foundation Design Division)									
BORE LOG									
Client		: Adani Ennore Container Terminal Pvt Ltd.,			Date of Started : 26-06-2014				
Project		: Sub - Soil Investigation for Jetty & Backup Area			Date of Completed: 27-06-2014				
Location		: Ennore - BH - 04		SL No - 06		Ground Water Level : 2.60 M Below EGL			
CO-ORDINATES : E - 428111.448 N - 1467590.483				RL : 3.935 - MCD					
LAYERS	Depth Below G.L.	Soil Profile	Description of Soil	Thickness of layer (m)	Standard Penetration Test Data			Graphical Representation of Penetration Resistance	Remarks
					Depth at which test is conducted	N-Value	Relative density / Consistency		
								0 20 40 60 80 100	
			Brownish grey medium to fine sand	15.00	1.50	19 [06/08/11]	Medium		
	3.00				24 [07/10/14]	Medium			
	4.50				28 [09/12/16]	Medium			
	6.00				29 [10/13/16]	Medium			
	7.50				32 [12/15/17]	Dense			
	9.00				32 [15/15/17]	Dense			
	10.50				33 [14/16/17]	Dense			
	12.00				34 [14/15/19]	Dense			
	13.50				35 [15/15/20]	Dense			
	15.00				36 [16/16/20]	Dense			
Borehole Terminated @ 15.00M									

VELCITI

CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD

VELCITI CONSULTING ENGINEERS PVT. LTD.,									
(Soil Exploration and Foundation Design Division)									
BORE LOG									
Client	: Adani Ennore Container Terminal Pvt Ltd.,			Date of Started : 20-06-2014					
Project	: Sub - Soil Investigation for Jetty & Backup Area			Date of Completed: 21-06-2014					
Location	: Ennore - BH - 05		SLNO - 03		Ground Water Level : 3.10 M Below EGL				
CO-ORDINATES : E - 428111.443 N - 1467040.892				RL : 4.236 - M CD					
LAYERS	Depth Below G.L.,	Soil Profile	Description of Soil	Thickness of layer (m)	Standard Penetration Test Data			Graphical Representation of Penetration Resistance	Remarks
					Depth at which test is conducted	N-Value	Relative density / Consistency		
								0 20 40 60 80 100	
1	7.50		Reddish brown silty medium to fine sand	7.50	1.00	30 [10/14/16]	Medium		
					2.00	33 [10/15/18]	Dense		
					3.00	34 [10/16/18]	Dense		
					4.00	51 [15/23/28]	Very dense		
					5.00	63 [20/28/35]	Very dense		
					6.50	60 [17/26/34]	Very dense		
2	15.00		Greyish silty medium to fine sand	7.50	8.00	53 [20/24/29]	Very dense		
					9.50	43 [13/19/24]	Dense		
					11.00	33 [10/14/19]	Dense		
					12.50	23 [08/10/13]	Medium		
					14.00	11 [04/04/07]	Medium		
15.00	20 [08/10/10]	Medium							

Borehole Terminated @ 15.00M

VELCITI

CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.

VELCITI CONSULTING ENGINEERS PVT. LTD.,									
(Soil Exploration and Foundation Design Division)									
BORE LOG									
Client	: Adani Ennore Container Terminal Pvt Ltd.,			Date of Started : 26-06-2014					
Project	: Sub - Soil Investigation for Jetty & Backup Area			Date of Completed: 29-06-2014					
Location	: Ennore - BH - 06	SL NO - 05	Ground Water Level : 3.00 M Below EGL						
CO-ORDINATES : E - 428317.595 N - 1467617.146			RL : 3.785 - MCD						
LAYERS	Depth Below G.L.	Soil Profile	Description of Soil	Thickness of layer (m)	Standard Penetration Test Data			Graphical Representation of Penetration Resistance	Remarks
					Depth at which test is conducted	N-Value	Relative density / Consistency		
								0 20 40 60 80 100	
			Brownish grey silty medium to fine sand	25.00	1.50	35 [10/15/20]	Dense		
		3.00			54 [14/25/29]	Very dense			
		4.50			>100 [24/50 _{14cm}]	Very dense			
		6.00			>100 [26/50 _{15cm}]	Very dense			
		7.50			48 [16/22/26]	Dense			
		9.00			57 [17/25/32]	Very dense			
		10.50			51 [16/21/30]	Very dense			
		12.00			>100 18/24/50 _{15cm}	Very dense			
		13.50			>100 17/26/50 _{14cm}	Very dense			
		15.00			25 [09/11/14]	Medium			
		16.50			27 [10/12/15]	Medium			
		18.00			16 [06/07/09]	Medium			

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VELCITI

CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.

VELCITI CONSULTING ENGINEERS PVT. LTD.,									
(Soil Exploration and Foundation Design Division)									
BORE LOG									
Client		Adani Ennore Container Terminal Pvt Ltd.,			Date of Started : 26-06-2014				
Project		Sub - Soil Investigation for Jetty & Backup Area			Date of Completed: 29-06-2014				
Location		Ennore - BH - 06		SE NO - 05		Ground Water Level : 3.00 M Below EGL			
CO-ORDINATES : E - 428317.595 N - 1467617.146				RL : 3.785 - MCD					
LAYERS	Depth Below G.L.	Soil Profile	Description of Soil	Thickness of layer (m)	Standard Penetration Test Data			Graphical Representation of Penetration Resistance	Remarks
					Depth at which test is conducted	N-Value	Relative density / Consistency		
								0 20 40 60 80 100	
1	25.00		Brownish grey silty medium to fine sand	9.00	19.50	18 [07/08/10]	Medium		
					21.00	38 [14/16/22]	Medium		
					22.50	42 [15/18/24]	Dense		
					24.00	46 [16/20/26]	Dense		
2	34.00		Brownish grey silty clay	9.00	25.50	57 [16/25/32]	Hard		
					27.00	62 [17/28/34]	Hard		
					28.50	66 [18/30/36]	Hard		
					30.00	>100 30/50 _{15cm}	Hard		
					31.50	>100 36/50 _{15cm}	Hard		
			Brownish grey fine to medium sand		34.50	>100 30/50 _{15cm}	Very dense		

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CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.,

VELCITI CONSULTING ENGINEERS PVT. LTD.,																	
(Soil Exploration and Foundation Design Division)																	
BORE LOG																	
Client : Adani Ennore Container Terminal Pvt Ltd.,			Date of Started : 26-06-2014														
Project : Sub - Soil Investigation for Jetty & Backup Area			Date of Completed: 29-06-2014														
Location : Ennore - BH - 06			SL NO - 05			Ground Water Level : 3.00 M Below EGL											
CO-ORDINATES : E - 428317.595			N - 1467617.146			RL : 3.785 - MCD											
LAYERS	Depth Below G.L.	Soil Profile	Description of Soil	Thickness of layer (m)	Standard Penetration Test Data			Graphical Representation of Penetration Resistance					Remarks				
					Depth at which test is conducted	N-Value	Relative density / Consistency										
								0	20	40	60	80	100				
3	44.60		Brownish grey fine to medium sand	10.60	36.00	>100 30/50 _{14cm}	Very dense										
					37.50	>100 36/50 _{13cm}	Very dense										
					39.00	>100 50/15cm	Very dense										
					40.50	>100 50/14cm	Very dense										
					42.00	>100 50/13cm	Very dense										
					43.50	>100 50/10cm	Very dense										
4	50.00		Brownish grey fine to medium sand with gravel	5.40	45.00	>100 25/50 _{15cm}	Very dense										
					46.50	>100 30/50 _{13cm}	Very dense										
					48.00	>100 30/50 _{12cm}	Very dense										
					50.00	>100 40/50 _{10cm}	Very dense										

Borehole Terminated @ 50.00M

VELCITI

CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.

VELCITI CONSULTING ENGINEERS PVT. LTD.,									
(Soil Exploration and Foundation Design Division)									
BORE LOG									
Client		: Adani Ennore Container Terminal Pvt Ltd.,			Date of Started : 22-06-2014				
Project		: Sub - Soil Investigation for Jetty & Backup Area			Date of Completed: 04-07-2014				
Location		: Ennore - BH - 07		SL NO - 04		Ground Water Level : 3.00 M Below E.G.L			
CO-ORDINATES : E - 428282.595 N - 1467417.146				RL : 3.925 - MCD					
LAYERS	Depth Below G.L.	Soil Profile	Description of Soil	Thickness of layer (m)	Standard Penetration Test Data			Graphical Representation of Penetration Resistance	Remarks
					Depth at which test is conducted	N-Value	Relative density / Consistency		
								0 20 40 60 80 100	
1			Brownish silty medium to fine sand	1.50	24 [08/11/13]	Medium			
	3.00			38 [14/18/20]	Dense				
	4.50			40 [13/19/21]	Dense				
	6.00			44 [15/20/24]	Dense				
	7.50			36 [11/15/21]	Dense				
	9.00			37 [10/14/23]	Dense				
	10.50			47 [17/22/25]	Dense				
	12.00			54 [18/26/28]	Very dense				
	13.50			46 [15/20/26]	Dense				
	15.00			17 [04/06/11]	Medium				
16.50	20 [05/07/13]	Medium							

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CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.,

VELCITI CONSULTING ENGINEERS PVT. LTD.,											
(Soil Exploration and Foundation Design Division)											
BORE LOG											
Client		: Adani Ennore Container Terminal Pvt Ltd.,			Date of Started : 22-06-2014						
Project		: Sub - Soil Investigation for Jetty & Backup Area			Date of Completed: 04-07-2014						
Location		: Ennore - BH - 07		SL NO - 04		Ground Water Level : 3.00 M Below EGL					
CO-ORDINATES : E - 428282.595 N - 1467417.146				RL : 3.925 - MCD							
LAYERS	Depth Below G.L.	Soil Profile	Description of Soil	Thickness of layer (m)	Standard Penetration Test Data			Graphical Representation of Penetration Resistance	Remarks		
					Depth at which test is conducted	N-Value	Relative density / Consistency				
							0 20 40 60 80 100				
2	26.50		Brownish silty medium to fine sand	26.50	17.50	UDS				SNR	
					18.00	12 [05/06/06]	Medium				
					19.50	15 [06/07/08]	Medium				
					21.00	28 [10/13/15]	Medium				
					22.50	31 [11/14/17]	Dense				
					24.00	38 [15/18/20]	Dense				
					25.50	41 [16/19/22]	Dense				
3			Brownish grey silty clay with sand		27.00	44 [15/21/23]	Hard				
					28.50	54 [16/25/29]	Hard				
					30.00	49 [14/23/26]	Hard				
					31.50	58 [23/28/30]	Hard				

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CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.,

VELCITI CONSULTING ENGINEERS PVT. LTD.,									
(Soil Exploration and Foundation Design Division)									
BORE LOG									
Client		: Adani Ennore Container Terminal Pvt Ltd.,			Date of Started : 22-06-2014				
Project		: Sub - Soil Investigation for Jetty & Backup Area			Date of Completed: 04-07-2014				
Location		: Ennore - BH - 07		SL NO - 04		Ground Water Level : 3.00 M Below EGL			
CO-ORDINATES : E - 428282.595 N - 1467417.146				RL : 3.925 - MCD					
LAYERS	Depth Below G.L.	Soil Profile	Description of Soil	Thickness of layer (m)	Standard Penetration Test Data			Graphical Representation of Penetration Resistance	Remarks
					Depth at which test is conducted	N-Value	Relative density / Consistency		
								0 20 40 60 80 100	
4	35.50		Brownish grey silty clay with sand	9.00	33.00	66 [27/30/36]	Hard		
					34.50	70 [29/32/38]	Hard		
5	50.00		Brownish grey fine to medium sand	14.50	36.00	>100 50 _{14cm}	Very dense		
					37.50	>100 50 _{12cm}	Very dense		
					39.00	>100 50 _{10cm}	Very dense		
					40.50	>100 50 _{9cm}	Very dense		
					42.00	>100 50 _{13cm}	Very dense		
					43.50	>100 50 _{12cm}	Very dense		
					45.00	>100 50 _{11cm}	Very dense		
					46.50	>100 50 _{10cm}	Very dense		
					48.00	>100 50 _{9cm}	Very dense		
					50.00	>100 50 _{8cm}	Very dense		

Borehole Terminated @ 50.00M

VELCITI

CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.,

VELCITI CONSULTING ENGINEERS PVT. LTD.,									
(Soil Exploration and Foundation Design Division)									
BORE LOG									
Client : Adani Ennore Container Terminal Pvt Ltd.,			Date of Started : 15-06-2014						
Project : Sub - Soil Investigation for Jetty & Backup Area			Date of Completed: 25-06-2014						
Location : Ennore - BH - 08			SL NO - 02			Ground Water Level : 2.90 M Below EGL			
CO-ORDINATES : E - 428317.595			N - 1467217.146			RL : 3.739 - MCD			
LAYERS	Depth Below G.L.	Soil Profile	Description of Soil	Thickness of layer (m)	Standard Penetration Test Data			Graphical Representation of Penetration Resistance	Remarks
					Depth at which test is conducted	N-Value	Relative density / Consistency		
								0 20 40 60 80 100	
1	0.30		Brown silty fine sand with shells	0.30	0.30				
2			Brownish silty medium to fine sand	8.70	1.00	22 [07/09/13]	Medium		
					2.00	30 [12/15/15]	Medium		
					3.00	33 [13/15/18]	Dense		
					4.00	41 [10/17/24]	Dense		
					5.00	42 [15/20/22]	Dense		
					6.50	>100 18/50 _{13cm}	Very dense		
					8.00	>100 24/50 _{7cm}	Very dense		
3			Greyish silty medium to fine sand	6.00	9.50	31 [08/13/18]	Medium		
					11.00	36 [15/17/19]	Dense		
					12.50	07 [03/03/04]	Loose		
					14.00	UDS			

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VELCITI

CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.

VELCITI CONSULTING ENGINEERS PVT. LTD.,									
(Soil Exploration and Foundation Design Division)									
BORE LOG									
Client		: Adani Ennore Container Terminal Pvt Ltd.,			Date of Started : 15-06-2014				
Project		: Sub - Soil Investigation for Jetty & Backup Area			Date of Completed: 25-06-2014				
Location		: Ennore - BH - 08		SL NO - 02		Ground Water Level : 2.90 M Below EGL			
CO-ORDINATES : E - 428317.595 N - 1467217.146				RL : 3.739 - MCD					
LAYERS	Depth Below G.L.	Soil Profile	Description of Soil	Thickness of layer (m)	Standard Penetration Test Data			Graphical Representation of Penetration Resistance	Remarks
					Depth at which test is conducted	N-value	Relative density / Consistency		
				15				0 20 40 60 80 100	
4	18.20		Greyish silty clayey sand	3.20	15.50	12 [05/06/06]	Medium		
					17.00	15 [05/06/09]	Medium		
5	24.00		Brownish grey silty fine to medium sand	5.80	18.50	41 [11/18/23]	Dense		
					20.00	47 [14/22/25]	Dense		
					21.50	51 [17/23/28]	Very dense		
					23.00	57 [20/27/30]	Very dense		
6	30.00		Brownish grey silty clay with sand	6.00	24.50	44 [12/19/25]	Hard		
					26.00	38 [13/17/21]	Hard		
					27.50	43 [14/19/24]	Hard		
					29.00	47 [16/20/27]	Hard		
			Greyish silty sand		30.50	>100 40/50 _{1cm}	Very dense		
					32.00	>100 42/50 _{1cm}	Very dense		

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VELCITI

CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.,

VELCITI CONSULTING ENGINEERS PVT. LTD.,										
(Soil Exploration and Foundation Design Division)										
BORE LOG										
Client			: Adani Ennore Container Terminal Pvt Ltd.,			Date of Started : 15-06-2014				
Project			: Sub - Soil Investigation for Jetty & Backup Area			Date of Completed: 25-06-2014				
Location			: Ennore - BH - 08			SL NO - 02		Ground Water Level : 2.90 M Below EGL		
CO-ORDINATES : E - 428317.595			N - 1467217.146			RL : 3.739 - MCD				
LAYERS	Depth Below G.L.	Soil Profile	Description of Soil	Thickness of layer (m)	Standard Penetration Test Data			Graphical Representation of Penetration Resistance	Remarks	
					Depth at which test is conducted	N-Value	Relative density / Consistency			
				3.0				0 20 40 60 80 100		
7	34.50		Greyish silty sand	4.50	33.50	>100 40/50 _{12cm}	Very dense			
8	37.50		Greyish silty clay	3.00	35.00	>100 24/50 _{13cm}	Hard			
					36.50	>100 26/50 _{13cm}	Hard			
9			Brownish grey silty fine to medium sand	12.50	38.00	>100 27/50 _{15cm}	Very dense			
					39.50	>100 30/50 _{14cm}	Very dense			
					41.00	>100 30/50 _{13cm}	Very dense			
					42.50	>100 32/50 _{14cm}	Very dense			
					44.00	>100 35/50 _{13cm}	Very dense			
					45.50	>100 40/50 _{12cm}	Very dense			
					47.00	>100 42/50 _{11cm}	Very dense			
					48.50	>100 30/50 _{12cm}	Very dense			
	50.00				50.00	>100 40/50 _{16cm}	Very dense			

Borehole Terminated @ 50.00M

VELCITI

CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.,

VELCITI CONSULTING ENGINEERS PVT. LTD.,									
(Soil Exploration and Foundation Design Division)									
BORE LOG									
Client		: Adani Ennore Container Terminal Pvt Ltd.,			Date of Started : 14-06-2014				
Project		: Sub - Soil Investigation for Jetty & Backup Area			Date of Completed: 20-06-2014				
Location		: Ennore - BH - 09		SL NO - 01		Ground Water Level : 3.00 M Below EGL -			
		CO-ORDINATES : E - 428282.595 N - 1467017.146			RL : 3.825 - MCD				
LAYERS	Depth Below G.L.	Soil Profile	Description of Soil	Thickness of layer (m)	Standard Penetration Test Data			Graphical Representation of Penetration Resistance	Remarks
					Depth at which test is conducted	N-Value	Relative density / Consistency		
								0 20 40 60 80 100	
1	2.60		Brownish silty medium to fine sand	2.60	1.00	22 [09/10/12]	Medium		
					2.00	31 [13/15/16]	Dense		
2	3.70		Brownish fine to medium sand	1.10	3.00	37 [16/18/19]	Dense		
3	4.60		Brownish silty medium to fine sand with gravel	0.90	4.00	>100 22/30 _{15cm}	Very dense		
4	13.50		Brownish silty fine to medium sand	8.90	5.00	>100 25/50 _{12cm}	Very dense		
					6.50	>100 27/50 _{14cm}	Very dense		
					8.00	>100 29/30 _{13cm}	Very dense		
					9.50	>100 30/30 _{12cm}	Very dense		
					11.00	24 [09/11/13]	Medium		
					12.50	30 [13/14/16]	Medium		
			Greyish silty medium to fine sand		14.00	07 [02/03/04]	Loose		SNR

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VELCITI

CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.,

VELCITI CONSULTING ENGINEERS PVT. LTD.,									
(Soil Exploration and Foundation Design Division)									
BORE LOG									
Client		: Adani Ennore Container Terminal Pvt Ltd.,				Date of Started : 14-06-2014			
Project		: Sub - Soil Investigation for Jetty & Backup Area				Date of Completed: 20-06-2014			
Location		: Ennore - BH - 09		SL NO - 01		Ground Water Level : 3.00 M Below EGL			
CO-ORDINATES : E - 428282.595 N - 1467017.146						RL : 3.825 - MCD			
LAYERS	Depth Below G.L.	Soil Profile	Description of Soil	Thickness of layer (m)	Standard Penetration Test Data			Graphical Representation of Penetration Resistance	Remarks
					Depth at which test is conducted	N-Value	Relative density / Consistency		
								0 20 40 60 80 100	
5	19.50	[Pattern]	Greyish silty medium to fine sand	6.00	15.50	08 [03/04/04]	Loose	[Graphical Representation]	SNR
					17.00	06 [02/03/03]	Loose		
					18.50	06 [03/03/03]	Loose		
6	21.00	[Pattern]	Greyish silty fine sand	1.50	20.00	>100 11/17/30 _{15cm}	Very dense	[Graphical Representation]	
					22.00	20 [08/09/11]	Medium		
7	25.30	[Pattern]	Greyish silty fine sand	4.30	24.00	25 [09/12/13]	Medium	[Graphical Representation]	
					26.00	28 [10/13/15]	Very stiff		
8	29.40	[Pattern]	Greyish silty clay	4.10	28.00	>100 40/50 _{1cm}	Hard	[Graphical Representation]	
					30.00	>100 50 _{13cm}	Very dense		
9	31.00	[Pattern]	Greyish silty medium to fine sand	1.60	31.50	>100 19/25/30 _{12cm}	Hard	[Graphical Representation]	
					33.00	>100 23/30 _{14cm}	Hard		

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VELCITI

CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.

VELCITI CONSULTING ENGINEERS PVT. LTD.,									
(Soil Exploration and Foundation Design Division)									
BORE LOG									
Client	Adani Ennore Container Terminal Pvt Ltd.,			Date of Started : 14-06-2014					
Project	Sub - Soil Investigation for Jetty & Backup Area			Date of Completed: 20-06-2014					
Location	Ennore - BH - 09		SL NO - 01	Ground Water Level : 3.00 M Below EGL					
CO-ORDINATES: E - 428282.595 N - 1467017.146				RL : 3.825 - MCD					
LAYERS	Depth Below G.L.	Soil Profile	Description of Soil	Thickness of layer (m)	Standard Penetration Test Data			Graphical Representation of Penetration Resistance	Remarks
					Depth at which test is conducted	N-Value	Relative density / Consistency		
								0 20 40 60 80 100	
10	40.00		Greyish silty clay	9.00	34.50	>100 23/50 _{14cm}	Hard		
					36.00	>100 28/50 _{12cm}	Hard		
					37.50	58 [22/28/30]	Hard		
					39.00	>100 30/50 _{14cm}	Hard		
11	46.00		Greyish brown silty fine to medium sand	6.00	40.50	>100 30/50 _{13cm}	Very dense		
					42.00	>100 30/50 _{12cm}	Very dense		
					43.50	>100 30/50 _{10cm}	Very dense		
					45.00	>100 28/50 _{14cm}	Very dense		
12	50.00		Greyish brown silty fine to medium sand	4.00	46.50	>100 30/50 _{12cm}	Very dense		
					48.00	>100 30/50 _{15cm}	Very dense		
					50.00	>100 30/50 _{13cm}	Very dense		

Borehole Terminated @ 50.00M

CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.,

LABORATORY TEST RESULTS

DEPTH OF (LAYER)	IS SOIL CLASSIFICATION	IS CLASSIFICATION	NATURAL WET DENSITY KNm^{-3}	NATURAL MOISTURE CONTENT (%)	DENSITY OF ROCK (GM/CC)	COMPRESSIVE STRENGTH (kg/cm^2)	INDEX TEST			CHAIN SIZE DISTRIBUTION					SHEAR TEST		STANDARD PENETRATION TEST				CONSOLIDATION TEST															
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	GRAVEL (%)	COARSE (%)	MEDIUM (%)	FINE (%)	SILT (%)	CLAY (%)	FREE SWELL INDEX (%)	SPECIFIC GRAVITY	COHESION (kg/cm^2)	ANGLE OF INTERNAL FRICTION	DEPTH OF TESTING (M)	OBSERVED N VALUE	CORRECTED N VALUE	CONSISTENCY / RELATIVE DENSITY	COMPRESSION INDEX C_c	CONSOLIDATION PRESSURE (kg/cm^2)	INITIAL VOIDS RATIO (e_0)	COEFFICIENT OF CONSOLIDATION C_v IN CM ² /SEC									
19.00 to 22.50	Greyish silty clay			25			Non Plastic				0	0	2	17	81	2.639			19.50	11		Medium														
22.50 to 30.00	Brownish grey silty medium to fine sand	SM		22			Non Plastic				0	0	6	71	23	2.644			22.50	27		Medium														
				19			Non Plastic				0	1	32	49	18	2.636			24.00	29		Medium														
				20			Non Plastic				2	0	28	45	25	2.637			25.50	33		Dense														
				21			54	18	36		0	0	4	35	61	100	2.599			27.00	34		Hard													
				22			Non Plastic				0	0	5	38	57	2.609			28.50	41		Hard														
				21			65	17	49		0	0	4	37	59	100	2.604			30.00	43		Hard													

Soilcore Terminated @ 30.00M

CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.

LABORATORY TEST RESULTS

DEPTH OF (LAYER)	I.S.SOIL CLASSIFICATION	NATURAL WET DENSITY KN/M ³	NATURAL MOISTURE CONTENT (%)	DENSITY OF ROCK (GM/CC)	COMPRESSIVE STRENGTH (KG/CM ²)	INDEX TEST			GRAIN SIZE DISTRIBUTION					SHEAR TEST		STANDARD PENETRATION TEST				CONSOLIDATION TEST								
						LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	GRAVEL (%)	COARSE (%)	MEDIUM (%)	FINE (%)	CLAY (%)	FINES	COHESION (KG/CM ²)	ANGLE OF INTERNAL FRICTION	DEPTH OF TESTING (M)	OBSERVED N VALUE	CORRECTED N VALUE	CONSISTENCY / RELATIVE DENSITY	COMPRESSION INDEX C _c	CONSOLIDATION PRESSURE KG/CM ²	INITIAL VOID RATIO (e ₀)	CO-EFFICIENT OF CONSOLIDATION C _v IN CM ² /SEC				
16.00 to 19.00	Brownish grey silty fine sand	23	23						0	0	10	36	52	2	2.656		16.50	18	Medium									
19.00 to 25.00	Brownish grey silty medium to fine sand	20	20						0	0	11	37	52		2.671		18.00	21	Medium									
25.00 to 30.00	Greyish silty sandy clay	18	18						0	0	21	61	18		2.507		19.50	36	Dense									
		21	21						0	0	27	57	16		2.501		21.00	41	Dense									
		23	23						10	2	9	36	45		2.492		22.50	46	Dense									
		22	22						1	2	7	40	50		2.483		24.00	>100	Very dense									
		19	19						0	2	5	40	53		2.475		25.50	>100	Very dense									
		18	18						2	2	7	37	52	10	2.553		27.00	>100	Hard									
		25	25						0	1	5	32	62	20	2.570		28.50	>100	Hard									
									0	1	5	32	62	20	2.570		30.00	>100	Hard									

Borehole Terminated @ 30.00M

CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.,

LABORATORY TEST RESULTS

CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.,

NAME OF THE WORK: SUB-SOIL INVESTIGATION FOR JETTY & BACKUP AREA @ ENNORE

GROUND WATER LEVEL : 2.50 M BELOW EGL

LAB WORK COMMENCED ON : 05-07-2014

LAB WORK COMPLETED ON : 14-07-2014

DEPTH OF (LAYER)	I.S.SOIL CLASSIFICATION	I.S CLASSIFICATION	NATURAL WET DENSITY KN/M ³	NATURAL MOISTURE CONTENT (%)	DENSITY OF ROCK (GM/CC)	COMPRESSIVE STRENGTH (KG/CM ²)	INDEX TEST			GRAIN SIZE DISTRIBUTION						SHEAR TEST	STANDARD PENETRATION TEST				CONSOLIDATION TEST												
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	GRAVEL (%)	COARSE (%)	MEDIUM (%)	SAND	FINES	CLAY (%)		COLLISION (KG/CM ²)	ANGLE OF INTERNAL FRICTION	DEPTH OF TESTING (M)	OBSERVED N VALUE	CORRECTED N VALUE	CONSISTENCY / RELATIVE DENSITY	COMPRESSION INDEX C _c	CONSOLIDATION PRESSURE (KG/CM ²)	INITIAL VOIDS RATIO (e ₀)	CO-EFFICIENT OF CONSOLIDATION C _v (MIN/2 / SEC)							
0.00 to 1.6.00	Brownish grey silty medium to fine sand	SM		22			Non Plastic	0	0	5	84	11	2.688			1.50	22		Medium														
				24			Non Plastic	2	1	15	77	5	2.682			3.00	28		Medium														
				27			Non Plastic	0	0	2	84	14	2.694			4.50	>100		Very dense														
				26			Non Plastic	0	0	1	77	22	2.666			6.00	>100		Very dense														
				28			Non Plastic	1	0	5	73	21	2.649			7.50	51		Very dense														
				26			Non Plastic	0	1	3	67	29	2.695			9.00	58		Very dense														
				24			Non Plastic	0	1	8	53	38	2.475			10.50	31		Dense														
				25			Non Plastic	0	0	7	67	26	2.489			12.00	37		Dense														
				20				0	1	22	38	37	2.502			13.50	36		Dense														
				21			Non Plastic	2	2	18	37	41	2.491			15.00	43		Dense														

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CLIENT: M/s. ADANI ENnore CONTAINER TERMINAL PVT.LTD.,
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LABORATORY TEST RESULTS																											
CLIENT: M/s. ADANI ENnore CONTAINER TERMINAL PVT. LTD.,																											
NAME OF THE WORK: SUB-SOIL INVESTIGATION FOR JETTY & BACKUP AREA @ ENnore																											
LOCATION: BH-03																											
GROUND WATER LEVEL: 2.49 M BELOW EGL																											
CO-ORDINATES: E: 428146.595 N: 1466975.146																											
LAB WORK COMMENCED ON: 08-07-2014																											
LAB WORK COMPLETED ON: 14-07-2014																											
REL: 4.175 M CD																											
DEPTH OF (LAYER)	I.S. CLASSIFICATION	NATURAL WET DENSITY K/M ³	NATURAL MOISTURE CONTENT (%)	DENSITY OF ROCK (G/MCC)	COMPRESSIVE STRENGTH (K/CM ²)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	GRAIN SIZE DISTRIBUTION					SHEAR TEST	CONSOLIDATION TEST												
									GRAVEL (%)	COARSE (%)	MEDIUM (%)	FINE (%)	SILT (%)			CLAY (%)	COHESION (K/CM ²)	ANGLE OF INTERNAL FRICTION	DEPTH OF TESTING (M)	OBSERVED N VALUE	CORRECTED N VALUE	CONSISTENCY / RELATIVE DENSITY	COMPRESSION INDEX Cc	CONSOLIDATION PRESSURE KG/CM ²	INITIAL VOIDS RATIO (e ₀)	CO-EFFICIENT OF CONSOLIDATION C _v IN CM/SEC	
0.00 to 11.00	Greyish brown medium to fine sand		14			Non Plastic			0	0	51	40	9	2.688		1.50	24	Medium									
			23			Non Plastic			0	0	8	83	9	2.684		3.00	38	Dense									
			25			Non Plastic			0	0	4	85	11	2.695		4.50	50	Very dense									
			23			Non Plastic			0	0	13	75	12	2.677		6.00	>100	Very dense									
			26			Non Plastic			0	0	7	59	33	2.666		7.50	52	Very dense									
			23			Non Plastic			0	1	11	59	28	2.675		9.00	55	Very dense									
			23			Non Plastic			1	2	16	37	44	2.661		10.50	18	Very dense									
11.00 to 13.00	Greyish sandy silt		23			Non Plastic			0	2	11	26	58	3	2.655		12.00	23	Medium								
13.00 to 15.00	Greyish silty medium to fine sand		23			Non Plastic			1	1	6	52	39	1	2.648		13.50	21	Medium								
			24			Non Plastic			1	1	9	44	44	1	2.671		15.00	25	Medium								

Borehole Terminated @ 15.00M

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CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.,

LABORATORY TEST RESULTS																																					
CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.,																																					
NAME OF THE WORK: SUB - SOIL INVESTIGATION FOR JETTY & BACKUP AREA @ ENNORE																																					
LOCATION: III - 04					GROUND WATER LEVEL: 2.00 M BELOW EGL					LAB WORK COMPLETED ON: 16-07-2014																											
CO-ORDINATES: E - 428111.448 N - 1467500.483					LAB WORK COMMENCED ON: 08-07-2014					RL: 3.935 M CD																											
DEPTH OF (LAYER)	IS SOIL CLASSIFICATION	IS CLASSIFICATION	NATURAL WET DENSITY KN/m ³	NATURAL MOISTURE CONTENT (%)	DENSITY OF ROCK (G/CC)	COMPRESSIVE STRENGTH (Kg/cm ²)	INDEX TEST					SHEAR TEST		CONSOLIDATION TEST																							
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	GRAVEL (%)	COARSE (%)	MEDIUM (%)	FINE (%)	SILT (%)	CLAY (%)	SPECIFIC GRAVITY	COHESION (Kg/cm ²)	ANGLE OF INTERNAL FRICTION	DEPTH OF TESTING (M)	OBSERVED N VALUE	CORRECTED N VALUE	CONSISTENCY / RELATIVE DENSITY	COMPRESSION INDEX Cc	CONSOLIDATION PRESSURE (KG/CM ²)	INITIAL VOIDS RATIO (e ₀)	CO-EFFICIENT OF CONSOLIDATION C _v IN CM ² /SEC											
0.00 to 1.5.00	Brownish grey medium to fine sand	SM		4			Non Plastic	0	0	45	52	3	2.618			1.52	19	Medium																			
				21			Non Plastic	1	1	39	55	4	2.612			3.00	24	Medium																			
				18			Non Plastic	0	0	27	64	9	2.607			4.50	28	Medium																			
				28			Non Plastic	0	0	6	84	10	2.673			6.00	29	Medium																			
				29			Non Plastic	0	0	5	82	13	2.674			7.50	32	Dense																			
				21			Non Plastic	0	0	21	65	14	2.625			9.00	32	Dense																			
				26			Non Plastic	0	1	27	58	14	2.671			10.50	33	Dense																			
				19			Non Plastic	0	1	21	49	29	2.669			12.00	34	Dense																			
				20			Non Plastic	0	1	21	50	28	2.833			13.50	35	Dense																			
				19			Non Plastic	0	1	18	57	24	2.648			15.00	36	Dense																			

Borehole Terminated @ 15.00M

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CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.,

LABORATORY TEST RESULTS																											
CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.																											
NAME OF THE WORK: SUB-SOIL INVESTIGATION FOR JETTY & BACKUP AREA @ ENNORE																											
LOCATION: BH - 07																											
GROUND WATER LEVEL: 3.00 M BELOW EGL																											
CO-ORDINATES: E - 42382.598 N - 146747.142																											
LAB WORK COMMENCEMENT ON: 04/07/2014																											
LAB WORK COMPLETION ON: 11/07/2014																											
RI - 3.1315 M CD																											
DEPTH OF LAYER	IS CLASSIFICATION	US SHS CLASSIFICATION	NATURAL WET DENSITY KN/m ³	NATURAL MOISTURE CONTENT (%)	DENSITY OF ROCK (GM/CC)	COMPRESSIVE STRENGTH (KG/CM ²)	INDEX TEST			GRAIN SIZE DISTRIBUTION					SHEAR TEST			STANDARD PENETRATION TEST			CONSOLIDATION TEST						
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	GRAVEL (%)	COARSE (%)	MEDIUM (%)	FINE (%)	SILT (%)	CLAY (%)	FREE SWELL INDEX (%)	SPECIFIC GRAVITY	COHESION (KG/CM ²)	ANGLE OF INTERNAL FRICTION	DEPTH OF TESTING (M)	OBSERVED N VALUE	CORRECTED N VALUE	CONSISTENCY / RELATIVE DENSITY	COMPRESSION INDEX C _c	CONSOLIDATION PRESSURE (KG/CM ²)	INITIAL VOIDS RATIO (e ₀)	COEFFICIENT OF CONSOLIDATION IN CM ² /SEC
0.00 to 26.50		SM					Non Plastic	0	1	10	52	37	2.371	2.371	12.00	54	Very dense										
			22				Non Plastic	0	1	20	71	7	2.655	2.655	1.50	24	Medium										
			19				Non Plastic	0	0	11	75	14	2.657	2.657	3.00	38	Dense										
			24				Non Plastic	0	0	13	81	6	2.666	2.666	4.50	40	Dense										
			16				Non Plastic	0	0	10	83	7	2.653	2.653	6.00	44	Dense										
			19				Non Plastic	0	0	15	79	6	2.670	2.670	7.50	36	Dense										
			10				Non Plastic	0	0	8	86	6	2.661	2.661	9.00	37	Dense										
			25				Non Plastic	1	1	14	64	20	2.661	2.661	10.50	47	Dense										
			21				Non Plastic	0	1	10	52	37	2.371	2.371	12.00	54	Very dense										
			21				Non Plastic	1	1	11	43	44	2.633	2.633	13.50	46	Dense										
			18				Non Plastic	0	0	26	42	32	2.644	2.644	15.00	17	Medium										
			18				Non Plastic	0	1	22	42	35	2.644	2.644	16.50	20	Medium										
			16				Non Plastic	3	6	37	36	18	2.616	2.616	18.00	12	Medium										
			17				Non Plastic	0	2	10	44	14	2.640	2.640	19.50	15	Medium										
			14				Non Plastic	0	1	31	45	23	2.616	2.616	21.00	28	Medium										
			14				Non Plastic	0	1	33	45	21	2.625	2.625	22.50	31	Dense										
			16				Non Plastic	0	1	32	49	18	2.637	2.637	24.00	38	Dense										
			16				Non Plastic	2	0	28	45	25	2.641	2.641	25.50	41	Dense										

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CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.

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LABORATORY TEST RESULTS																															
CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.																															
NAME OF THE WORK: SUB-SOIL INVESTIGATION FOR JETTY & BACKUP AREA @ ENNORE																															
LOCATION: BH-08																															
GROUND WATER LEVEL: 2.90 M BELOW EGL																															
LAB WORK COMMENCED ON: 27-06-2014																															
LAB WORK COMPLETED ON: 10-07-2014																															
RI: 1379 M CD																															
DEPTH OF LAYER	I.S. SOIL CLASSIFICATION	I.S. CLASSIFICATION	NATURAL WET DENSITY $\rho_{w, nat}$	NATURAL MOISTURE CONTENT (%)	DENSITY OF ROCK (GM/CC)	COMPRESSIVE STRENGTH (ρ_{p, cm^2})	INDEX TEST			GRAIN SIZE DISTRIBUTION					SHEAR TEST		STANDARD PENETRATION TEST				CONSOLIDATION TEST										
							LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	GRAVEL (%)	COARSE (%)	MEDIUM (%)	FINE (%)	SILT (%)	CLAY (%)	FREE SWELL INDEX (%)	SPECIFIC GRAVITY	COHESION (ρ_{c, cm^2})	ANGLE OF INTERNAL FRICTION	DEPTH OF TESTING (M)	OBSERVED N VALUE	CORRECTED N VALUE	CONSISTENCY / RELATIVE DENSITY	COMPRESSION INDEX C_c	CONSOLIDATION PRESSURE KG/CM^2	INITIAL VOIDS RATIO (e_0)	COEFFICIENT OF CONSOLIDATION $INC/M/SEC$				
18.20 to 24.00	Brownish grey silty fine to medium sand	SM		17			Non Plastic	0	1	68	15	15			2.661			18.50	41		Dense										
24.00 to 30.00	Brownish grey silty clay with sand	CI/C L		18			Non Plastic	0	0	85	8	7			2.618			21.50	51		Very dense										
30.00 to 34.50	Greyish silty sand	SM		15			Non Plastic	0	0	34	14	52			2.650			29.00	47		Very dense										

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CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.,
VELICITY

LABORATORY TEST RESULTS																																		
CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.,																																		
NAME OF THE WORK: SUB-SOIL INVESTIGATION FOR JETTY & BACKUP AREA @ ENNORE																																		
LOCATION: BH-08																																		
COORDINATES: E - 428317.595 N - 1407217.146																																		
GROUND WATER LEVEL: 2.90 M BELOW EGL																																		
LAB WORK COMMENCED ON: 17-06-2014																																		
LAB WORK COMPLETED ON: 10-07-2014																																		
DEPTH OF (LAYER)	IS SOIL CLASSIFICATION	NATURAL WET DENSITY Km^3	NATURAL MOISTURE CONTENT (%)	DENSITY OF ROCK (GN/CC)	COMPRESSIVE STRENGTH (kg/cm^2)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	GRAIN SIZE DISTRIBUTION					SHEAR TEST	STANDARD PENETRATION TEST																			
									GRAVEL (%)	COARSE (%)	MEDIUM (%)	FINE (%)	SILT (%)		CLAY (%)	FREE SWELL INDEX (%)	SPECIFIC GRAVITY	COHESION (Kp/cm^2)	ANGLE OF INTERNAL FRICTION	DEPTH OF TESTING (M)	OBSERVED N VALUE	CORRECTED N VALUE	CONSISTENCY / RELATIVE DENSITY	COMPRESSION INDEX C_c	CONSOLIDATION PRESSURE (Kg/cm^2)	INITIAL VOIDS RATIO (e_0)	COEFFICIENT OF CONSOLIDATION C_v (MCM/SEC)							
34.50 to 37.50	Greyish silty clay	21	21		58	25	33	8	1	4	86	50	2.590			35.00	>100	Hard																
		21	21		60	31	29	0	2	1	5	92	50	2.231			36.30	>100	Hard															
37.50 to 50.00	Brownish grey silty fine to medium sand	7	7		Non Plastic			0	1	71	24	4	2.628			38.00	>100	Very dense																
		6	6		Non Plastic			0	1	72	23	4	2.636			39.50	>100	Very dense																
		17	17		Non Plastic			0	2	33	49	16	2.241			41.00	>100	Very dense																
		7	7		Non Plastic			0	0	64	35	1	2.639			42.50	>100	Very dense																
		6	6		Non Plastic			2	0	62	35	1	2.646			44.00	>100	Very dense																
		7	7		Non Plastic			0	0	69	30	1	2.644			45.50	>100	Very dense																
		7	7		Non Plastic			0	0	59	40	1	2.622			47.00	>100	Very dense																
		5	5		Non Plastic			0	0	70	29	1	2.639			48.50	>100	Very dense																
		7	7		Non Plastic			0	0	61	38	1	2.641			50.00	>100	Very dense																

Borehole Termination @ 50.00M

CLIENT: M/s. ADANI ENNVORE CONTAINER TERMINAL PVT LTD.,

LABORATORY TEST RESULTS																											
CLIENT: M/s. ADANI ENNVORE CONTAINER TERMINAL PVT LTD.,																											
NAME OF THE WORK: SUB-SOIL INVESTIGATION FOR JETTY & BACKUP AREA @ ENNVORE																											
GROUND WATER LEVEL: 3.00 M BELOW EGL																											
LAB WORK COMMENCED ON: 27-06-2014																											
LAB WORK COMPLETED ON: 08-07-2014																											
RL: 3.825 M CD																											
DEPTH OF (LAYER)	IS SOIL CLASSIFICATION	NATURAL WET DENSITY KN/m^3	NATURAL MOISTURE CONTENT (%)	DENSITY OF ROCK (G/CC)	COMPRESSIVE STRENGTH (Kg/cm^2)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	GRAIN SIZE DISTRIBUTION					SHEAR TEST	STANDARD PENETRATION TEST			CONSOLIDATION TEST									
									GRAVEL (%)	COARSE (%)	MEDIUM (%)	FINE (%)	SILT (%)		CLAY (%)	SPECIFIC GRAVITY	ANGLE OF INTERNAL FRICTION	DEPTH OF TESTING (M)	OBSERVED N VALUE	CORRECTED N VALUE	CONSISTENCY / RELATIVE DENSITY	COMPRESSION INDEX Cc	CONSOLIDATION PRESSURE Kg/cm^2	INITIAL VOIDS RATIO (e ₀)	COEFFICIENT OF CONSOLIDATION IN CM/SEC		
0.00 to 2.60	Brownish silty medium to fine sand		10			Non Plastic			1	0	19	71	9	2.688	1.00	22		Medium									
2.60 to 3.70	Brownish fine to medium sand		12			Non Plastic			0	1	29	65	5	2.694	2.00	31		Dense									
3.70 to 4.60	Brownish silty medium to fine sand with gravel		14			Non Plastic			0	2	40	27	31	2.655	3.00	37		Dense									
			16			Non Plastic			17	7	35	35	6	2.733	4.00	>100		Very dense									
			45			Non Plastic			1	0	14	75	10	2.722	5.00	>100		Very dense									
			16			Non Plastic			2	2	36	42	18	2.683	6.50	>100		Very dense									
			28			Non Plastic			0	0	1	40	59	2.682	8.00	>100		Very dense									
			27			Non Plastic			1	0	4	65	30	2.678	9.50	>100		Very dense									
			21			Non Plastic			1	1	12	43	43	2.659	11.00	24		Medium									
			21			Non Plastic			1	1	12	53	33	2.550	12.50	30		Medium									

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CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.,

LABORATORY TEST RESULTS																												
CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.																												
NAME OF THE WORK: SUB-SOIL INVESTIGATION FOR JETTY & BACKFILL AREA @ ENNORE																												
GROUND WATER LEVEL: 1.00 M BELOW ECL																												
LAB WORK COMMENCED ON: 27/06/2014																												
LAB WORK COMPLETED ON: 10/07/2014																												
RL: 3.825 M CD																												
DEPTH OF (LAYER)	L.S. SOIL CLASSIFICATION	NATURAL WET DENSITY KN/M ³	NATURAL MOISTURE CONTENT (%)	DENSITY OF ROCK (GM/CC)	COMPRESSIVE STRENGTH (KPCM ²)	INDEX TEST					SHEAR TEST			STANDARD PENETRATION TEST				CONSOLIDATION TEST										
						LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	GRAVEL (%)	COARSE (%)	MEDIUM (%)	FINE (%)	SILT (%)	CLAY (%)	FREE SWELL INDEX (%)	SPECIFIC GRAVITY	COHESION (KG/CM ²)	ANGLE OF INTERNAL FRICTION	DEPTH OF TESTING (M)	OBSERVED N VALUE	CORRECTED N VALUE	CONSISTENCY / RELATIVE DENSITY	COMPRESSION INDEX C _c	CONSOLIDATION PRESSURE (KG/CM ²)	INITIAL VOIDS RATIO (e ₀)	COEFFICIENT OF CONSOLIDATION IN CM ² /SEC		
13.50 to 19.50	Greyish silty medium to fine sand SM		18			Non Plastic	0	1	20	50	29	2.646		17.00	06		Loose											
19.50 to 21.00	Greyish silty clayey sand SC		19			Non Plastic	2	0	18	51	29	2.643		18.50	06		Loose											
21.00 to 23.30	Greyish silty fine sand SM		14			44 16 38	0	0	30	39	31	2.582		20.00	>100		Very Dense											
23.30 to 25.10	Greyish silty fine sand SM		24			Non Plastic	0	0	5	80	15	2.623		22.00	20		Medium											
25.10 to 29.40	Greyish silty clay CI		22			Non Plastic	0	0	5	60	35	2.618		24.00	25		Medium											
29.40 to 31.00	Greyish silty medium to fine sand SM		21			39 23 16	6	1	14	23	56	2.622		26.00	28		Very stiff											
			20			40 25 15	1	1	18	28	52	2.625		28.00	>100		Hard											
			17			Non Plastic	10	2	16	29	43	2.612		30.00	>100		Very dense											

Cont. >

CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT. LTD.

LABORATORY TEST RESULTS

DEPTH OF (LAYER)	U.S. SOIL CLASSIFICATION	NATURAL WET DENSITY kg/m ³	NATURAL MOISTURE CONTENT (%)	DENSITY OF ROCK (G/CC)	COMPRESSIVE STRENGTH (kg/cm ²)	INDEX TEST							SHEAR TEST					CONSOLIDATION TEST												
						LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	GRAVEL (%)	COARSE (%)	MEDIUM (%)	FINE (%)	SILT (%)	CLAY (%)	FREE SWELL INDEX (%)	SPECIFIC GRAVITY	COLLISION (kg/cm ²)	ANGLE OF INTERNAL FRICTION	DEPTH OF TESTING (M)	OBSERVED N VALUE	CORRECTED N VALUE	CONSISTENCY / RELATIVE DENSITY	COMPRESSION INDEX	CONSOLIDATION PRESSURE (kg/cm ²)	INITIAL VOID RATIO (e ₀)	COEFFICIENT OF CONSOLIDATION (C _v IN CM/ SEC)				
31.00 to 40.00	Greyish silty clay	26				82	31	51	0	1	6	7	86	100	2.543			31.50	>100		Hard									
		29				102	39	63	0	0	4	5	61	30	86	2.576			33.00	>100		Hard								
		29				114	41	73	0	0	4	3	93	109	2.558			34.50	>100		Hard									
		31				127	40	87	0	0	2	2	96	118	2.342			36.00	>100		Hard									
40.00 to 46.00	Greyish brown silty fine to medium sand	18				71	21	50	0	0	19	22	40	19	2.442			37.50	>100		Hard									
		28				119	33	86	0	0	2	5	62	31	150	2.401			39.00	>100		Hard								
		17				Non Plastic					0	3	61	34	2	2.607			40.50	>100		Very dense								
		16				Non Plastic					0	5	59	21	15	2.608			42.00	>100		Very dense								
46.00 to 50.00	Greyish brown silty fine to medium sand with gravel	15				Non Plastic					6	5	51	23	15	2.595			43.50	>100		Very dense								
		13				Non Plastic					17	5	43	19	16	2.602			45.00	>100		Very dense								
		16				Non Plastic					11	3	56	16	14	2.620			46.50	>100		Very dense								
		16				Non Plastic					2	3	67	11	17	2.618			48.00	>100		Very dense								
						17					4	6	62	11	17	2.610			50.00	>100		Very dense								

Borehole Terminated @ 50.00M

VELCITI

CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.

VELCITI CONSULTING ENGINEERS P. LTD.,

PILE CAPACITY CALCULATIONS :

PROJECT : ENNORE PORT BACK UP YARD
 CLIENT : M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.,
 CONSTRUCTION OF PORT JETTY AREA [BH-7, 8&9]

REF. BORE HOLE : BH-7 (1400 mm dia)
 DREDGING LEVEL : -17.500 (ASSUMED)
 FOUNDING LEVEL : -45.000
 PILE LENGTH BELOW GL : 45.000 m
 EFF. PILE LENGTH : 27.500 m

SKIN FRICTION CALCULATIONS [Fs1]

Layer	From RL	To RL	Thickness of Layer (L) m	Dia of Pile (D) m	C KN/m ²	φ = ρ	Δv KN/m ²	α	κ	γ KN/m ²	πDL m ²	Fs1 = (κ Δv tanδ + αc) πDL KN
1	-17.500	-26.500	9.00	1.40	150	30.0	45.000	0.3	1.5	20.0	39.600	1544.008
2	-26.500	-35.500	9.00	1.40	150	36.0	137.250	0.3	1.5	20.5	39.600	1762.000
3	-35.500	-45.000	9.50	1.40	150	36.0	239.125	0.3	1.5	21.5	41.800	10899.946
27.500												14224.955

SOCKET RESISTANCE [Fs2]

Depth (m)	Dia of pile (D) m	Area of Socket m ²	Ultimate Shear Resistance KN/m ²	Ult. Socket Resistance KN
1.40	1.40	11.5	60.3	55
			Nq	293.750
			Po	1.540
			AREA OF PILE	25628.164
			KN/m ²	KN

END BEARING CALCULATIONS (Fp)

Depth (D) m	γ _{sub} KN/m ³	N _y	N _q	Po	AREA OF PILE m ²	Fp KN
1.40	11.5	60.3	55	293.750	1.540	25628.164

ALLOWABLE PILE CAPACITY = (Fp/2.5) + (Fs1/5) + (Fs2/10)
 = 13096.26 KN (Say) 1300 Tonnes

NOTE: DIA OF PILE IS 1400 mm
 MINIMUM DEPTH OF PILE FROM CL IS 45.0 M
 PILE CAPACITY HAS TO BE RESTRICTED TO STRUCTURAL CAPACITY OF THE PILE
 PILE LOAD TESTS HAVE TO BE PERFORMED TO ASCERTAIN THE ACTUAL CAPACITY OF THE PILE.

VILACITI

CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.,

VELCETTI CONSULTING ENGINEERS P. LTD.,

PILE CAPACITY CALCULATIONS :

PROJECT : ENNORE PORT BACK UP YARD
 CLIENT : M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.,
 CONSTRUCTION OF PORT (JETTY AREA) [B6, 7, 8&9]

REF. BORE HOLE : BH-7 (1400 mm dia)
 DREDGING LEVEL : -17.500 (ASSUMED)
 FOUNDING LEVEL : -45.000
 PILE LENGTH BELOW GL : 45.000 m
 EFF. PILE LENGTH : 27.500 m

SKIN FRICTION CALCULATIONS (F_{s1})

Layer	From RL	To RL	Thickness of Layer (L) m	Dia of Pile (D) m	c KN/m ²	φ = β	ΔV KN/m ²	α	x	γ KN/m ³	πDL m ²	F _{s1} = (x ΔV tanδ + cc) πDL KN
1	-17.500	-26.500	9.00	1.40		30.0	45.000	0.3	1.5	20.0	35.500	
2	-26.500	-35.500	9.00	1.40	150		137.250	0.3	1.5	20.5	35.500	
3	-35.500	-45.000	9.50	1.40		36.0	239.125	0.3	1.5	21.5	41.800	
27.500												

SOCKET RESISTANCE (F_{s2})

Depth (m)	Dia of pile (D) m	Area of Socket m ²	Ultimate Shear Resistance KN/m ²	Ult. Socket Resistance KN
	1.40	11.5	60.3	55
				25628.164

END BEARING CALCULATIONS (F_p)

Dia of pile (D) m	N ₆₀ KN/m ²	N ₉₀ KN/m ²	N ₁₂₀ KN/m ²	P _o KN/m ²	AREA OF PILE m ²	F _p KN
1.40	11.5	60.3	55	253.750	1.540	25628.164

ALLOWABLE PILE CAPACITY = (F_p/2.5) + (F_{s1}/5) + (F_{s2}/10)
 (WITHOUT FRICTION)

= 10251.27 KN (Say) 1020 Tonnes

NOTE: DIA OF PILE IS 1400 mm

MINIMUM DEPTH OF PILE FROM GL IS 45.0 M

ABOVE CALCULATIONS WERE MADE WITHOUT FRICTION.

PILE CAPACITY HAS TO BE RESTRICTED TO STRUCTURAL CAPACITY OF THE PILE

PILE LOAD TESTS HAVE TO BE PERFORMED TO ASCERTAIN THE ACTUAL CAPACITY OF THE PILE.

MELCOTT

CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.,

MELCOTT CONSULTING ENGINEERS P. LTD.,

UPLIFT CAPACITY CALCULATIONS:

PROJECT : ENNORE PORT BACK UP YARD
 CLIENT : M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.,
 CONSTRUCTION OF PORT JETTY AREA [B&S]

REF. BORE HOLE : BH-7 (1400 mm dia)
 DREDGING LEVEL : -17.500 (ASSUMED)
 FOUNDING LEVEL : -45.000
 PILE LENGTH BELOW GL : 45.000 m
 EFF. PILE LENGTH : 27.500 m

SKIN FRICTION CALCULATIONS [Fs1]

Layer	From RL	To RL	Thickness of Layer (L) m	Dia of Pile (D) m	c KN/m ²	φ = β	Δv KN/m ²	α	k	γ KN/m ³	πDL m ²	Fs1 = (k Δv tan δ + ac) πDL KN
1	-17.500	-26.500	9.00	1.40		30.0	45.000	0.3	1.5	20.0	39.600	1544.008
2	-26.500	-35.500	9.00	1.40	150	36.0	137.250	0.3	1.5	20.5	39.600	1782.000
3	-35.500	-45.000	9.50	1.40		36.0	239.125	0.3	1.5	21.5	41.800	10898.346
27.500												14224.355

SOCKET RESISTANCE [Fs2]

Depth (m)	Dia of pile (D) m	Area of Socket m ²	Ultimate Shear Resistance KN/m ²	Ult. Socket Resistance KN
1.40	1.40	11.5	60.3	55
				253.750
				1.540

END BEARING CALCULATIONS [Fp]

Dia of pile (D) m	γsub KN/m ³	Nγ	Nq	Po KN/m ²	AREA OF PILE m ²	Fp KN
1.40	11.5	60.3	55	253.750	1.540	

ALLOWABLE PILE CAPACITY = (Fp/2.5) + (Fs1/5) + (Fs2/10)
 = 2844.991 KN (Say) 284 Tonnes

NOTE: DIA OF PILE IS 1400 mm
 MINIMUM DEPTH OF PILE FROM GL IS 45.0 M
 PULL LOAD TEST HAS TO BE PERFORMED TO ASCERTAIN THE ACTUAL TENSILE CAPACITY OF THE PILE.

VELDITI

CLIENT: M/S. ADANI ENNORE CONTAINER TERMINAL PVT LTD.,

CBR RESULTS

NO	CHAINAGE NO	I.S.SOIL CLASSIFICATION	INDEX TEST			GRAIN SIZE DISTRIBUTION				MODIFIED PROCTOR COMPACTION TEST		4 days soaked for energy levels (%)		
			LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	GRAVEL (%)	SAND (%)			Max. Dry Density gm/cc	O.M.C. (%)			
							COARSE (%)	MEDIUM (%)	FINE (%)	SILT (%)	CLAY (%)			
1	TP - 01	Brownish grey silty sand	Non Plastic			0	15	81		4		1.62	12.1	11.25
2	TP - 02		Non Plastic			0	11	88		1		1.66	12.5	12.50

VIELCTIT

CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.,

LOCATION - 01

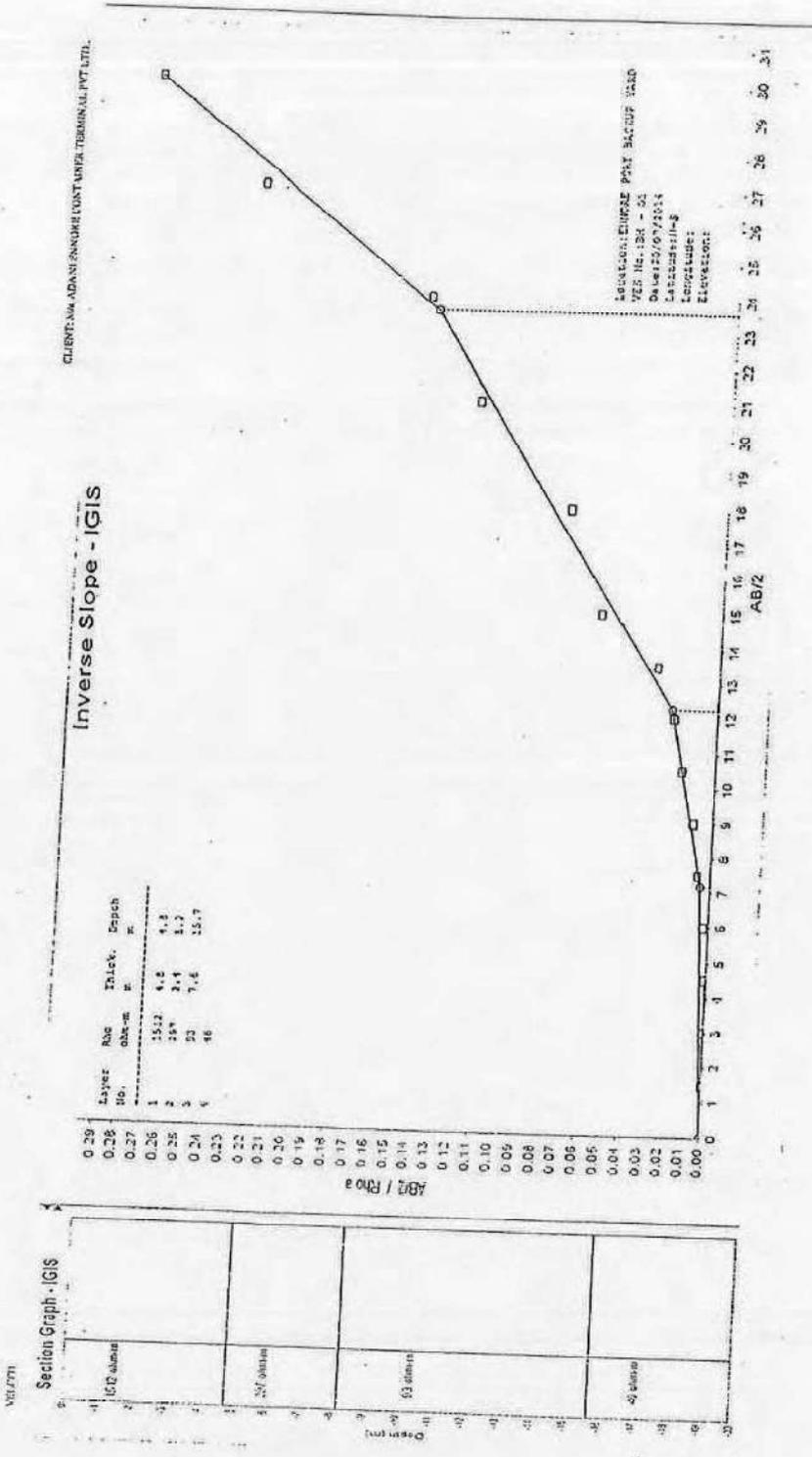
Sl NO	North-south			NORTH EAST - SOUTH WEST			EAST - WEST			NORTH WEST - SOUTH EAST			AVG RESISTIVITY DEPTH p avg(ft-m)	MAXIMUM RESISTIVITY at Depth p max(ft-m)	MINIMUM RESISTIVITY at Depth p min(ft-m)	
	Direction depth (m)	Resistance, R(Ω)	f	Resistance, R(Ω)	f	Resistivity, 'p'(ft-m)	Resistance, R(Ω)	f	Resistivity, 'p'(ft-m)	Resistance, R(Ω)	f	Resistivity, 'p'(ft-m)				
1	1	1324.15	1	8319.88	1102.85	1	6229.41	1286.25	1	8081.75	1434.22	1	9011.47	8081.63	9011.47	6919.41
2	2	635.22	1	7982.41	521.31	1	6551.00	512.32	1	6437.98	423.32	1	5319.53	6572.73	7982.41	5319.53
3	3	265.34	1	5001.56	93.26	1	1757.82	106.23	1	2002.43	197.24	1	3717.79	3118.90	5001.56	1757.82
4	4	89.39	1	2246.49	31.66	1	785.63	35.13	1	882.84	95.43	1	2398.34	1580.82	2398.34	795.63
5	5	37.44	1	1176.15	24.26	1	782.02	16.31	1	512.46	81.14	1	2549.18	1243.95	2549.18	512.46
6	6	24.40	1	919.67	12.33	1	464.64	9.43	1	335.31	44.33	1	1671.01	852.66	1671.01	335.31
7	7	14.70	1	646.41	7.45	1	327.84	6.73	1	296.09	33.79	1	1485.94	685.07	1485.94	296.09
8	8	11.33	1	569.31	5.23	1	262.59	4.24	1	213.23	12.64	1	635.20	420.11	635.20	213.23
9	9	7.93	1	448.20	4.40	1	248.93	3.79	1	214.49	7.52	1	448.09	339.93	448.09	214.49
10	10	4.13	1	259.43	2.74	1	171.85	2.12	1	133.45	4.79	1	300.90	216.41	300.90	133.45
11	11	3.19	1	240.14	1.99	1	149.74	1.42	1	107.37	2.33	1	175.45	168.18	240.14	107.37
12	12	1.99	1	174.61	1.70	1	149.54	1.11	1	97.82	1.38	1	120.95	135.73	174.61	97.82
13	13	1.63	1	163.36	1.43	1	143.26	0.83	1	83.64	1.03	1	103.65	123.48	163.36	83.64
14	14	1.03	1	116.94	1.10	1	124.03	0.68	1	76.79	0.93	1	104.95	105.83	124.03	76.79
15	15	0.85	1	106.19	0.95	1	119.38	0.42	1	52.90	0.75	1	93.87	93.09	119.38	52.90
Avg Resistivity in direction													1891.384	1303.236	1875.757	1583.567

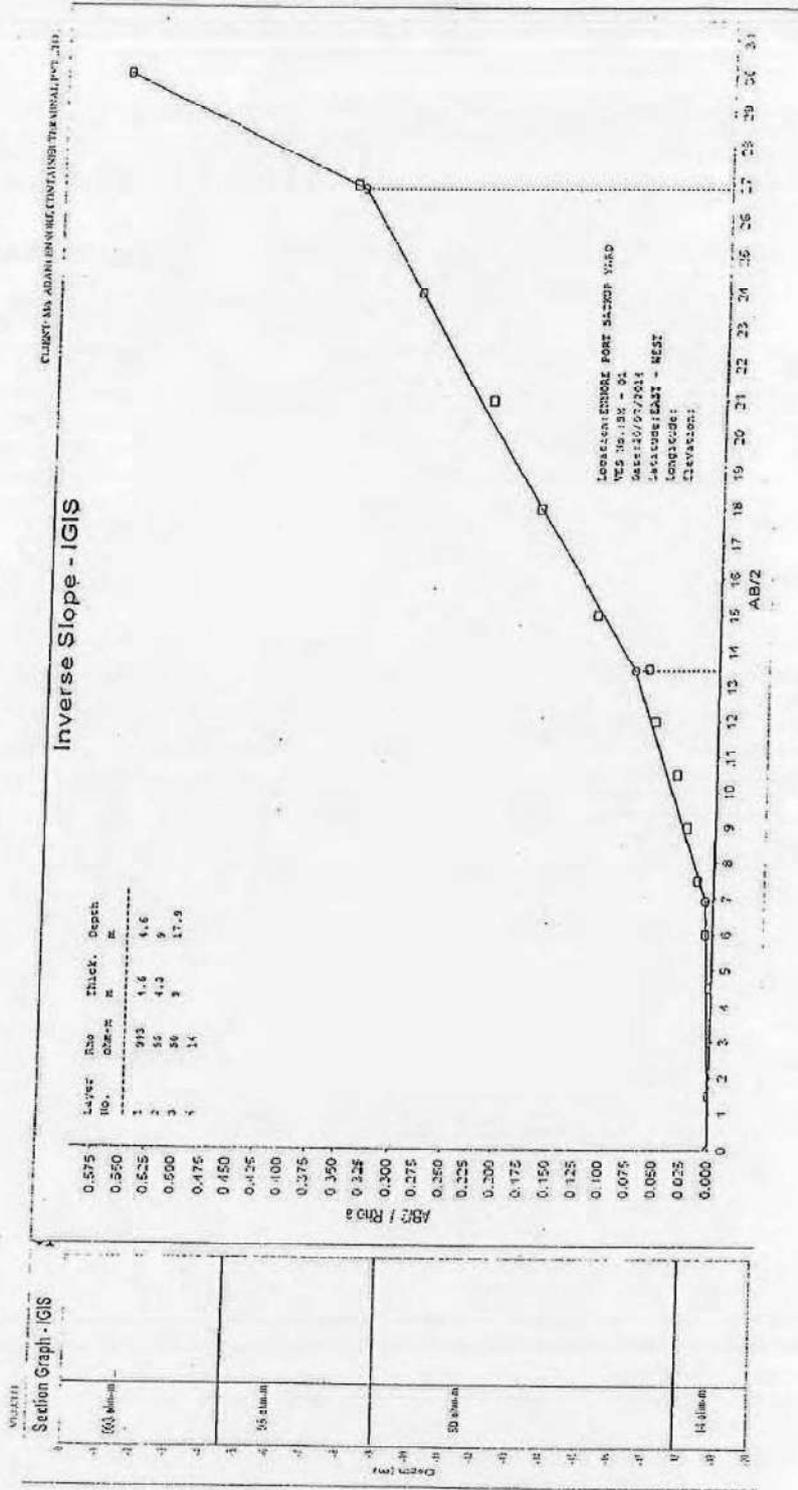
CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.,

VEELLIT

LOCATION - 03

SL NO	North-south		NORTH EAST - SOUTH WEST		EAST - WEST		NORTH WEST - SOUTH EAST			AVG RESISTIVITY DEPTH p avg (0-m)	MAXIMUM RESISTIVITY at Depth p max (0-m)	MINIMUM RESISTIVITY at Depth p min (0-m)		
	Direction depth (m)	Resistance, R (Ω)	f	Resistivity, p (Ω-m)	Resistance, R (Ω)	f	Resistivity, p (Ω-m)	Resistance, R (Ω)	f				Resistivity, p (Ω-m)	
1	1	1376.97	1	865.176	764.23	1	4801.79	1394.36	1	8761.02	1244.75	7508.89	8761.02	4801.79
2	2	403.11	1	5065.64	417.95	1	5252.13	525.43	1	6602.72	442.34	5558.61	6602.72	5065.64
3	3	96.38	1	1816.70	88.36	1	1665.37	218.65	1	4121.42	242.91	4578.65	4578.65	1665.37
4	4	30.39	1	763.73	27.74	1	697.06	102.34	1	2572.19	64.16	1612.42	1411.35	2572.19
5	5	13.21	1	415.10	17.26	1	542.50	66.28	1	2082.09	34.14	1072.38	2082.09	415.10
6	6	7.29	1	274.75	8.51	1	320.93	30.52	1	1150.43	21.54	811.89	639.50	1150.43
7	7	5.32	1	234.12	5.22	1	229.37	26.92	1	1184.18	15.03	661.01	577.17	1184.18
8	8	3.95	1	197.34	3.87	1	184.48	16.96	1	852.23	12.59	632.64	468.18	852.23
9	9	2.49	1	140.92	2.95	1	166.82	8.86	1	500.80	8.46	478.46	321.75	500.80
10	10	1.84	1	115.86	1.86	1	116.87	5.64	1	354.31	6.73	423.05	252.52	423.05
11	11	1.20	1	90.18	1.51	1	113.78	2.84	1	214.13	4.84	364.85	195.73	364.85
12	12	0.85	1	46.18	0.85	1	75.03	1.82	1	160.36	2.10	184.64	116.55	184.64
13	13	0.66	1	66.05	0.75	1	75.00	1.67	1	167.79	1.71	171.61	120.11	171.61
14	14	0.43	1	48.74	0.41	1	45.92	1.15	1	129.50	1.31	147.71	92.97	147.71
15	15	0.42	1	53.03	0.45	1	56.17	1.17	1	147.28	0.91	114.73	92.80	147.28
Avg resistivity in direction											1196.6738	1933.363	1642.242	269.000



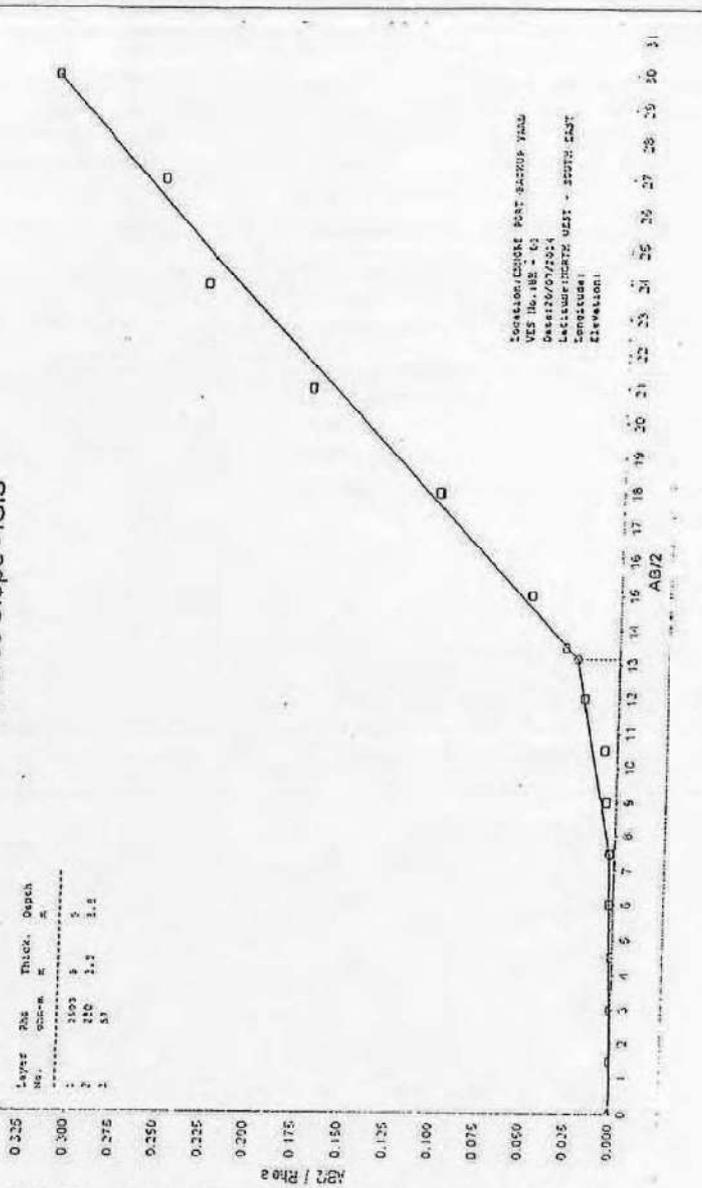
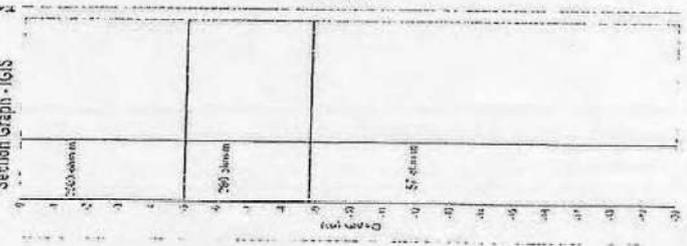


CLIENT: MALAYSIAN AIRWAYS BERHAD (MAB) - AIRPORT SECURITY SERVICES (ASS) - KUALA LUMPUR

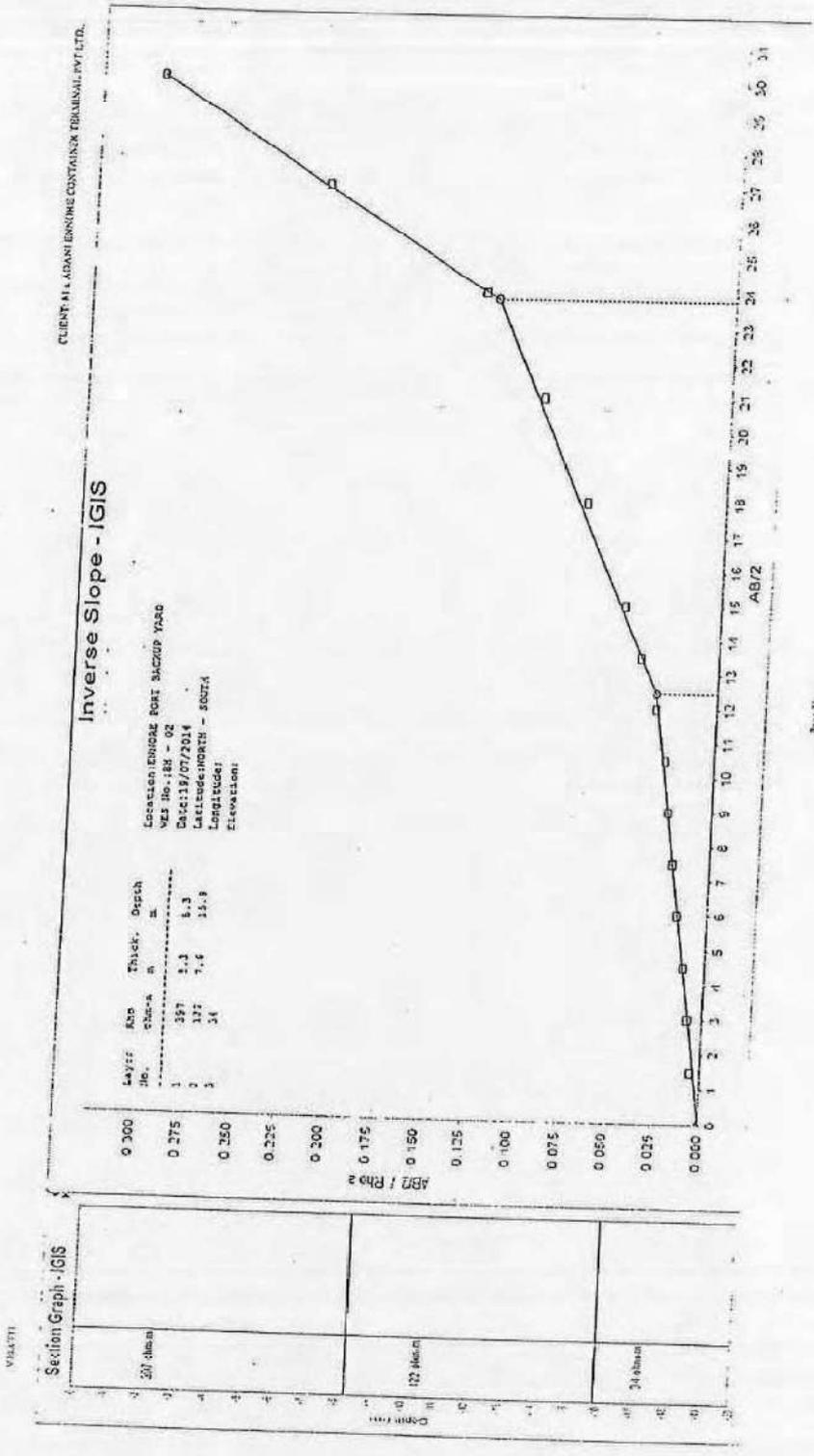
Inverse Slope - IGIS

Layer No.	Size	Thick.	Depth
	mm	mm	m
1	100	5	5
2	250	1.5	1.1
3	50		

Section Graph - IGIS



CONSTRUCTION POINT: 8-20205 - YONG
 VES No. 185 - 63
 Date: 26/07/2014
 Location: 8-20205 - YONG
 Construction: 8-20205 - YONG
 Elevation:

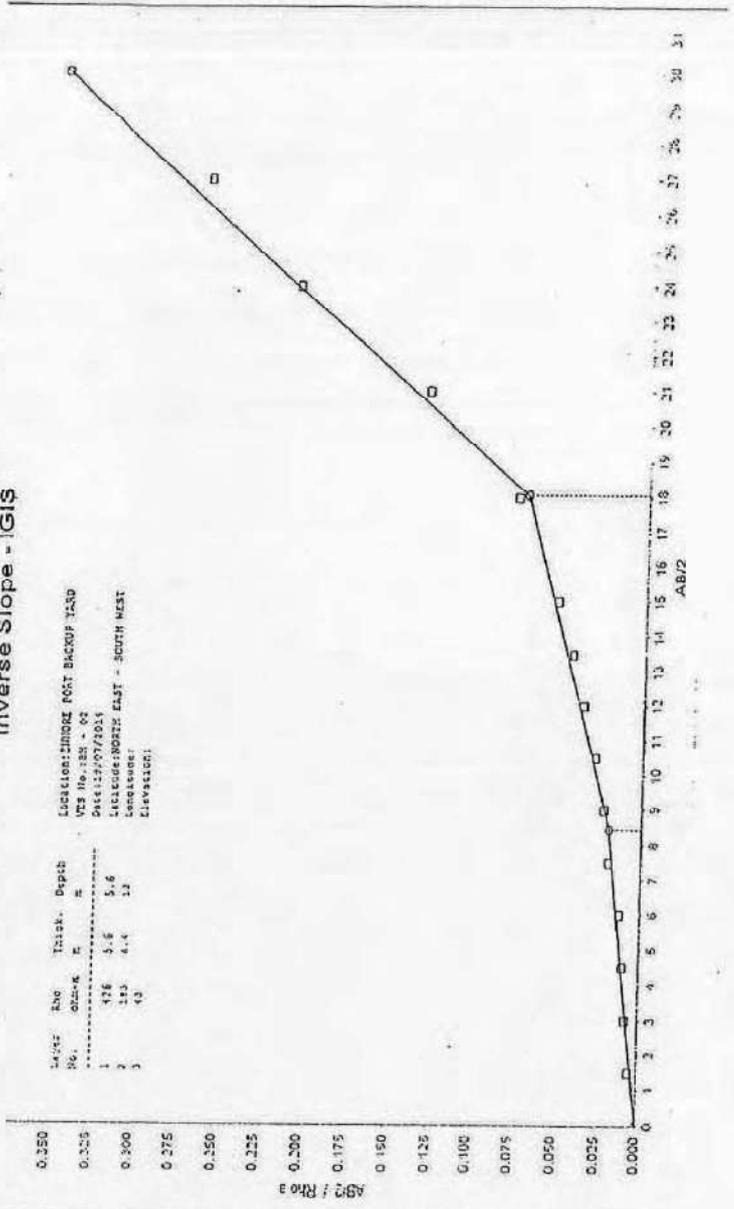
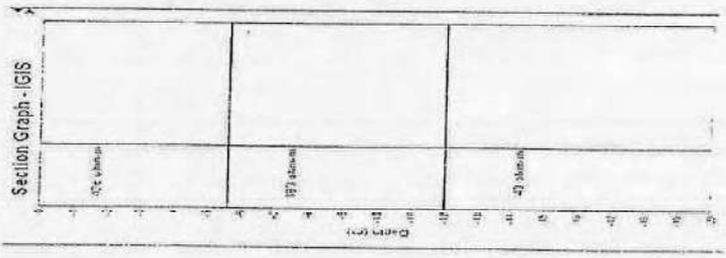


CLIENT: MR. ADAMT ENSSURE CONTAINER TERMINAL, PVT. LTD.

Inverse Slope - IGIS

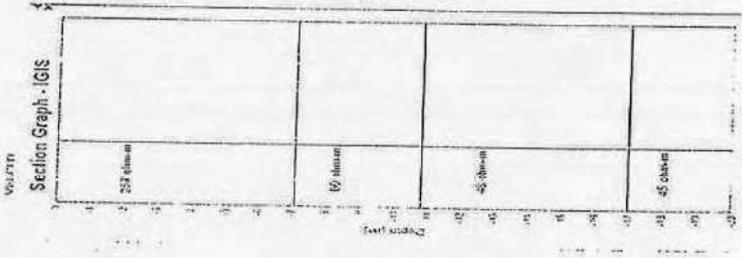
Layer No.	Inv	Thick.	Depth
	0.2m	m	m
1	128	3.8	5.6
2	125	4.4	12
3	13		

Location: INHORE PORT BACKUP YARD
 VES No.: EN - 03
 Date: 12/07/2015
 Latitude: NORTH EAST - SOUTH WEST
 Longitude:
 Elevation:



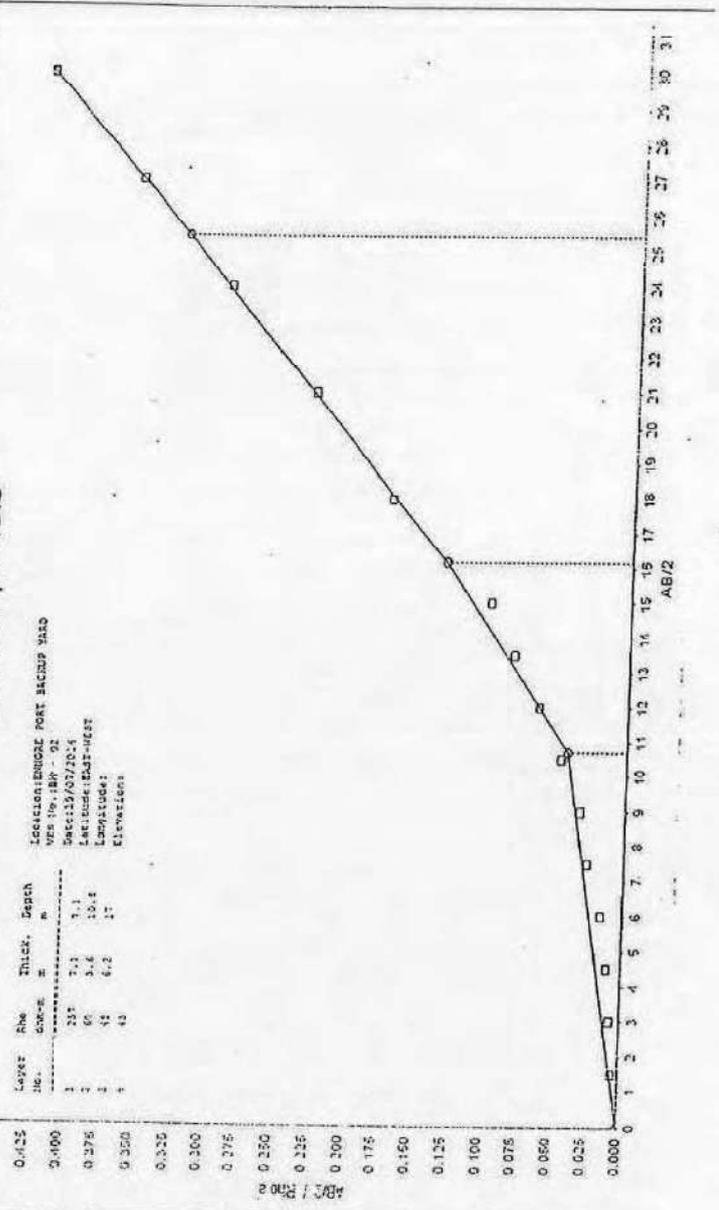
CLIENTE: MALABANI BONDAGE CONTAINER TERMINAL PVT LTD.

Inverse Slope - IGIS

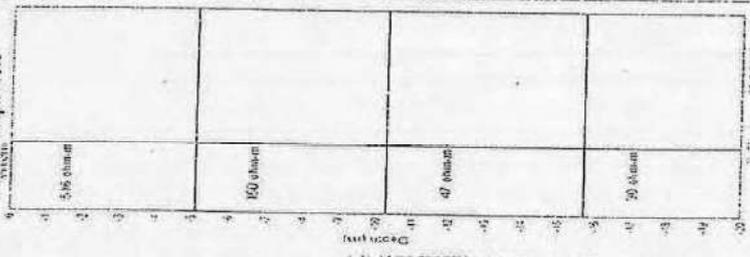


Layer No.	Rhe. course #	Thick. #	Depth m
1	25	7.1	1.1
2	6	3.4	15.4
3	11	6.2	17

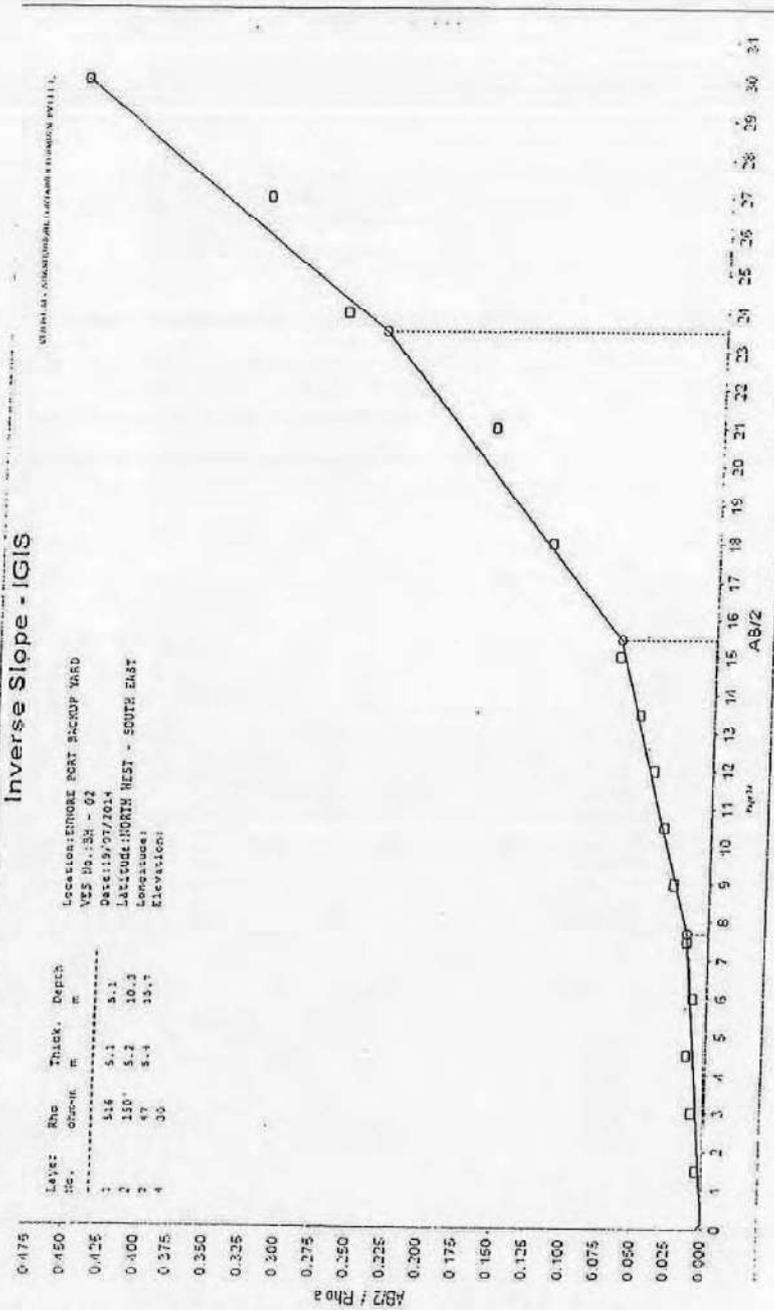
Location: BUDGET POST BACKUP 2020
 VES No: 18K - 01
 Date: 15/07/2015
 Location: EAST-WEST
 Elevation:

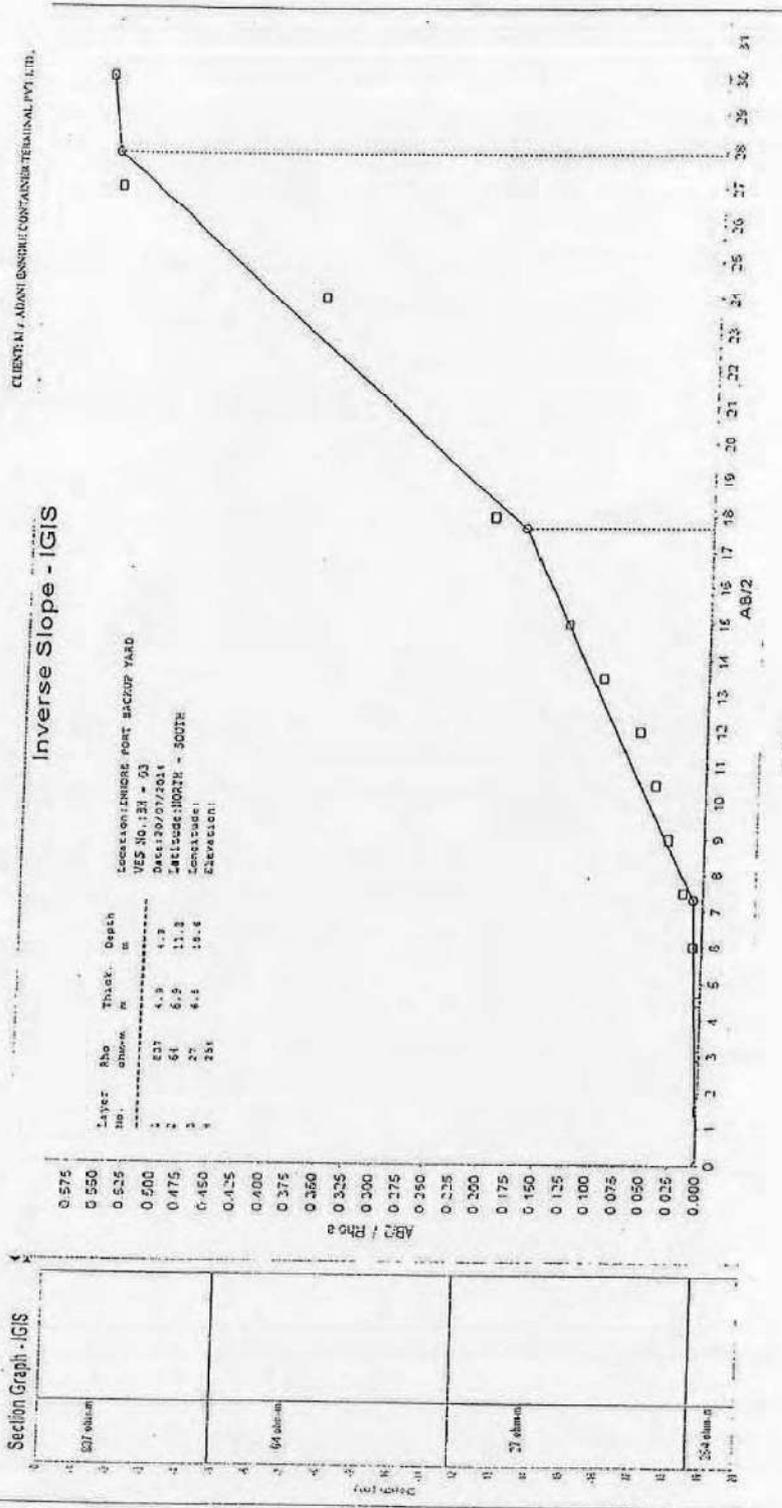


Section Graph - IGIS



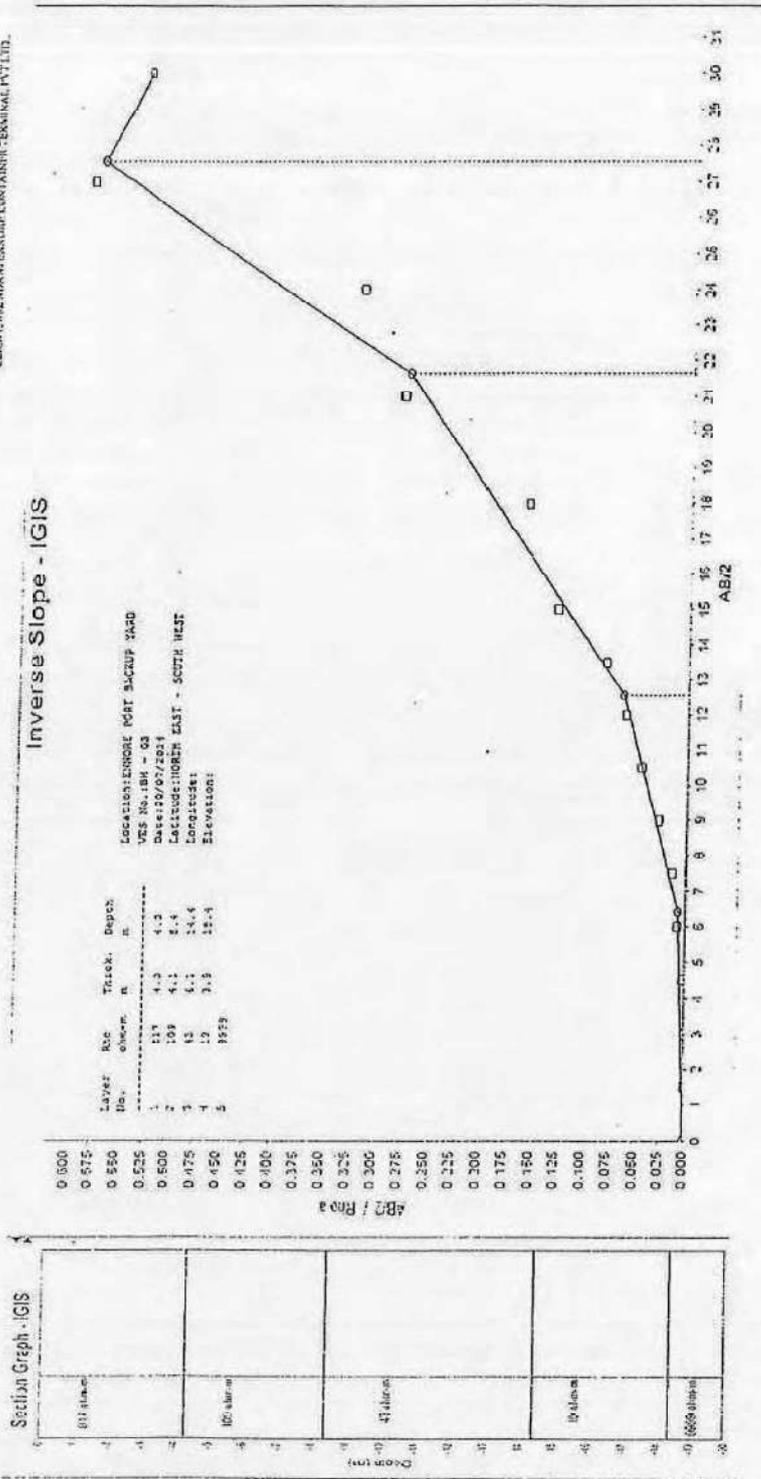
Inverse Slope - IGIS

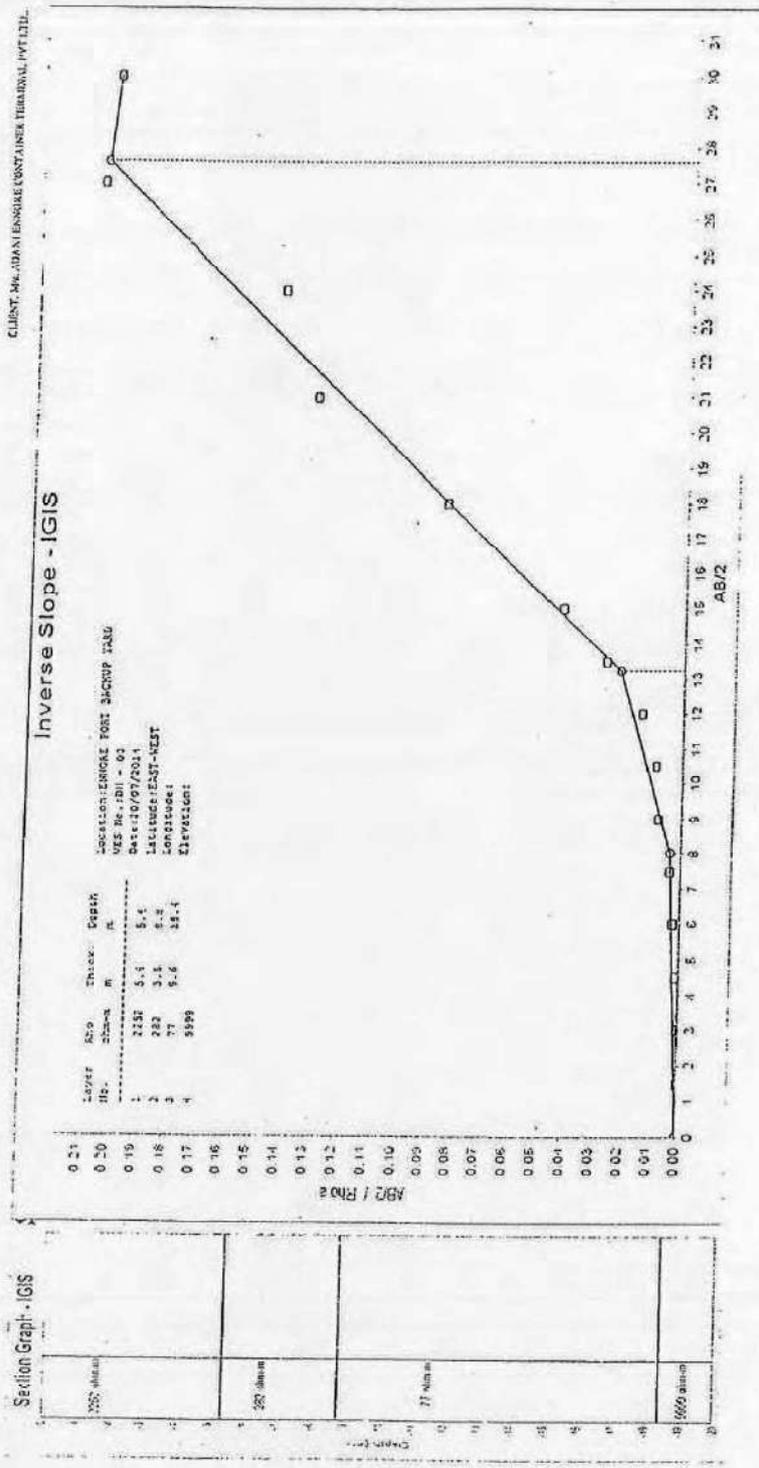


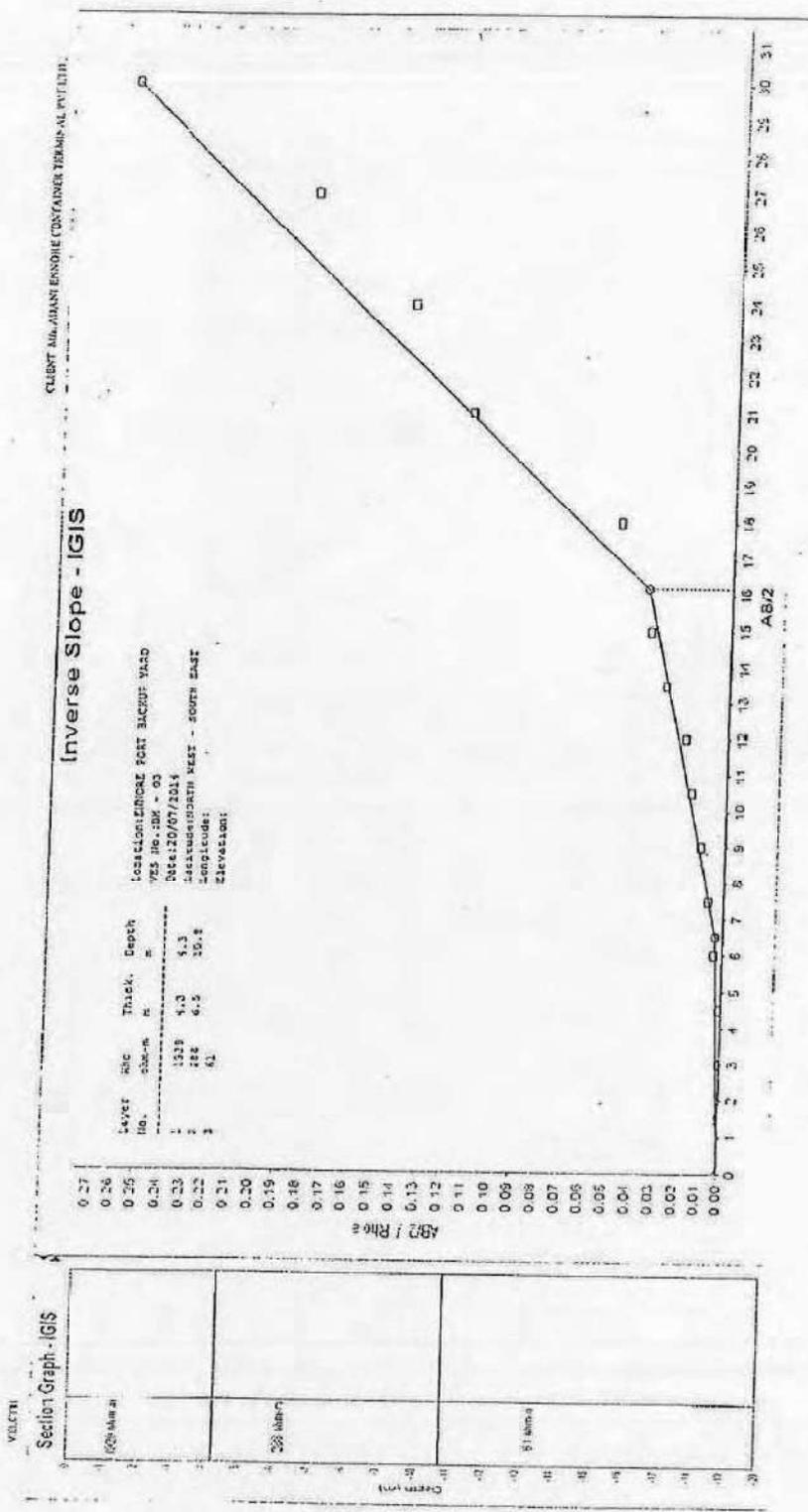


CLIENT: MVA ADAMH INSULIU CONTAINER TERMINAL PT LTD.

Inverse Slope - IGIS



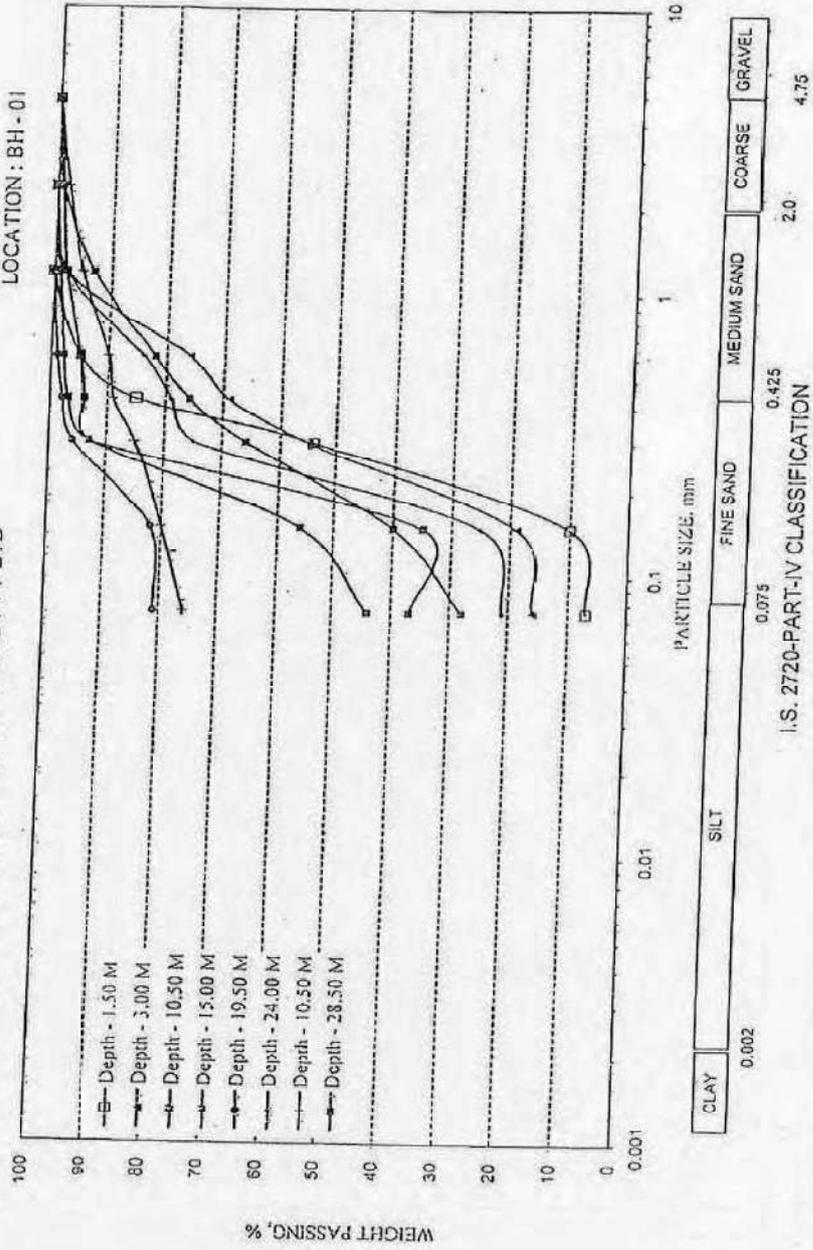




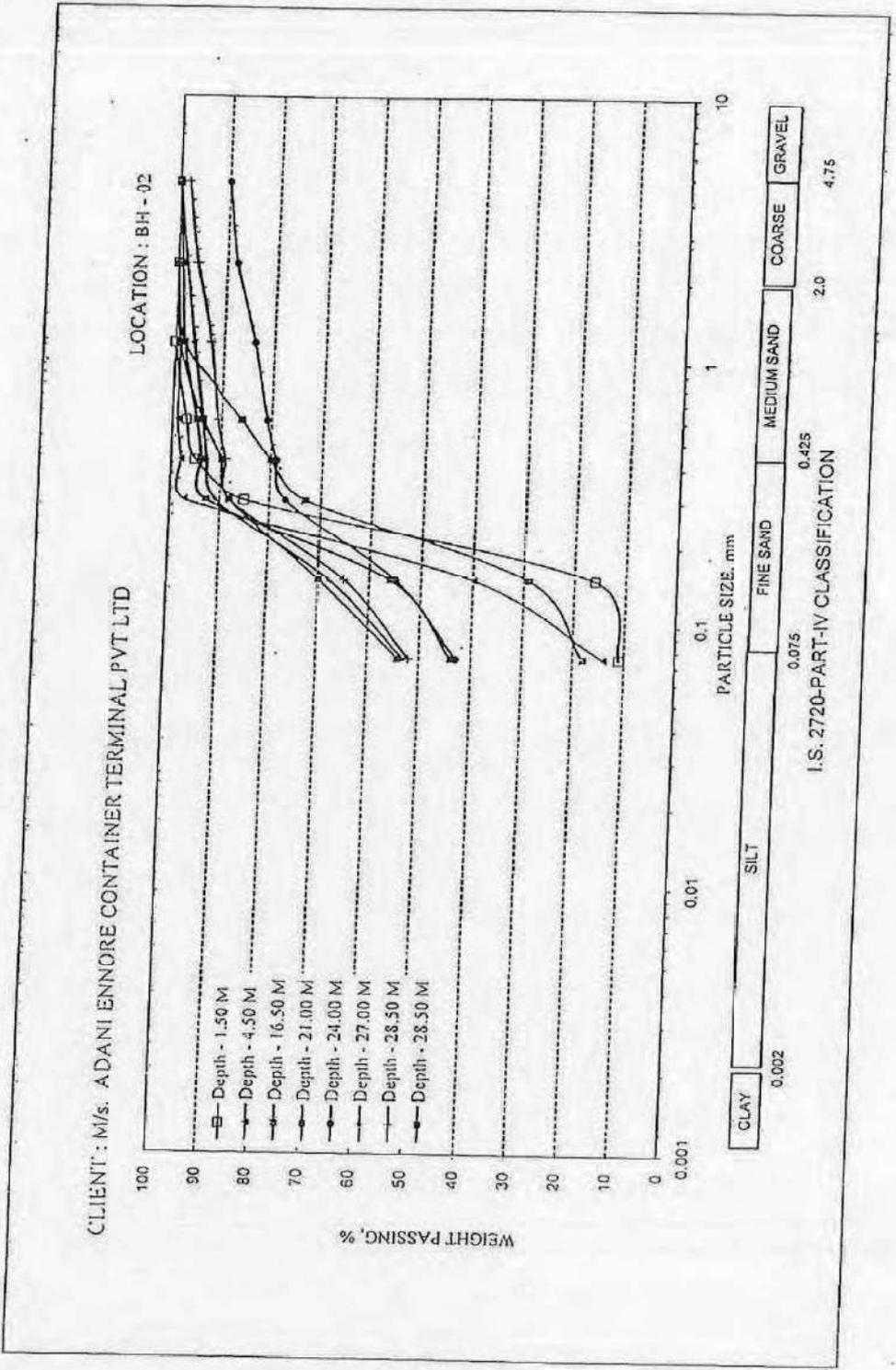
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CLIENT : M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD

LOCATION : BH - 01



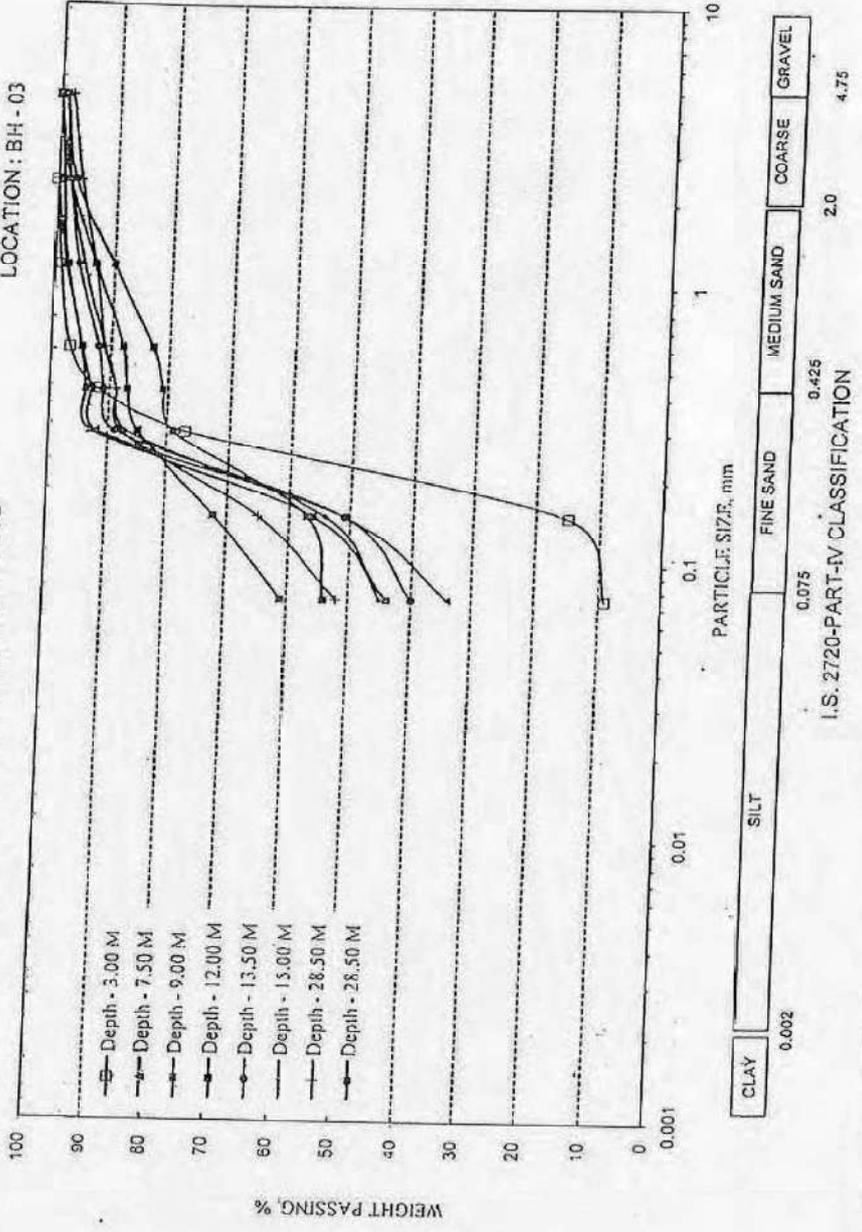
CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT. LTD.



CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL, PVT LTD.

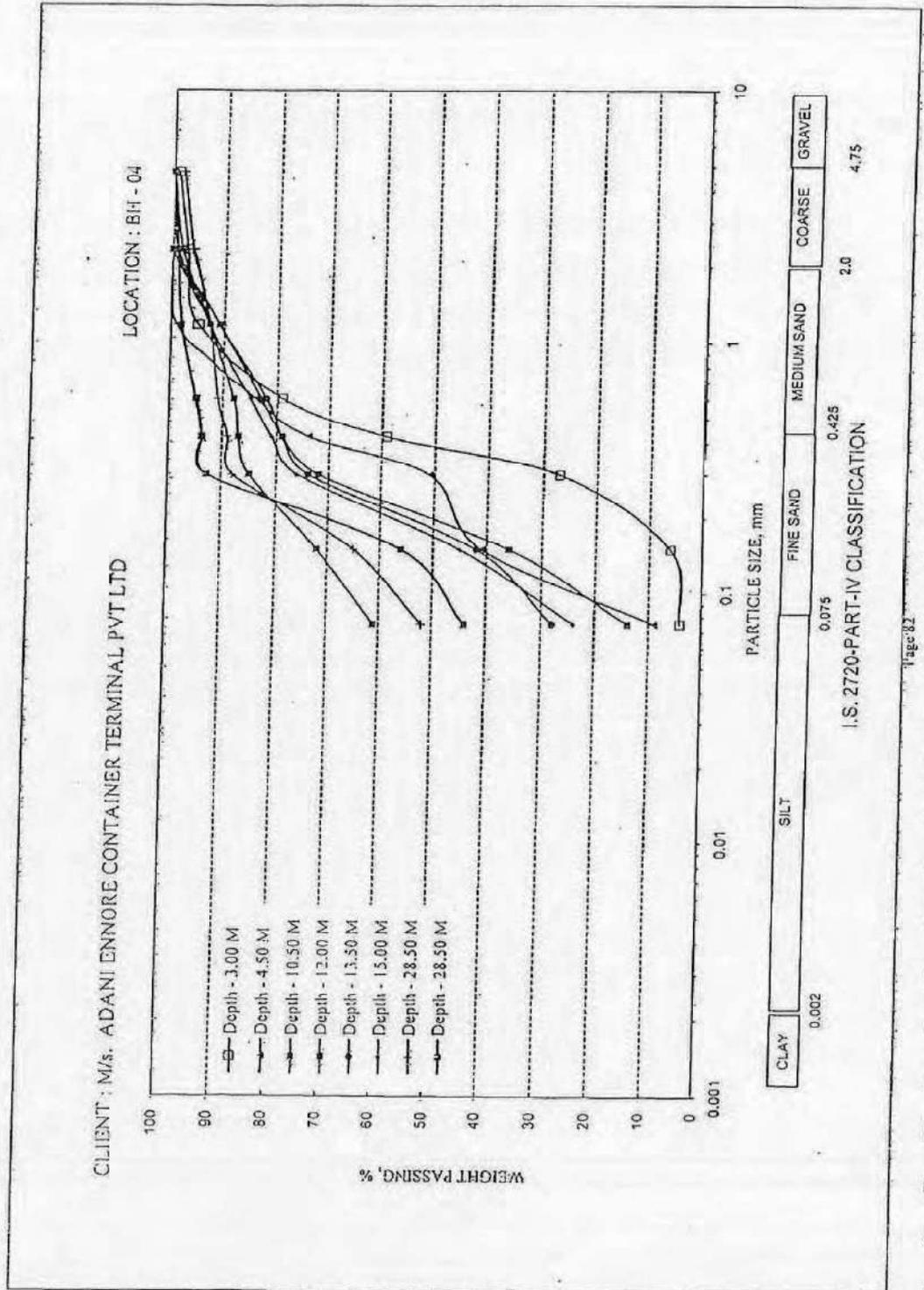
CLIENT : M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD

LOCATION : BH - 03



VELOCITY

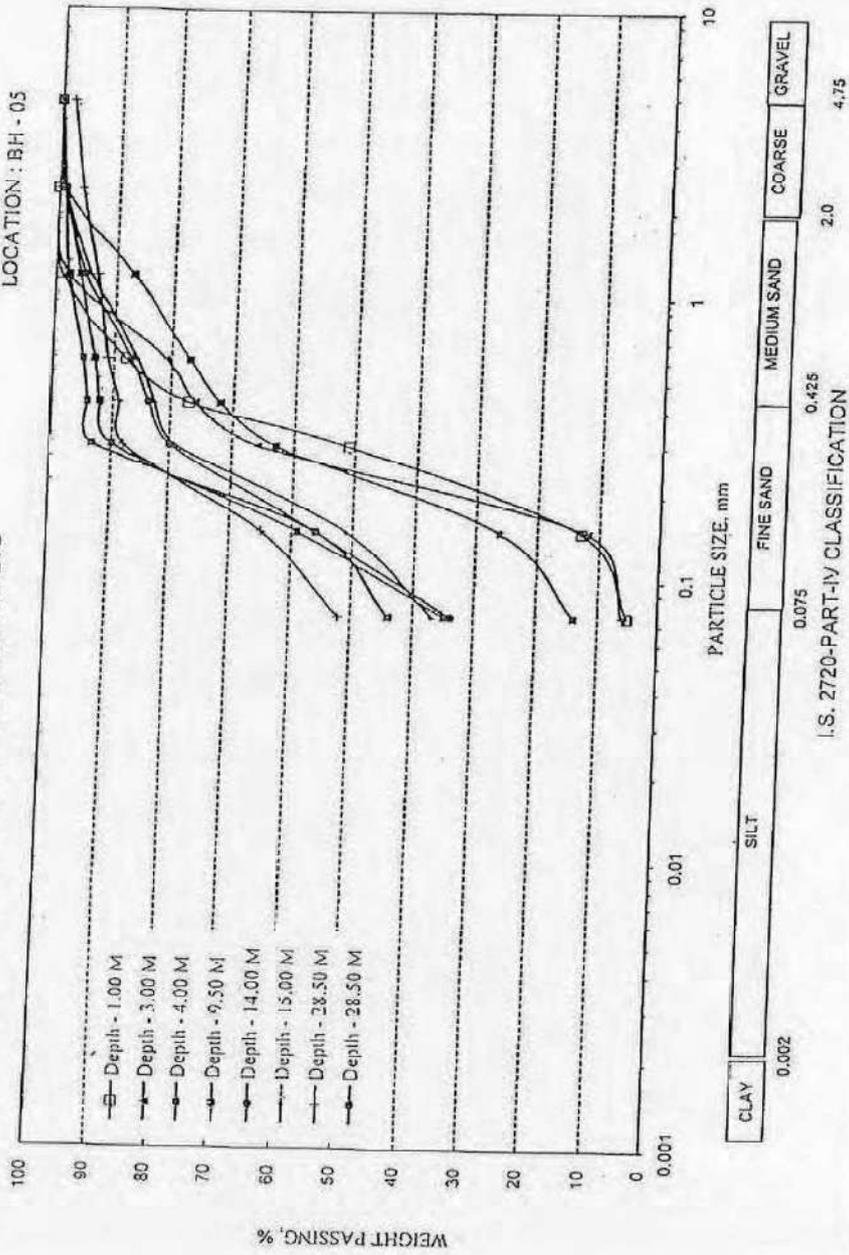
CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.



CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.

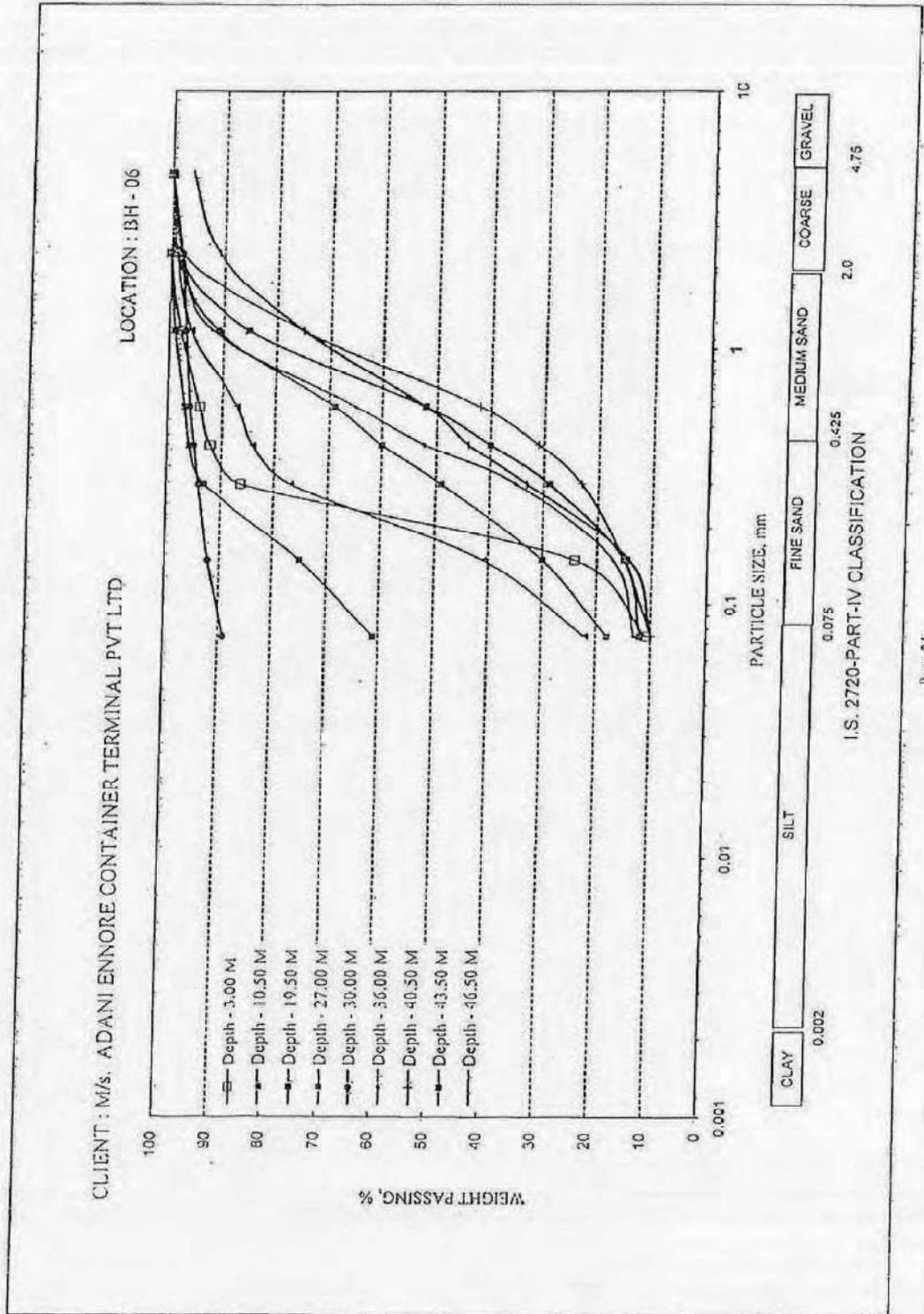
CLIENT : M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD

LOCATION : BH - 05



CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD.

YBLC111



CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL, PVT LTD.,

CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD

LOCATION: BH - 07

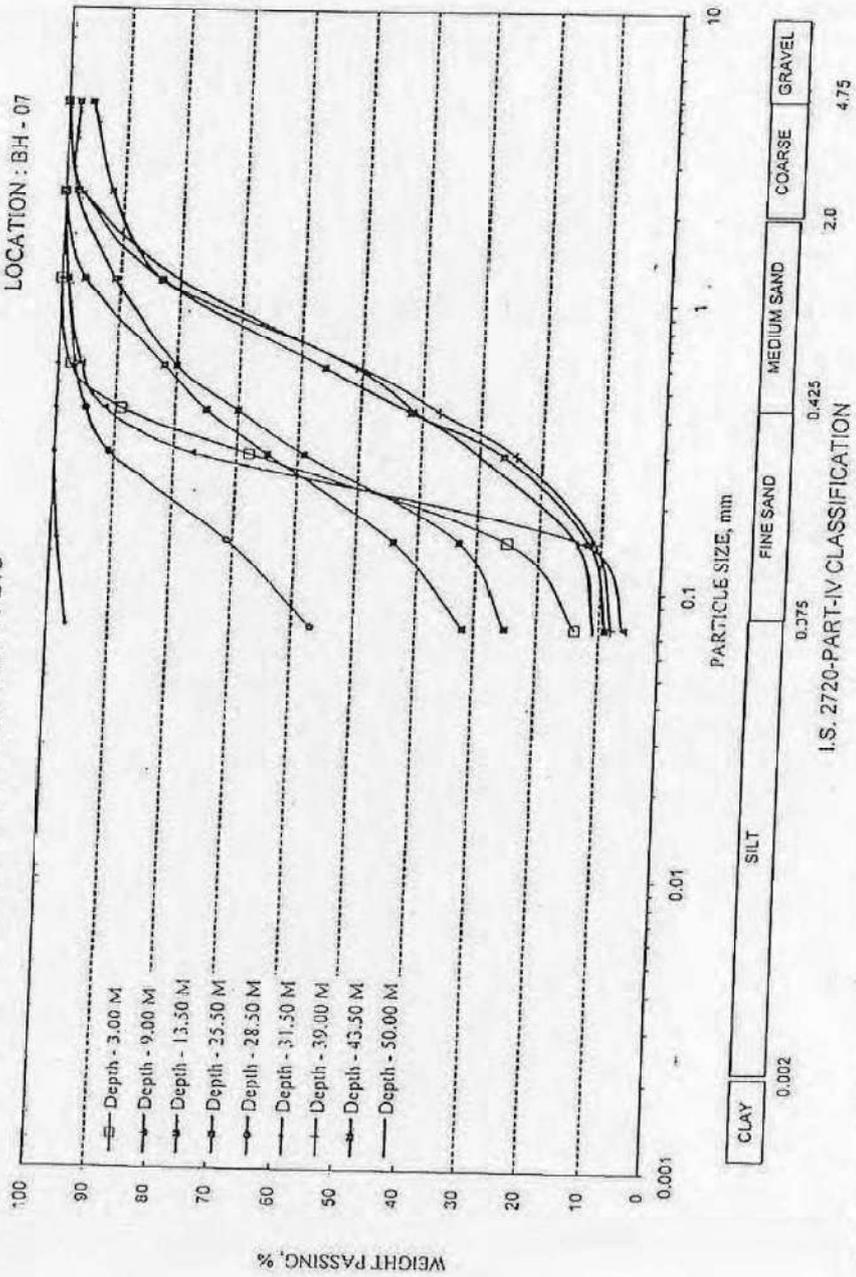
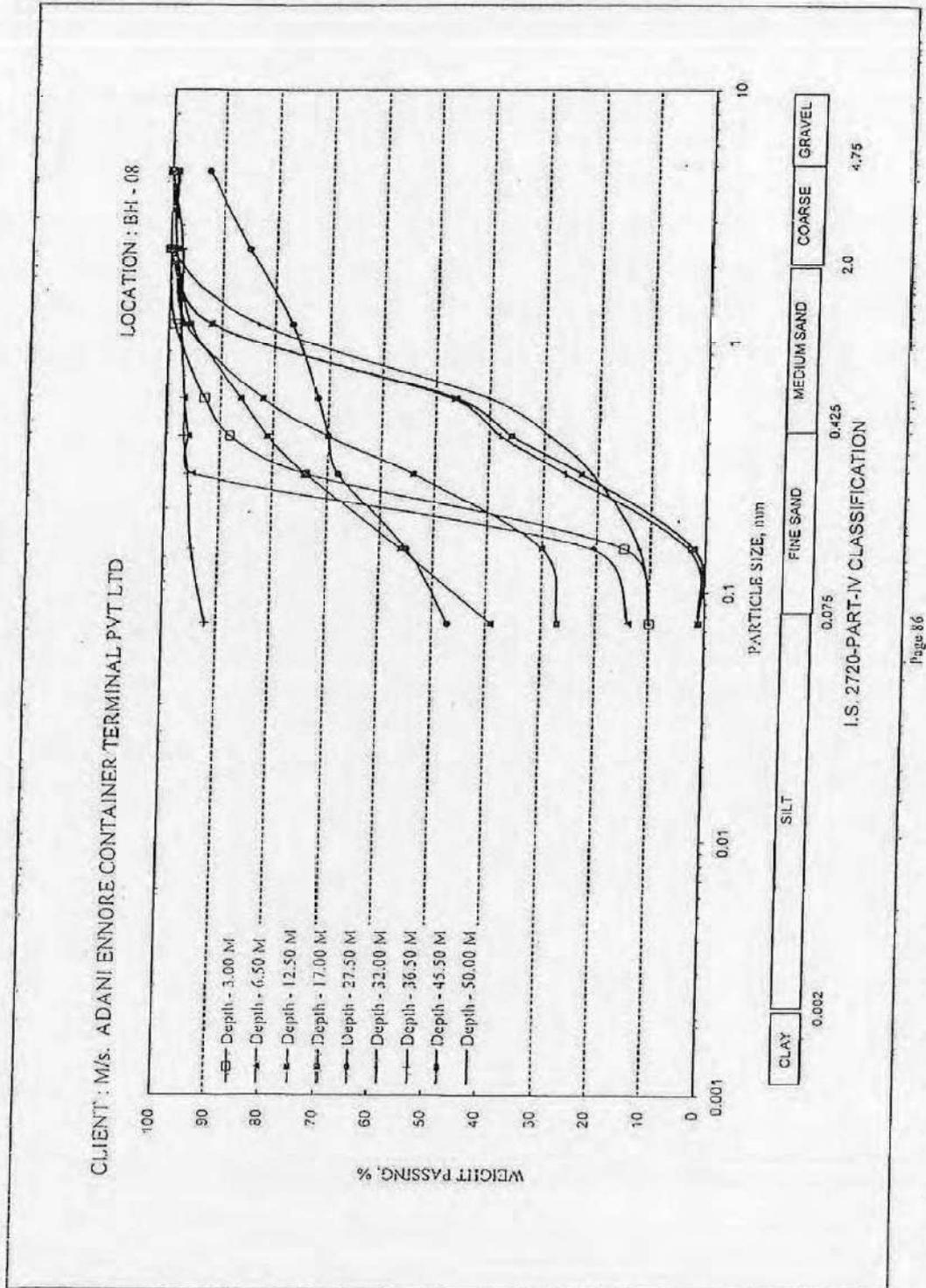


Figure 85

VELSHT

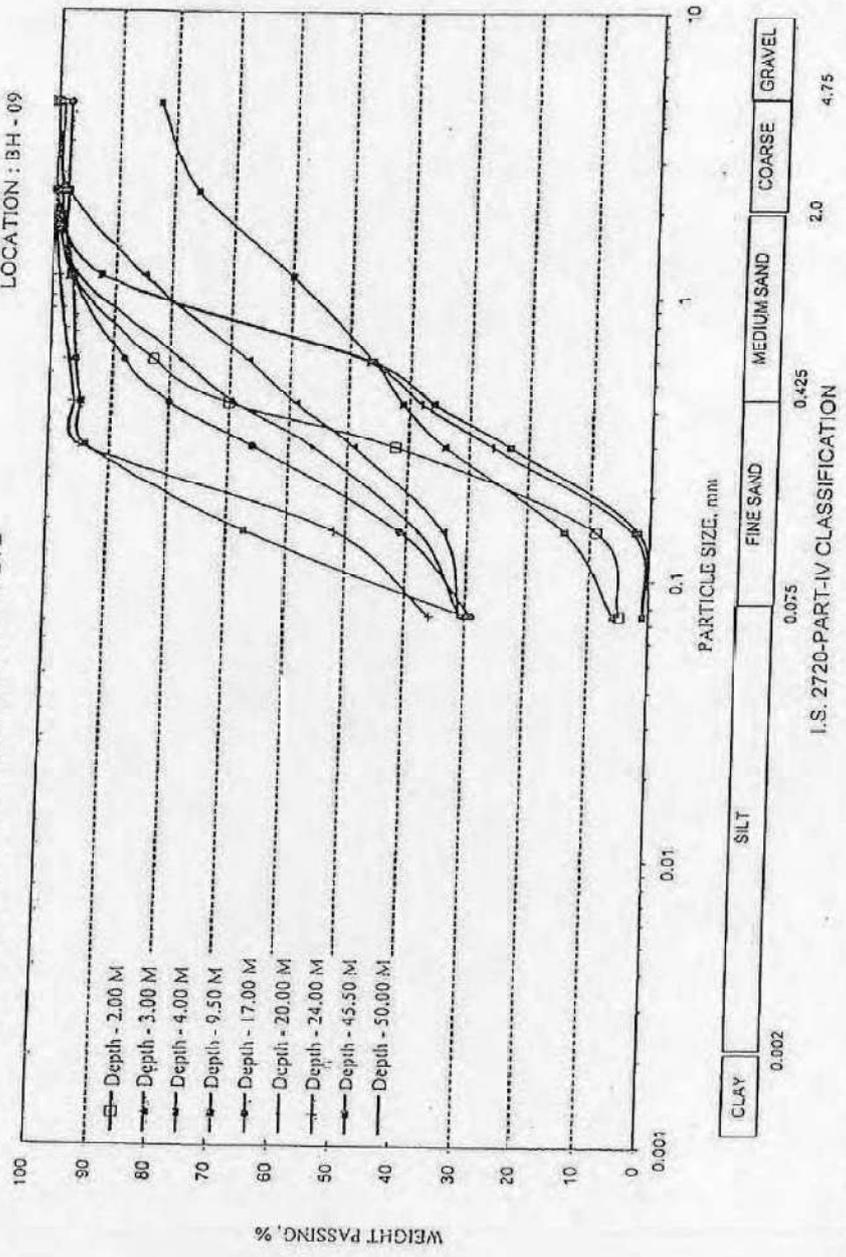
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CLIENT: M/s. ADANI ENNORE CONTAINER TERMINAL PVT. LTD.

CLIENT : M/s. ADANI ENNORE CONTAINER TERMINAL PVT LTD

LOCATION : BH - 09



ADANI ENNORE CONTAINER TERMINAL



D
E=427817.505
N=1467682.146

E=428251.843
N=1467732.802
z=4.335 CD
AP3
R

General Cargo Berth

G1 G2 G3

AP4
E=427790.500
N=1467663.274
z=5.307 CD

C
E=428317.505
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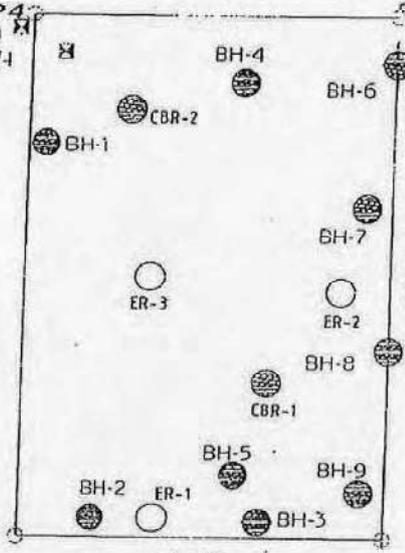
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N=1466952.146

RJ2
E=428199.7
N=1466952.146

SICAL JETTY

AP5
E=428199.7
N=1466952.146



REFERENCES

- 1 IS:6403 - 1981
- 2 IS : 2720 (Methods of test of soils)
- 3 IS : 2911 - (Part / Sec-2) - 1979
- 4 IS : 2131 - 1981
- 5 IS:8009 (Part-1) 1976
- 6 IRC 78 : 2000
- 7 Wayne C.Teng (1992), Foundation design,
13th reprint, Prentice- Hall of India Pvt. Ltd.,
- 8 Bowles J.E,(1982) Foundation Analysis and design,
3rd edition, McGraw Hill International Book co.
- 9 Tomlinson M.J. (1995) Foundation Design and
Construction, 6th edition, Longman Group.



SOIL EXPLORATION REPORT

For

M/s. KAMARAJAR PORT LIMITED,

Ref: GEO- 332-2015

Date: 22.12.15 to 29.12.15

PROJECT NAME:

SOIL INVESTIGATION FOR THE PROPOSED BERTH AREA FOR
THE DEVELOPMENT OF RORO CUM GENERAL CARGO
BERTH AT KAMARAJAR PORT LIMITED, CHENNAI.



GEO DESIGN

(An ISO 9001 : 2008 Certified Company)

Soil Investigations, SPT Test, DTH, Diamond core drilling, & Grouting works

Old no – 40 , New no – 29 , 8th street , K.K.Pudur, Coimbatore - 38

Ph. 0422 4202452 Mobile : 90433 - 44488

E - mail: geodesign123@gmail.com , Web : www.geodesign.co.in



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1. INTRODUCTION

1.1. PURPOSE AND SCOPE

Geo-technical site investigation work for. “SOIL INVESTIGATION FOR THE PROPOSED BERTH AREA FOR THE DEVELOPMENT OF RORO CUM GENERAL CARGO BERTH AT KAMARAJAR PORT LIMITED, CHENNAI.” The primary purpose of our investigation is to obtain data to develop foundation design recommendations for the above work. At, first instance, Four boreholes was bored at site. Client’s representatives selected the locations of borings. To accomplish these purposes, the following tasks were performed:

1. Detailed soil borings were done up to stratum to explore the sub surface stratigraphy and obtain soil samples for testing. Field and laboratory tests were conducted to evaluate the index and engineering properties of the soils
2. Engineering analysis were performed to develop foundation design information for proposed structure

1.2. THE SITE :

“SOIL INVESTIGATION FOR THE PROPOSED BERTH AREA FOR THE DEVELOPMENT OF RORO CUM GENERAL CARGO BERTH AT KAMARAJAR PORT LIMITED, CHENNAI.”

2. FIELD INVESTIGATIONS

2.1. ROTARY BORING

Rotary drilling technique was adapted using Calyx machine in this field. In this method, boring is effected by the cutting action of a rotating bit that is kept in firm contact with the bottom of the hole. The bit is attached to the lower end of a hollow drill rod that is rotated by a suitable chuck. Drilling mud (usually Bentonite) is continuously forced down the hollow drill rods. The mud returning upwards though the annular space between the drill rods and the side of the hold bring the cutting to the surface.



2.2. STANDARD PENETRATION TEST

It is now most commonly used in site test. The test measures the penetration resistance of the split spoon sampler, when it is driven into the soil, at the bottom of a borehole in a standard manner. The N-value, which is the number of blow required to achieve 300mm penetration of the soil, indicates the relative density of sand or gravel, the consistency of other soil such as silts or clays and the strength of weak rocks. The test is described in IS 2131 - 1981. The split spoon sampler is attached to stiff drill rod and lowered to the bottom of the bore hold. A standard blow consists of dropping a mass of 63.5kg free fall through 750 mm on to an anvil at the top of the rods and ensuing that this amount of dynamic energy is transferred to the sampler as much as possible.

The number of blows required to achieve each 150mm penetration is recorded for a fall penetration of 450mm. The initial 150mm penetration is referred to as seating drive and the blows required for this penetration are not considered as this zone is in disturbed soil. The next 300mm of penetration is referred to as the test drive and the number of blows required to achieve this fully is termed the penetration resistance or N-value.

2.3. SAMPLING

Soil samples were collected through Split spoon and rock core sample were collected through single tube core barrel.

3.LABORATORY TESTS

The operations to be performed in the laboratory depend upon the type of the nature of data required for the problem at hand. In case of cohesionless material, like sand, the laboratory tests are usually minimum and the design parameters are worked out from field test data such as form SPT- N value, Core resistance and plate load test data.

In the case of cohesive soils, the programme of laboratory testing can vary from carrying out simple tests such as unconfined tests to comprehensive study of soil behaviour using triaxial shear tests and consolidation tests.

Following laboratory tests are conducted.

For Cohesion & cohesionless soil

- a) Specific gravity
- b) Sieve analysis
- c) Atterberg's limits
- d) Natural moisture content



4. FOUNDATION ANALYSIS

4.1 Soil Profile

The profile of the area as observed in the bore hole is given in the chart. The water level is observed far below. The soil layer up to 45.00m depth is SILTY SAND WITH SHELL FORMATION was obtained.

4.2 Safe Bearing Capacity

The bearing capacity of granular soil depends upon the unit weight and angle of internal friction of the soil. These two properties of granular soils are determined by standard penetration tests.

The allowable bearing pressure based on tolerable settlement has been established empirically by Terzaghi and Peck, 1948 and may be expressed by the equation.

$$\text{Safe bearing capacity (SBC)} = 3.5 (N-3) \left\{ \frac{B+0.3}{2B} \right\}^2 \times R_W \times F_D + P$$

Where

N = Corrected N value N1

B = Width of Foundation = constant 1

RW = Water Correction = constant 0.5

FD = Depth of Factor = constant 1

P = Over Burden Pressure



5 . RECOMMENDATION

- The site of “SOIL INVESTIGATION FOR THE PROPOSED BERTH AREA FOR THE DEVELOPMENT OF RORO CUM GENERAL CARGO BERTH AT KAMARAJAR PORT LIMITED, CHENNAI.” The borehole investigation was conduct and SBC was determined.
- The site up to 45.00 m SILTY SAND WITH SHELL FORMATION is obtained.
- The **PILE FOUNDATION IS RECOMMENDED** for this site (See the Annexure-I).

Note:

- The detailed SBC at every 1.50m is mentioned in page no -15 to 21.

**Er.K.P.VETRISELVAN.ME(GEOTECH),MIGS,MISTE.,
GEOTECHNICAL ENGINEER**

S.NO	TITLE	ENGINEER'S NAME	SIGNATURE
1	Lab testing	Er.S.Chitra	
2	Report prepared by	Er. S.Lingam	
3	Corrected by	Er.P.Sudharsanaswathiselvan	
4	Checked by	Er.K.P.Vetriselvan	

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6. REFERENCES

1. IS :6403-1981
2. IS :1892-1979
3. IS :2131-1981
4. IS :8009 (Part-1) 1976
5. Moisture content- IS :2720(Part-2)1973
6. Sieve analysis- IS :2720(Part-4)1985
7. Atterberg Limits- IS :2720(Part-5)1985
8. Specific gravity- IS :2720-1980
9. Pile Foundation- IS 2911-2010
10. Wayne CTEng(1992)Foundation design,13th reprint,
Prentice - Hall of India Pvt.Ltd.,
11. Bowles J.E,(1982) Foundation Analysis and design ,3rd edition, Mc Graw Hill
International Book Co.
12. Tomlinson M.J. (1995) Foundation Design and Construction, 6th edition, Longman
Group.



1(i)
Bore Log

Ref: GEO/ 332/ 2015

Name of Project: SOIL INVESTIGATION FOR THE PROPOSED BERTH AREA FOR THE DEVELOPMENT OF RORO CUM GENERAL CARGO BERTH AT KAMARAJAR PORT LIMITED, CHENNAI.

Soil Investigation done by: GEO DESIGN
Soil Exploration
Contractor,
Coimbatore-38

Type of Drilling: Rotary – Mud Circulation

G.W.T-
1.35m

Bed Level :
Chainage :

Bore hole No:1(i)
Location/R.L:

Date of commencement : 22.12.2015
Date of completion : 25.12.2015

Depth below G.L. (R.L)	Soil Profile	Description of Soil	Thickness of layer (m)	Standard penetration test data					Relative density / Consistency	Graphical representation of penetration resistance										
				Depth at which test is conducted	N – Value- Depth of penetration					0	20	40	60	80	100					
					15cm	30cm	45cm	For 30cm												
0.20		Filling soil	0.20																	
		Silty sand	7.20	1.50	8	12	14	26	Medium											
				3.00	8	8	12	20	Medium											
				4.50	7	6	13	19	Medium											
7.40				6.00	22	41	44	>50	V.Dense											
		Silty sand with shell formation	18.10	7.50	7	12	21	33	Dense											
				9.00	9	14	23	37	Dense											
				10.50	8	16	26	42	Dense											
				12.00	9	11	13	24	Medium											
				13.50	10	12	16	28	Medium											
				15.00	3	4	5	9	Loose											
				16.50	4	2	3	5	Loose											
				18.00	3	3	4	7	Loose											
				19.50	6	10	12	22	Medium											
				21.00	4	8	10	18	Medium											
				22.50	6	9	11	20	Medium											
				24.00	8	10	14	24	Medium											
				25.50	7	11	12	23	Medium											
25.50m		End of Bore hole																		

Contd.....1(ii)



1(ii)
Bore Log

Ref: GEO/ 332/ 2015

Name of Project: SOIL INVESTIGATION FOR THE PROPOSED BERTH AREA FOR THE DEVELOPMENT OF RORO CUM GENERAL CARGO BERTH AT KAMARAJAR PORT LIMITED, CHENNAI.

Soil GEO DESIGN
Investigation Soil Exploration
done by: Contractor,
Coimbatore-38

Type of Drilling: Rotary – Mud Circulation

G.W.T-
1.35m

Bed Level :
Chainage :

Bore hole No:1(ii)
Location/R.L:

Date of commencement : 22.12.2015
Date of completion : 25.12.2015

Depth below G.L. (R.L)	Soil Profile	Description of Soil	Thickness of layer (m)	Standard penetration test data					Relative density / Consistency	Graphical representation of penetration resistance					
				Depth at which test is conducted	N – Value- Depth of penetration					0	20	40	60	80	100
					15cm	30cm	45cm	For 30cm							
25.50				27.00	6	9	16	25	Medium						
				28.50	5	7	11	18	Medium						
				30.00	9	9	16	25	Medium						
				31.50	7	10	13	23	Medium						
				33.00	9	13	17	30	Medium						
		Silty sand	19.50	34.50	7	15	32	47	Dense						
				36.00	5	37	48	>50	V.Dense						
				37.50	10	19	37	>50	V.Dense						
				39.00	11	23	44	>50	V.Dense						
				40.50	19	37	48	>50	V.Dense						
				42.00	17	33	45	>50	V.Dense						
				43.50	15	28	39	>50	V.Dense						
45.00m		End of Bore hole		45.00	19	37	47	>50	V.Dense						

Contd.....2(i)



2(i)
Bore Log

Ref: GEO/ 332/ 2015

Name of Project: SOIL INVESTIGATION FOR THE PROPOSED BERTH AREA FOR THE DEVELOPMENT OF RORO CUM GENERAL CARGO BERTH AT KAMARAJAR PORT LIMITED, CHENNAI.

Soil GEO DESIGN
Investigation Soil Exploration
done by: Contractor,
Coimbatore-38

Type of Drilling: Rotary – Mud Circulation

G.W.T-
1.55m

Bed Level :
Chainage :

Bore hole No:2(i)
Location/R.L:

Date of commencement : 22.12.2015
Date of completion : 25.12.2015

Depth below G.L. (R.L)	Soil Profile	Description of Soil	Thickness of layer (m)	Standard penetration test data					Relative density / Consistency	Graphical representation of penetration resistance									
				Depth at which test is conducted	N – Value- Depth of penetration					0	20	40	60	80	100				
					15cm	30cm	45cm	For 30cm											
0.30		Filling soil	0.30																
		Silty sand	7.00	1.50	9	9	11	20	Medium										
				3.00	6	14	12	26	Medium										
				4.50	8	10	14	24	Medium										
7.30				6.00	12	16	23	39	Dense										
				7.50	8	12	19	31	Dense										
				9.00	12	15	18	33	Dense										
				10.50	9	12	18	30	Dense										
				12.00	5	8	9	17	Medium										
				13.50	6	6	8	14	Medium										
				15.00	3	4	6	10	Loose										
		Silty sand with shell formation	18.20	16.50	3	3	4	7	Loose										
				18.00	3	2	2	4	Loose										
				19.50	6	11	15	26	Medium										
				21.00	10	13	15	28	Medium										
				22.50	12	15	18	33	Dense										
				24.00	7	10	9	19	Medium										
				25.50	9	13	11	24	Medium										
25.50m																			

Contd.....2(ii)



2(ii)
Bore Log

Ref: GEO/ 332/ 2015

Name of Project: SOIL INVESTIGATION FOR THE PROPOSED BERTH AREA FOR THE DEVELOPMENT OF RORO CUM GENERAL CARGO BERTH AT KAMARAJAR PORT LIMITED, CHENNAI.

Soil Investigation done by: GEO DESIGN
Soil Exploration
Contractor,
Coimbatore-38

Type of Drilling: Rotary – Mud Circulation

G.W.T-
1.55m

Bed Level :
Chainage :

Bore hole No:2(ii)
Location/R.L:

Date of commencement : 22.12.2015
Date of completion : 25.12.2015

Depth below G.L. (R.L)	Soil Profile	Description of Soil	Thickness of layer (m)	Standard penetration test data					Relative density / Consistency	Graphical representation of penetration resistance					
				Depth at which test is conducted	N – Value- Depth of penetration					0	20	40	60	80	100
					15cm	30cm	45cm	For 30cm							
25.50				27.00	5	9	10	19	Medium						
				28.50	7	10	14	24	Medium						
				30.00	12	15	29	44	Dense						
				31.50	20	36	45	>50	V.Dense						
				33.00	21	24	42	>50	V.Dense						
		Silty sand	19.50	34.50	37	47	>50	>50	V.Dense						
				36.00	12	22	38	>50	V.Dense						
				37.50	19	28	41	>50	V.Dense						
				39.00	15	25	47	>50	V.Dense						
				40.50	14	28	45	>50	V.Dense						
				42.00	10	22	47	>50	V.Dense						
				43.50	25	37	41	>50	V.Dense						
45.00m		End of Bore hole		45.00	16	33	48	>50	V.Dense						

Contd.....3(i)



3(i)
Bore Log

Ref: GEO/ 332/ 2015

Name of Project: SOIL INVESTIGATION FOR THE PROPOSED BERTH AREA FOR THE DEVELOPMENT OF RORO CUM GENERAL CARGO BERTH AT KAMARAJAR PORT LIMITED, CHENNAI.

Soil Investigation done by: GEO DESIGN
Soil Exploration
Contractor,
Coimbatore-38

Type of Drilling: Rotary – Mud Circulation

G.W.T-
3.15m

Bed Level :
Chainage :

Bore hole No:3(i)
Location/R.L:

Date of commencement : 22.12.2015
Date of completion : 25.12.2015

Depth below G.L. (R.L)	Soil Profile	Description of Soil	Thickness of layer (m)	Standard penetration test data					Relative density / Consistency	Graphical representation of penetration resistance									
				Depth at which test is conducted	N – Value- Depth of penetration					0	20	40	60	80	100				
					15cm	30cm	45cm	For 30cm											
0.50		Filling soil	0.50																
		Silty sand	8.10	1.50	8	12	15	27	Medium										
				3.00	9	12	14	26	Medium										
				4.50	10	11	15	26	Medium										
				6.00	9	13	16	29	Medium										
8.60				7.50	8	16	19	35	Dense										
		Silty sand with shell formation	16.90	9.00	11	18	24	42	Dense										
				10.50	9	15	18	33	Dense										
				12.00	8	14	21	35	Dense										
				13.50	4	6	8	14	Medium										
				15.00	3	5	5	10	Loose										
				16.50	3	4	6	10	Loose										
				18.00	3	4	5	9	Loose										
				19.50	10	12	16	28	Medium										
				21.00	13	16	18	34	Dense										
				22.50	10	17	30	47	Dense										
				24.00	18	20	39	>50	V.Dense										
				25.50	15	21	24	46	Dense										
25.50m																			

Contd.....3(ii)



3(ii)
Bore Log

Ref: GEO/ 332/ 2015

Name of Project: SOIL INVESTIGATION FOR THE PROPOSED BERTH AREA FOR THE DEVELOPMENT OF RORO CUM GENERAL CARGO BERTH AT KAMARAJAR PORT LIMITED, CHENNAI.

Soil GEO DESIGN
Investigation Soil Exploration
done by: Contractor,
Coimbatore-38

Type of Drilling: Rotary – Mud Circulation

G.W.T-
3.15m

Bed Level :
Chainage :

Bore hole No:3(ii)
Location/R.L:

Date of commencement : 22.12.2015
Date of completion : 25.12.2015

Depth below G.L. (R.L)	Soil Profile	Description of Soil	Thickness of layer (m)	Standard penetration test data					Relative density / Consistency	Graphical representation of penetration resistance					
				Depth at which test is conducted	N – Value- Depth of penetration					0	20	40	60	80	100
					15cm	30cm	45cm	For 30cm							
25.50				27.00	19	25	27	>50	V.Dense						
				28.50	10	13	17	30	Medium						
				30.00	12	15	22	37	Dense						
				31.50	15	25	27	>50	V.Dense						
				33.00	10	19	33	>50	V.Dense						
		Silty sand	19.50	34.50	12	23	44	>50	V.Dense						
				36.00	29	34	40	>50	V.Dense						
				37.50	10	30	37	>50	V.Dense						
				39.00	15	27	44	>50	V.Dense						
				40.50	22	29	40	>50	V.Dense						
				42.00	27	37	48	>50	V.Dense						
				43.50	29	39	46	>50	V.Dense						
45.00m		End of Bore hole		45.00	33	44	47	>50	V.Dense						

Contd....4



4
Bore Log

Ref: GEO/ 332/ 2015

Name of Project: SOIL INVESTIGATION FOR THE PROPOSED BERTH AREA FOR THE DEVELOPMENT OF RORO CUM GENERAL CARGO BERTH AT KAMARAJAR PORT LIMITED, CHENNAI.

Soil Investigation done by: GEO DESIGN
Soil Exploration Contractor,
Coimbatore-38

Type of Drilling: Rotary – Mud Circulation

G.W.T- 1.00m

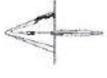
Bed Level :
Chainage :

Bore hole No:4
Location/R.L:

Date of commencement : 29.12.2015
Date of completion : 29.12.2015

Depth below G.L.(R.L)	Soil Profile	Description of Soil	Thickness of layer (m)	Standard penetration test data					Relative density / Consistency	Graphical representation of penetration resistance										
				Depth at which test is conducted	N – Value- Depth of penetration					0	20	40	60	80	100					
					15cm	30cm	45cm	For 30cm												
1.20		Filling soil	1.20																	
		Silty sand with shell formation	8.80	1.50	6	10	11	21	Medium											
				3.00	8	12	15	27	Medium											
				4.50	9	11	14	25	Medium											
				6.00	8	16	19	35	Dense											
				7.50	9	14	23	37	Dense											
				9.00	12	15	13	28	Dense											
10.00m		End of Bore hole		10.00	10	13	13	26	Dense											

Geotechnical Engineer



1(i)
SOIL TEST RESULTS

Ref: GEO/332/ 2015

Name of Project: SOIL INVESTIGATION FOR THE PROPOSED BERTH AREA FOR THE DEVELOPMENT OF RORO CUM GENERAL CARGO BERTH AT KAMARAJAR PORT LIMITED, CHENNAI.																		
Geo Design Soil Exploration Contractor, Coimbatore-38		BORE NUMBER-1(i) CHAINAGE:		REDUCED LEVEL:		GROUND WATER LEVEL: 1.35 m		WORK COMMENCEMENT ON 22.12.2015		WORK COMPLETED ON 25.12.2015								
SOIL PROFILE AND DEPTH IN METRES	DEPTH OF SAMPLING	IS SOIL CLASSIFICATION	NATURAL WET DENSITY K _m ³	NATURAL MOISTURE CONTENT %	SIEVE ANALYSIS % PASSING IS SIEVE ANALYSIS				STANDARD PENETRATION TEST				CONSOLIDATION TEST					
					LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX	% of GRAVEL	% of SAND	% of SILT	% of CLAY	SPECIFIC GRAVITY	COHESION C _{ton} / M ²	ANGLE OF INTERNAL FRICTION °	DEPTH OF TESTING M	OBSERVED N	CORRECTED N VALUE	SAFE BEARING CAPACITY T/m ²
	0.20	FS	-	-	-	-	-	-	-	-	1.50	26	30.00	21.01				
	7.40	SM	18.6	11.3	-	46.5	10.5	2.67	-	33	3.00	20	22.92	16.82				
				8	5	36.5	5				4.50	19	20.46	16.05				
											6.00	>50	50	38.93				
											7.50	33	27.05	23.02				
											9.00	37	28.37	25.05				
											10.50	42	30.31	27.53				
											12.00	24	20.03	20.98				
											13.50	28	21.65	23.24				
		SM (shell)	16.04	14.2	11	41	13	2.72	-	38	15.00	9	11.93	17.10				
			3	3							16.50	5	9.89	16.64				
											18.00	7	10.75	18.33				
											19.50	22	17.62	24.45				
											21.00	18	15.53	23.96				
											22.50	20	16.15	25.47				
											24.00	24	17.63	27.61				
	25.50										25.50	23	16.96	28.17				

FS-FILLING SOIL, SM-SILTY SAND, SM(shell)-SILTY SAND WITH SHELL FORMATION. Shear Test & SBC is based on SPT results.

Contd.....1(ii)



2(i)
SOIL TEST RESULTS

Ref: GEO/332/ 2015

Name of Project: SOIL INVESTIGATION FOR THE PROPOSED BERTH AREA FOR THE DEVELOPMENT OF RORO CUM GENERAL CARGO BERTH AT KAMARAJAR PORT LIMITED, CHENNAI.																			
Geo Design Soil Exploration Contractor, Coimbatore-38		BORE NUMBER-2(i) CHAINAGE:		REDUCED LEVEL:		GROUND WATER LEVEL: 1.55 m		WORK COMMENCEMENT ON 22.12.2015		WORK COMPLETED ON 25.12.2015									
SOIL PROFILE AND DEPTH IN METRES	DEPTH OF SAMPLING	IS SOIL CLASSIFICATION	NATURAL WET DENSITY K _m ³	NATURAL MOISTURE CONTENT %	SIEVE ANALYSIS % PASSING IS SIEVE ANALYSIS			SHEAR TEST			STANDARD PENETRATION TEST			CONSOLIDATION TEST					
					LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX	% of GRAVEL	% of SAND	% of SILT	% of CLAY	SPECIFIC GRAVITY	COHESION C _{ton} / M ²	ANGLE OF INTERNAL FRICTION °	DEPTH OF TESTING M	OBSERVED N	CORRECTED N VALUE	SAFE BEARING CAPACITY T/m ²	COMPRESSION INDEX C _c
	0.30	FS	-	-	-	-	-	-	-	-	1.50	20	24.81	17.17					
	7.30	SM	17.89	12.43	7	35.5	48	9.5	2.66	34	3.00	26	27.55	20.24					
											4.50	24	23.87	18.57					
											6.00	39	31.99	25.63					
											7.50	31	25.87	22.15					
											9.00	33	26.11	23.38					
											10.50	30	23.79	22.71					
											12.00	17	16.37	18.28					
											13.50	14	14.58	18.01					
		SM (shell)	16.58	14.38	10.5	41.5	37	11	2.73	35	15.00	10	12.43	17.47					
											16.50	7	10.84	17.35					
											18.00	4	9.36	17.30					
											19.50	26	19.46	25.81					
											21.00	28	19.99	27.25					
											22.50	33	21.77	29.62					
											24.00	19	15.52	26.05					
	25.50										25.50	24	17.38	28.47					

FS-FILLING SOIL, SM-SILTY SAND, SM(shell)-SILTY SAND WITH SHELL FORMATION. Shear Test & SBC is based on SPT results.

Contd.....2(ii)



3(i)
SOIL TEST RESULTS

Ref: GEO/332/ 2015

Name of Project: SOIL INVESTIGATION FOR THE PROPOSED BERTH AREA FOR THE DEVELOPMENT OF RORO CUM GENERAL CARGO BERTH AT KAMARAJAR PORT LIMITED, CHENNAI.																																		
Geo Design Soil Exploration Contractor, Coimbatore-38		BORE NUMBER-3(i) CHAINAGE:		REDUCED LEVEL:		GROUND WATER LEVEL: 3.15 m		WORK COMMENCEMENT ON 22.12.2015		WORK COMPLETED ON 25.12.2015																								
SOIL PROFILE AND DEPTH IN METRES	DEPTH OF SAMPLING	IS SOIL CLASSIFICATION	NATURAL WET DENSITY K _n /m ³	NATURAL MOISTURE CONTENT %	SIEVE ANALYSIS % PASSING IS SIEVE ANALYSIS				SHEAR TEST			STANDARD PENETRATION TEST				CONSOLIDATION TEST																		
					LIQUID LIMIT %	PLASTIC LIMIT %	PLASTICITY INDEX	% of GRAVEL	% of SAND	% of SILT	% of CLAY	COHESION C Ton / M ²		ANGLE OF INTERNAL FRICTION °		DEPTH OF TESTING M	OBSERVED N	CORRECTED N VALUE	SAFE BEARING CAPACITY T/m ²	COMPRESSION INDEX C _c	PRE - CONSOLIDATION PRESSURE KG/CM ²	INITIAL VOIDS RATIO	CO-EFFECT OF CONSOLIDATION CV IN CM ² /SEC											
	0.50	FS	-	-	-	-	-	-	-	-	-	1.50	27	30.87	21.64	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
	8.60	SM	18. 14	12.6 8	9	35	49	7	-	-	-	3.00 4.50	26 26	27.55 25.23	20.24 19.58	34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
	25.50	SM (shell)	16. 66	14.4 8	11.5	42.5	36. 5	9.5	2.75	-	-	15.00 16.50 18.00 19.50 21.00 22.50 24.00 25.50	10 10 9 28 34 47 >50 46	12.43 12.28 11.68 20.38 22.66 27.83 50 26.43	17.47 18.40 19.01 26.49 29.23 34.10 51.53 35.16	37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

FS-FILLING SOIL, SM-SILTY SAND, SM(shell)-SILTY SAND WITH SHELL FORMATION. Shear Test & SBC is based on SPT results.

Contd.....3(ii)



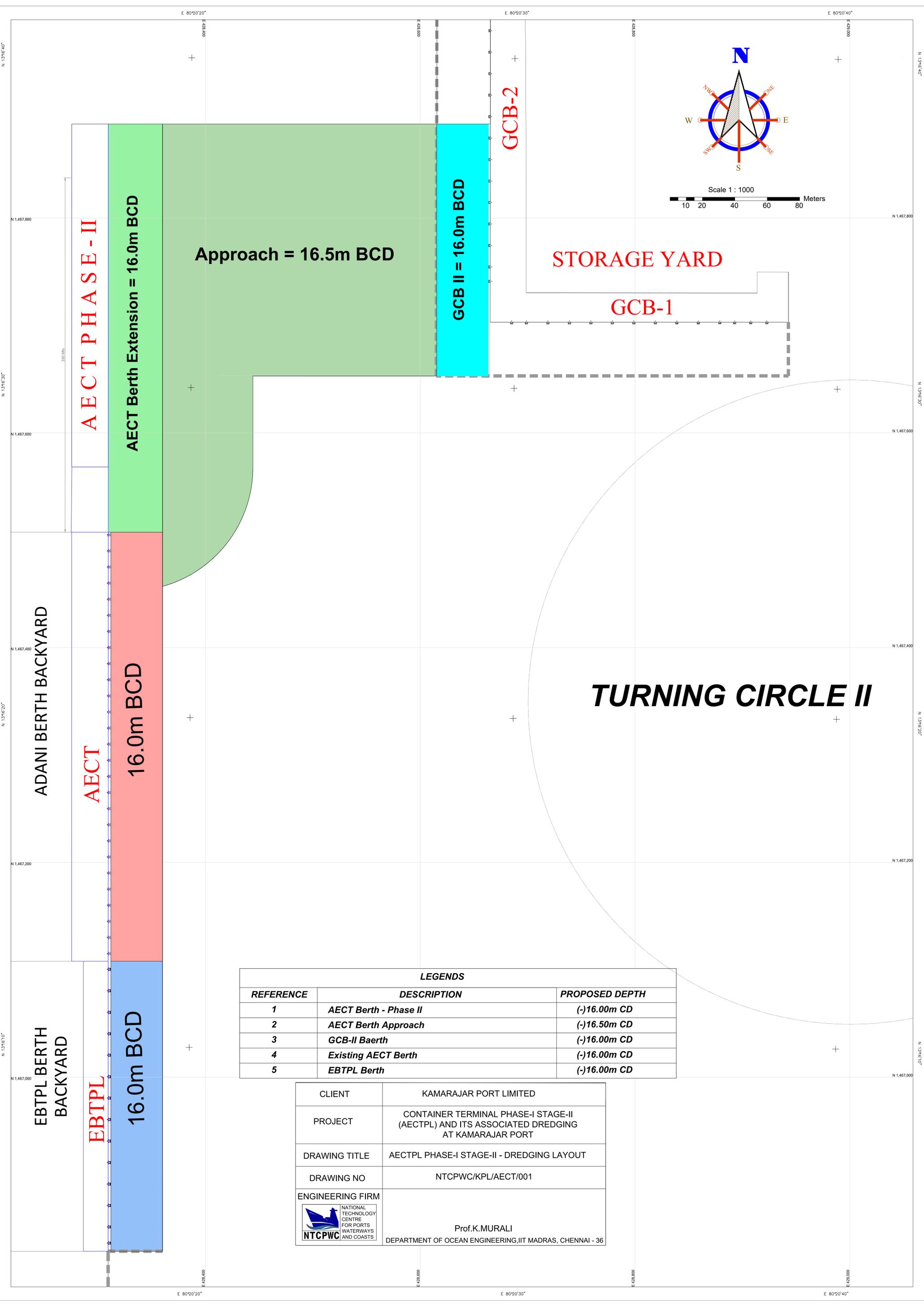
3(ii)
SOIL TEST RESULTS

Ref: GEO/332/ 2015

Name of Project: SOIL INVESTIGATION FOR THE PROPOSED BERTH AREA FOR THE DEVELOPMENT OF RORO CUM GENERAL CARGO BERTH AT KAMARAJAR PORT LIMITED, CHENNAI.																																						
Soil Profile and Depth in Metres	Depth of Sampling	IS SOIL CLASSIFICATION	NATURAL WET DENSITY K _m ³	NATURAL MOISTURE CONTENT %	INDEX TEST			SIEVE ANALYSIS % PASSING IS SIEVE ANALYSIS				GROUND WATER LEVEL: 3.15m	WORK COMMENCEMENT ON 22.12.2015	WORK COMPLETED ON 25.12.2015																								
					Liquid Limit %	Plastic Limit %	Plasticity Index	% of Gravel	% of Sand	% of Silt	% of Clay				Specific Gravity	COHESION C _{ton} / M ²	ANGLE OF INTERNAL FRICTION φ _o	DEPTH OF TESTING M	OBSERVED N VALUE	CORRECTED N VALUE	SAFE BEARING CAPACITY T/m ²	COMPRESSION INDEX C _c	PRE - CONSOLIDATION PRESSURE KG/CM ²	INITIAL VOIDS RATIO	CO-EFFECT OF CONSOLIDATION CV IN CM ² /SEC													
25.50		SM	17.52	12.7	-	-	4	38	48	10	2.72	-	43	27.00	>50											50	53.63											
45.00														28.50	30	19.22	31.93																					
														30.00	37	21.56	34.72																					
														31.50	>50	50	56.78																					
														33.00	>50	50	57.83																					
														34.50	>50	50	58.88																					
														36.00	>50	50	59.93																					
														37.50	>50	50	60.98																					
														39.00	>50	50	62.03																					
														40.50	>50	50	63.08																					
														42.00	>50	50	64.13																					
														43.50	>50	50	65.18																					
														45.00	>50	50	66.23																					

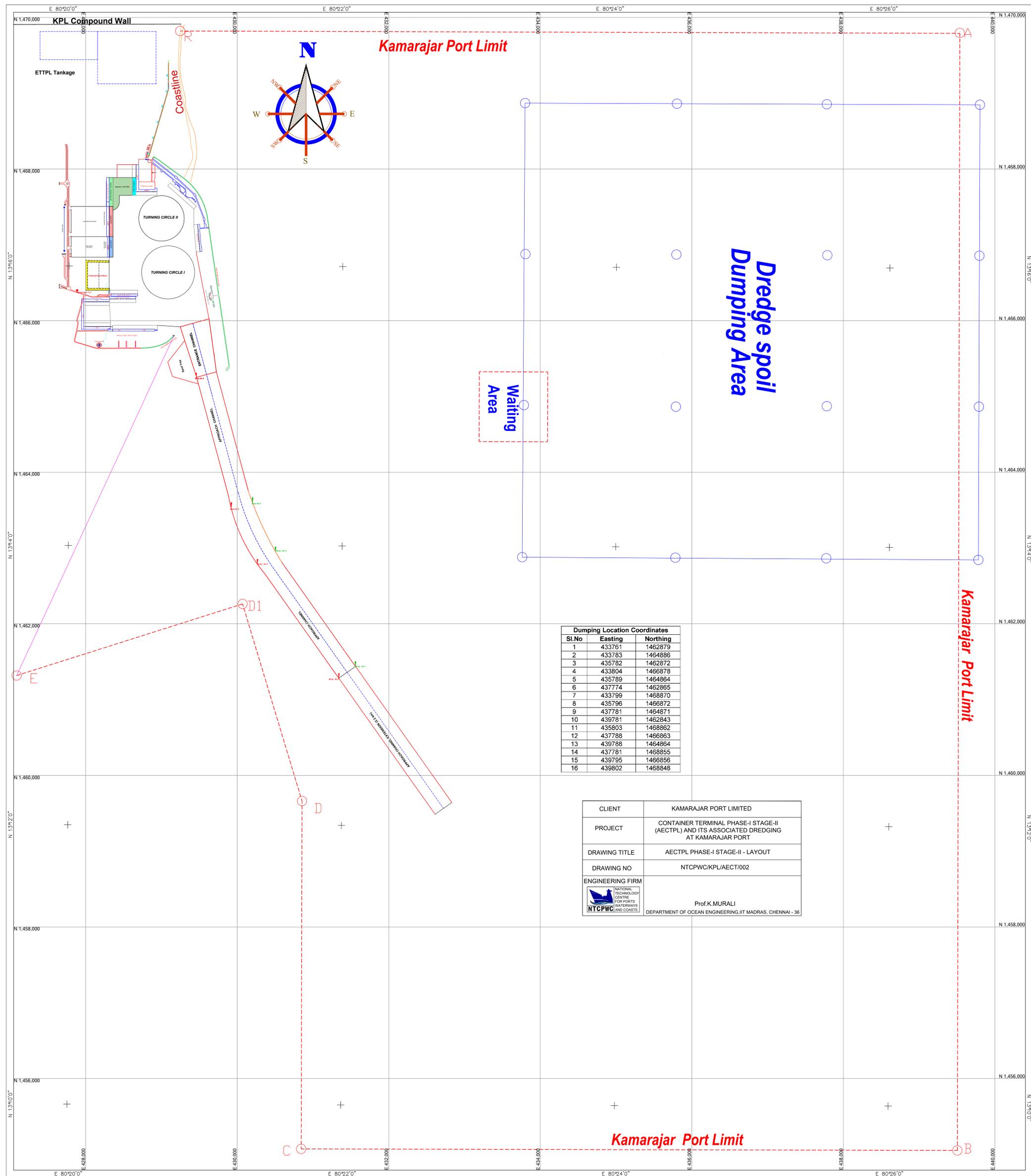
SM-SILTY SAND. Shear Test & SBC is based on SPT results.

Contd....4

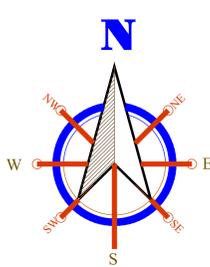


LEGENDS		
REFERENCE	DESCRIPTION	PROPOSED DEPTH
1	AECT Berth - Phase II	(-)16.00m CD
2	AECT Berth Approach	(-)16.50m CD
3	GCB-II Baerth	(-)16.00m CD
4	Existing AECT Berth	(-)16.00m CD
5	EBTPL Berth	(-)16.00m CD

CLIENT	KAMARAJAR PORT LIMITED
PROJECT	CONTAINER TERMINAL PHASE-I STAGE-II (AECTPL) AND ITS ASSOCIATED DREDGING AT KAMARAJAR PORT
DRAWING TITLE	AECTPL PHASE-I STAGE-II - DREDGING LAYOUT
DRAWING NO	NTCPWC/KPL/AECT/001
ENGINEERING FIRM	 NATIONAL TECHNOLOGY CENTRE FOR PORTS WATERWAYS AND COASTS Prof.K.MURALI DEPARTMENT OF OCEAN ENGINEERING,IIT MADRAS, CHENNAI - 36



Kamarajar Port Limit



**Dredge spoil
Dumping Area**

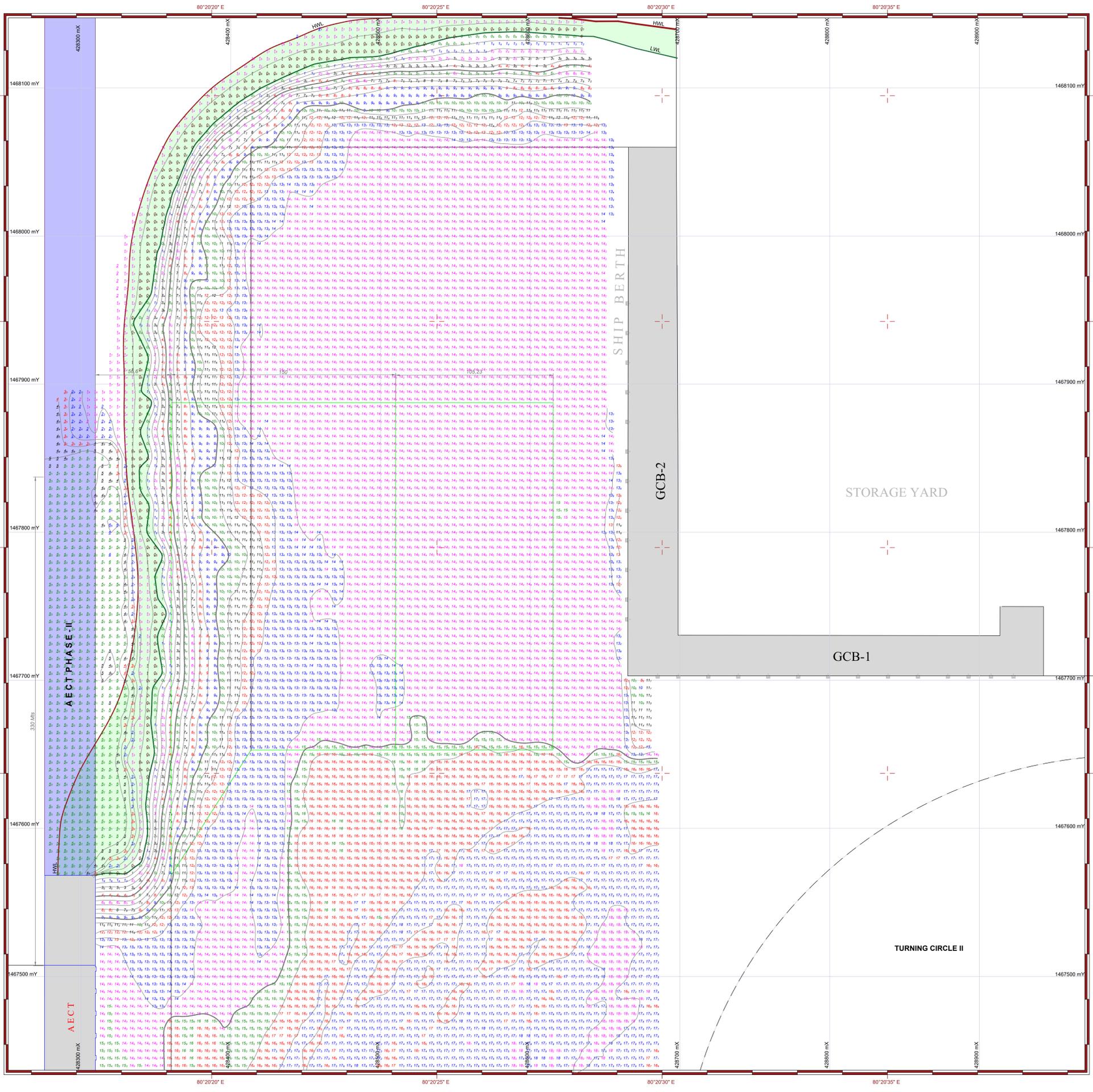
**Waiting
Area**

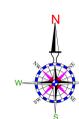
Kamarajar Port Limit

Dumping Location Coordinates		
Sl.No	Easting	Northing
1	433761	1462879
2	433783	1464886
3	435782	1462872
4	433804	1466878
5	435789	1464864
6	437774	1462865
7	433799	1468870
8	435796	1466872
9	437781	1464871
10	439781	1462843
11	435803	1468862
12	437788	1466863
13	439788	1464864
14	437781	1468855
15	439795	1466856
16	439802	1468848

CLIENT	KAMARAJAR PORT LIMITED
PROJECT	CONTAINER TERMINAL PHASE-I STAGE-II (AECTPL) AND ITS ASSOCIATED DREDGING AT KAMARAJAR PORT
DRAWING TITLE	AECTPL PHASE-I STAGE-II - LAYOUT
DRAWING NO	NTCPWC/KPL/AECT/002
ENGINEERING FIRM	 NTCPWC NATIONAL TECHNOLOGY CENTRE FOR PORTS, WATERWAYS AND COASTS Prof.K.MURALI DEPARTMENT OF OCEAN ENGINEERING,IIT MADRAS, CHENNAI - 36

Kamarajar Port Limit

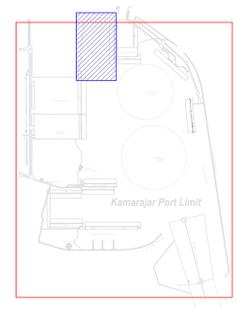




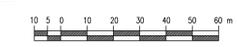
Notes :

- Water depths are reduced to CD using Measured Lides.
- Horizontal positioning acquired using Vector DGPS system.
- Multibeam Bathymetry acquired using Ping DSP 30SS System.
- Annotations are in metres and suffix in decimetres.
- Contour depths are in Metres.
- Topographic survey acquired using Leica RTK GNSS GS14.

Key Map :



SCALE :



SCALE 1 : 1000

Geodetic Details :

- Spheroid : WGS 84
- Semi major axis (a) : 6378137.00 m
- Flattening (1/f) : 298.2572
- Grid Projection : U.T.M. Zone 44N
- Latitude of origin : 0° equator
- Longitude of origin (CM) : 81° East
- Scale factor on CM : 0.9996
- Fake easting : 500000m E
- Fake northing : 0m N
- Unit : International Metre

LEGEND :

General

- Geographical Grid Intersection \pm 2: Depth in metres & decimetres below Chart Datum
- UM Grid Intersection \pm 2: Elevation in metres & decimetres above Chart Datum

TIDAL INFORMATION (N. H. O. CHART NO. 356)

PLACE	POSITION		HEIGHT ABOVE CHART DATUM		MSL	
	WGS 1984	Zone-44	MHW	MFW	MWN	MWS
Ennore	Latitude	Longitude	Metre	Metre	Metre	Metre
	13°15' N	80°20' E	1.15	0.84	0.43	0.14

CLIENT :



KAMARAJAR PORT LIMITED

SURVEYED BY :



Ph. 91-44-2482482 ; WEB www.indoram.com ; Chennai.

PROJECT TITLE :

**MULTIBEAM BATHYMETRY SURVEY
AECT PHASE II JETTY AT KAMARAJAR PORT.**

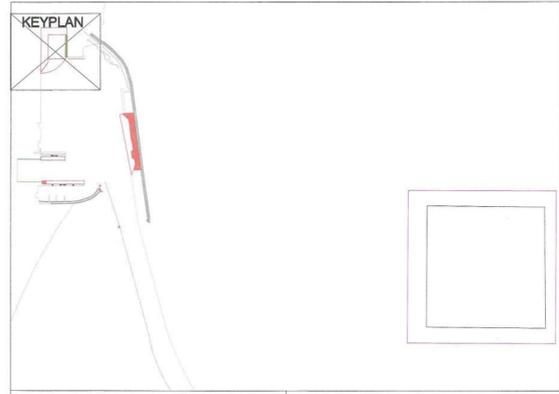
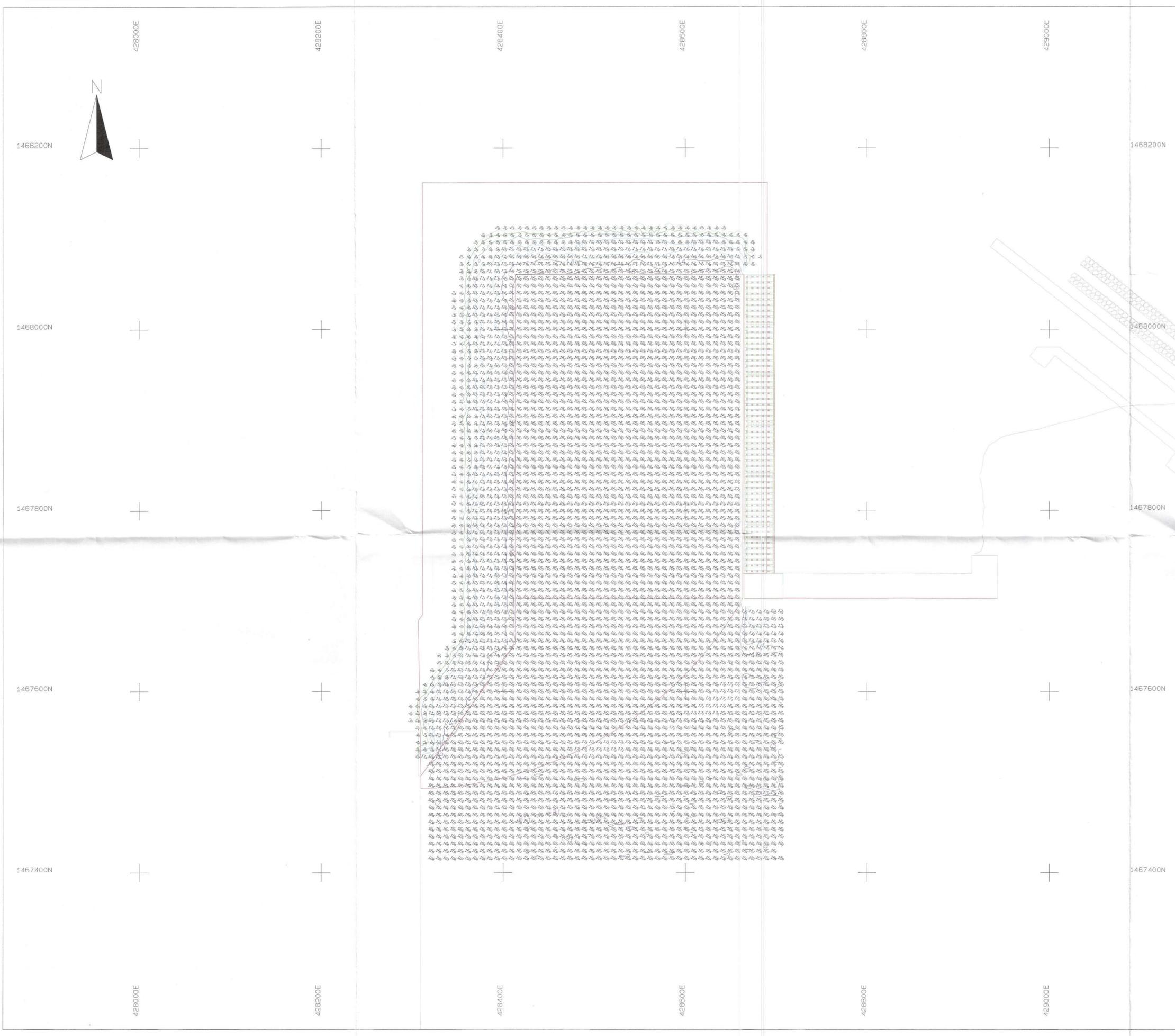
DRAWING TITLE :

**MULTIBEAM BATHYMETRY SURVEY
AECT PHASE II JETTY**

Boat : MFV SANGHWI	Surveyed by : Baskaran/Saravanan
Survey period : 19.01.26 & 20.01.26	Processed by : Baskaran
Drawn by : Baskaran/Mohandran	Checked by : Dr.Guru Prasaath

APPROVED BY :

DR. P. CHANDRAMOHAN
P.E. (Ocean Engg.) | CHARTERED ENGINEER, INDIA
F.I.E. (India), M.ASCE (USA) | PRACTICING ENGINEER, USA



NOTES

1) All dimensions and levels are in metres

2) All levels are related to Chart Datum (CD)

LLW	MLWS	MLWN	MCL	MHWN	M-FWS	H-HWL
0.10	+0.10	+0.40	+0.65	+0.80	+1.10	+1.50

BM-CB1: 5.000m CD

3) Survey Equipment

GNS receiver:	Norbit SBG-Ekinox Serial N° 2222717
Base station:	Septentrio Serial N° 3402570
Echo sounder:	Norbit MBMS Serial N° 2223882
Motion Sensor:	Norbit SBG-Ekinox Serial N° 2222717
SVP:	Valeport Swift SVP Serial N° 63522

GEODETTIC NOTES

Datum: WGS84

Ellipsoid (spheroid): GRS80

Semi-major axis: 6 378 137.000 m

Semi-minor axis: 6 356 782.314 m

Inverse flattening (1/f): 298.2572235630

Projection: UTM

Zone: 44 North

Latitude of origin: 0° N

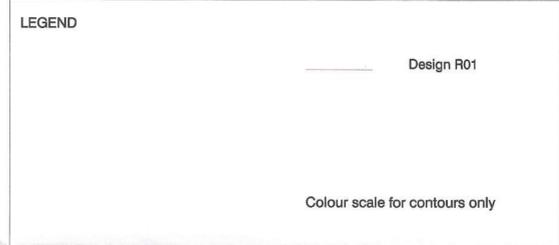
Longitude of origin: 81° E

Scale factor: 0.999600000

False easting: 500 000 m

False northing: 0 m

Unit: metres



CLIENT

KAMARAJAR PORT LIMITED

CONTRACTOR

Jan De Nul Dredging
INDIA Private Limited

PROJECT

**CAPITAL DREDGING PHASE V
KAMARAJAR PORT**

REV NO.	DATE	DESCRIPTION	CONTRACTOR	EMPLOYER	ENGINEER
02	28/10	REVISION 02			
01	11/10	REVISION 01			
00	08/10	REVISION 00			

TITLE

**OUT SURVEY
AREA A&B**

SCALE (A1)

1 : 2000

JDN Dwg No : JDN2875-SUR-RQ0260-0067-02

DESIGN VERSION: R01 **LAST SURVEYED :** 18/10/2023 **PAGE NUMBER:** 01 of 01



**KAMARAJAR PORT LIMITED
(A COMPANY OF CHENNAI PORT AUTHORITY)**

E-Procurement Mode

**TENDER FOR CAPITAL DREDGING FOR
CONTAINER TERMINAL PHASE-I STAGE-II
(AECTPL) AND ITS ASSOCIATED
DREDGING
AT KAMARAJAR PORT**

TENDER NO: KPL/ PPD/ CD (AECTPL) /2026

VOLUME - II

Financial Bid



CHAPTER-II BILL OF QUANTITIES

SCHEDULE OF RATES

Sl. No	Item Description	Probable quantity	Unit	Unit Rate in INR	Amount in INR
1	<p>Dry Excavation: Cutting, loosening and removing all type of materials such as sand, silt, silt mixed with clay/roots boulders weighing upto 250kg individually etc. as available at the location of the proposed Container Terminal phase-I, stage-II (AECTPL) berth pocket from the existing level upto 0.00m CD and transporting, dumping (to the required height as directed by the Employer/ Engineer) and levelling at the designated area located anywhere in the port lands within a lead of upto 5 km including cost of all labour, materials, tools and plants, fuel, loading, unloading transportation, consumables etc., all as directed by the Engineer in charge.</p> <p>Note: The rate specified is deemed to include transportation cost for a lead of upto 5 Kms.</p>	41,643	Cu.m		
2	Deploying required type of dredgers (TSHD/CSD/Backhoe or other suitable machineries/crafts etc) and carry out dredging in all type of soil including sand, silt, clay, boulders etc (boulders and cobbles up to size of 200 mm to be included as dredging quantity along with this item), as existing at site of work from the existing	2,99,859	Cu.m		



Capital Dredging for Container Terminal Phase-I Stage-II
(AECTPL)

Sl. No	Item Description	Probable quantity	Unit	Unit Rate in INR	Amount in INR
	sea bed level to 16.0 m CD in the berth pocket of proposed Container Terminal phase-I, stage-II (AECTPL) berth as detailed including disposing/ dumping the dredged materials evenly in the designated area located anywhere in the port lands within a lead of upto 5 km Including cost of conducting all types of surveys (Pre, Post and interim surveys, Third Party Surveys),cost/hire charges of survey launch, all plants, pipes, pumps, labour, fuel materials, consumables, etc. complete.				
3	Deploying required type of dredgers (TSHD/CSD/Backhoe or other suitable machineries/crafts etc) and carry out dredging in all type of soil including sand, silt, clay, boulders etc (boulders and cobbles up to size of 200 mm to be included as dredging quantity along with this item), as existing at site of work from the existing sea bed level to 16.0 m CD in the berth pocket of existing AECTPL berth, EBTPPL berth and GCB II berth, and upto 16.5m CD in the approaches and area earmarked as Phase VI dredging excluded area in the drawing to the required width all as shown in the drawing and as detailed including disposing/ dumping the dredged materials in the designated offshore dumping ground of KPL including cost of conducting all	3,68,996	Cu.m		



Capital Dredging for Container Terminal Phase-I Stage-II
(AECTPL)

Sl. No	Item Description	Probable quantity	Unit	Unit Rate in INR	Amount in INR
	types of surveys (Pre, Post and interim surveys, Third Party Surveys), cost/ hire charges of survey launch, all plants, labour, fuel materials, consumables, etc. complete.				
4	<p>Removal of isolated submerged boulders / stones from seabed below 00.00m CD, if any in the dredging area including all labour, transport, tools tackles, plants, equipment, machinery, fuel etc., complete</p> <p>Note:</p> <p>1. The removed items shall be transported and stacked properly at an identified location anywhere inside the port limits within a lead of 5 Kms. The rates quoted for this item shall include the cost of loading, handling, transporting and stacking of the boulders/stones.</p> <p>2. The Contractor shall engage cranes of suitable capacity and boom length for easy handling and placing at the required place.</p> <p>3. The Contractor shall engage suitable skilled labours including divers if any for the work.</p> <p>4. Quantity for payment will be based on stacked measurement on ground. 30% shall be considered as voids and deducted from the stacked volume.</p>	100	Cu.m		



Capital Dredging for Container Terminal Phase-I Stage-II
(AECTPL)

Sl. No	Item Description	Probable quantity	Unit	Unit Rate in INR	Amount in INR
5	Mobilization of all equipment machinery, crafts including all type of dredgers and ancillary crafts commensuration with the method statement to carry out all the works as per the scope of work within the time specified and demobilize all the equipment brought after completion of the respective works with the prior approval of the “Engineer-in-charge” including cost of all, labour, fuel, consumables, transportation etc. complete. Note: The Mobilization & de-Mobilization is restricted to maximum 10% of total contract value.	1	Lumps um		
	TOTAL				