



DEENDAYAL PORT AUTHORITY

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No. CN-I/WK/Bill File/ 663

Office of the
Executive Engineer (C-I),
A.O. Building, Annex Room No. 303
Gandhidham – 370 201

Date: 23/12/2025

To,
Prof. S. Nallayarasu,
Department of Ocean Engineering,
Indian Institute of Technology Madras,
Chennai-600 036, India,
Tel.: (O) (044) 2257 4819, Fax: 044-22574802,
e-mail: nallay@iitm.ac.in

Sub: Appointment of IITM Chennai, on Nomination basis for "Proposal to prepare feasibility cum detailed project report for development of 6 KM waterfront outside Kandla creek into a 135 MMTPA capacity cargo handling modern facility including mathematical model studies"- Work Order Reg.

Ref: IIT-M's Offer vide letter dated: 05.12.2025

Sir,

With reference to your offer dated: 05.12.2025 amounting to **Rs. 350 lakhs + GST** towards providing the services for the subject work, including all the terms and conditions mentioned in the letter has been accepted by the Competent Authority, DPA.

The Scope of work, Deliverables, Exclusions, Consultancy Fee, Terms of payment, Methodology, Travel, and schedule are mentioned in **Annexure-A**.

The Employer reserves the right to terminate the consultancy/advisory services at any stage if the performance of the consultant is not found satisfactory and employer shall not pay for the remaining stages.

Kindly, send acknowledgement of this work order & start the work w.e.f. 26/12/2025.

Thanking You,

Encl: As Above.

Yours faithfully,

Executive Engineer (C-I)
Deendayal Port Authority

1. Scope of Work

The Scope of work includes the preparation of Feasibility Cum Detailed Project Report for the development of 6 KM Waterfront outside Kandla Creek into a 135 MMTPA capacity cargo handling modern facility. The detailed TOR describing the scope is attached.

2. Deliverables

Following deliverable will be prepared and issued.

- Feasibility Cum Detailed Project Report
- Drawings
- Presentations

3. Exclusions

Following scope is excluded as it will be carried out by PPP concessionaire at a later date.

- Field survey (Bathymetry, topography, side scan sonar etc.)
- Field investigations (Geotechnical studies etc.)

4. Consultancy Fee

The lump sum consultancy fee for the scopes of work as defined in section 1 (attached TOR) is Rs. 350 Lakhs + GST.

5. Payment Terms

50% shall be paid upon submission of Inception report.

40% shall be paid upon submission of draft DPR.

10% shall be paid upon submission of final DPR.

Payment shall be made to "The Register, IIT Madras".

Income Tax shall not be deducted as IIT Madras is exempted from income tax.

Payment shall be made within 30 days of issuance of invoice.

6. Methodology

The methodology to be followed is described below.

- a) Collect all the existing data such as bathymetry, topography and geotechnical investigations and identify gap and intimate DPA for further necessary action.
- b) Periodically present the prepared layout, studies to DPA for taking input and modify where it is found to be necessary.
- c) Prepare Feasibility Cum DPR including Techno-Economic assessment.

7. Travel

Travel required for the project duration, considered as 2 months, is included in the lump sum fee including local accommodation.

8. Schedule

The overall schedule for the completion of the scope of work is 2 Months.



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1. SCOPE OF WORK/TERMS OF REFERENCE (TOR): -

Deendayal Port (erstwhile Kandla Port) is a protected natural harbour situated in the Kandla Creek in Gujarat, 90 Nautical Miles from the mouth of Gulf of Kachchh on the West Coast of India. It is portal to the West and North India and enjoys locational advantage with vast hinterland of 1 million Sq. Km. consisting of States of J&K, Punjab, Himachal Pradesh, Haryana, Rajasthan, Delhi, Gujarat and part of Madhya Pradesh and Uttar Pradesh.

Ports play a key role in economic development by handling both domestic coastal and export-import traffic. Deendayal Port is the nearest among all Major Ports in India to the vast hinterland it serves through well connected four-lane road network of National Highways as well as Broad Gauge Railway linkage.

Presently, the Port has fourteen dry cargo berths for handling general & breakbulk cargo traffic, two berths for handling container cargo, Seven oil jetties for handling POL products and other liquid cargo traffic at Kandla within Kandla Creek, one Offshore Terminal at Tekra for handling dry bulk cargo, and three Single Buoy Mooring (SBM) & two product jetties at Vadinar for handling crude oil.

Deendayal Port Authority (DPA) has initiated action to Development of 6 KM Waterfront outside Kandla Creek into a 135 MMTPA capacity cargo handling modern facility. The project shall be developed under EPC & PPP mode with suitable VGF support.

The main objective of the development of 6 KM Waterfront outside Kandla Creek into a 135 MMTPA capacity cargo handling modern facility (which includes but not limited to Dry cargo, Liquid cargo, facilities) at Kandla by firming up with more details, which will be a standalone base document for planning the project, taking investment decision, getting approvals and implementation.

The scope of advisory services / Terms of References (TOR) shall include but not necessarily be limited to the following activities: -

- 1.1 Study of climatic data, wind direction, Rain fall, temperature, sun direction etc. and its implication on planning.
- 1.2 Study of Sea Climate, Wind Pattern, Wave height & Pattern, Current pattern and coastal topography.
- 1.3 Identification of any environmentally sensitive area.
- 1.4 Study and delineation of Coastal Regulation Zone as per sanctioned CZMP (Coastal Zone Management Plan).
- 1.5 Review the available traffic study report as well as Carry out the detail studies for Traffic Gap Analysis for the proposed Facilities. To evaluate & workout detailed projection of traffic in terms of Cargo as well as vessels for the project. The analysis for forecast traffic should be done year wise

basis. Further a detailed rationalise methodology undertaken for evaluation for traffic project should be also detailed out. Also, study & analyses current and future market trends, including shipping volumes, trade flows, and competitive positioning of the port relative to other regional and global ports, global scenario this will involve a detailed study of import/export data, potential growth in specific sectors (e.g., containerized goods, bulk commodities etc.), and the potential capture of additional market share and various Port facilities existing at the nearby Ports developed along the Coastline or likely to be developed on the existing Port, servicing the same hinterland.

1.5.1 Demand Forecasting: This involves conducting a detailed market analysis to identify potential cargo types, sources, and destinations. It also includes developing a robust cargo projection model that considers various growth scenarios and economic factors, as well as analyzing the potential impact of new and emerging technologies on future cargo flows.

1.6 Navigation, Mooring and Berthing Studies

1.6.1 A conceptual design of navigational infrastructure for the entrance channel and turning circle to the proposed terminal shall be undertaken based on guidance provided in PIANC, ROM or other internationally recognized standards. Factors such as the environmental conditions, type of seabed material, seabed slope and direction of slope, available water depth, vessel's characteristics, etc. shall be considered.

1.7 Port Detail Design and Engineering

1.7.1 Design Criteria Firmed up Traffic Estimate with Phases, Design vessels. Benchmarking & capacity calculations of berths which are inputs for planning the layout, design of structures and fixing depth for dredging works.

1.7.2 Port layout Planning the configuration of the Port layout, positioning and alignment of components like berth structures, operational areas, Harbour basin & manoeuvring (turning) circles, approach channel, road & rail connectivity etc. The proposed Port Layout shall be checked to ensure safe manoeuvring of ships, Sediment transportation studies etc. Optimum facility layout shall be selected considering alternative layouts if applicable and agreed with the Ports Authority.

- Berth structures: Planning & Design of berth structures including piles and super structure, reinforcement details, founding levels and preparation of connected drawings (longitudinal and cross sections), scour protection.

- Design of riverbank protection along the proposed terminal.
- To analyse & establish the dredging level alongside the Project & its approach. To suggest the alignment for navigation channel.
- To analyse & establish the type of foundation & its founding level for the Project.
- To analyse & establish the handling equipment and the rated capacity
- To analyse & establish the quantity & type of berthing aids. To analyse & establish the finished level of Berthing facilities & land development.
- To assess the requirement of Offshore & Onshore land requirement in line with the capacity of the Project.
- To analyse & workout the requirement of sweet water and suggest mode for economic availability of same. Also, to evaluate & establish the nearest suitable source of water & electricity & quarry materials.
- To analyses and workout the route for supply of water and electricity.

1.7.3 Navigational Channel and Dredging Fixation of keel clearances for design vessels, depths of dredging in berth areas, Port basin & manoeuvring areas and approach channel, computation of dredging quantities with supporting calculations, dredging methods, details of reclamation /dumping grounds by matching the dredge quantity with reclamation quantity for economic optimization etc.

1.7.4 Port Crafts and Tugs: The IIT-M shall assess the requirement of Port crafts and Tugs required for the proposed facilities to perform the various marine related activities

1.7.5 Operational areas/ Stack yards / Storages Layout of Operational areas, Stack yards, ground slots and stacker arrangement for Multipurpose cargoes including storages cargos, design of terminal pavements, and foundation for equipment's and buildings, receipt and delivery areas.

1.7.6 Utilities and Utilities Corridor: Basic calculations and drawings, including general arrangements and typical cross sections of all internal road and intermodal yard, water supply (including quantity and source), electrical power supply (including quantity and source), sewerage, rainwater drainage system, lighting (General arrangement drawing of tentative location of high mass tower), firefighting and communications (IT Networking or require). A separate corridor for these may also be planned to take into consideration future developments.

1.7.7 For arrangement of Security Gate Entry-Exit or emergency, Security tower, Custom compound wall (Detailing and Designing as per norms of Customs), Labour amenities center, Toilets, Canteens, First Aid centers, VTMS Signal station arrangement, Electrical Sub-Station, Telecom Tower, Scanner, Weighbridges etc.

1.7.8 Details of Drainage Management Plan: Details of existing/ proposed sewer master plan, drainage outlets, sea outfalls etc. And proposal for divert /extend of existing drainage outlet

1.7.9 Solid waste: description of planned solid waste collection and disposal system

1.7.10 Water supply: description and assessment of the need for water supply systems

1.7.11 waste water treatment: description of planned wastewater collection and disposal systems, undertaking from relevant authorities: observation from relevant agencies on availability / supply of electricity, water and sewerage network.

1.7.12 Modular Port Complex / Buildings. Basic design and drawings of the Port buildings, including Parking areas, and architectural views of main buildings.

1.7.13 Cargo Handling Equipment's Planning & design of Multipurpose handling equipment's, yard, provision for handling Ro-Ro vessels, Project cargo and Intermodal yard handling equipment's, etc. including broad specifications but not limited to Fully automated handling systems, including drones and robotics for loading and unloading, are expected to become standard, reducing labor costs and improving turnaround times at ports.

1.7.14 Planning of Road and Rail Connectivity; Modal Split of cargo through rail / road mode, No. of Railway sidings and No. Of road lanes. To analyses & establish the shortest and economical road & rail connectivity of project facility with existing nearby main road & railway route.

1.7.15 Based on the above analysis & studies, work out and establish the most ideal, Technically, economically and environmentally suitable alignment of the proposed Berthing facilities & allied facilities.

1.7.16 **Hinterland Connectivity:** The focus here is on assessing the current road and rail infrastructure serving the port and identifying any existing bottlenecks. A plan should be developed to improve hinterland connectivity, including potential upgrades to rail and road networks. Additionally, the feasibility of establishing inland container depots (ICDs) should be analyzed to extend the port's reach.

1.7.17 **Cargo Handling and Storage:** This involves determining the optimal mix of cargo handling equipment to ensure efficient operations. It also includes

planning for adequate storage facilities, both covered and open, and considering the need for specialized storage solutions for hazardous or temperature-sensitive cargo.

1.7.18 Traffic Flow Management: A traffic management plan should be developed to optimize the movement of trucks and trains within the port area. Implementing a truck appointment system can help reduce congestion and improve turnaround times. The use of technology to track cargo movement and provide real-time information to stakeholders is also recommended.

1.7.19 Sustainability: This involves assessing the environmental impact of port operations, including emissions and noise pollution. A sustainability plan should be developed to minimize the port's carbon footprint, considering the use of renewable energy sources and electric vehicles within the port area.

1.7.20 Smart Port and Advance IT Systems but not limited to

- i. Fully Automated handling/ Robotics handling, Drones
- ii. Advance AI systems to optimize cargo flow, predict demand surges, and allocate resources efficiently. Real-time data analytics will allow for quicker decision-making.
- iii. AI / IoT to monitor equipment and infrastructure, predicting when repairs or maintenance are needed to avoid downtime.
- iv. Blockchain and Digital Twins: to enhance transparency and security in tracking shipments, customs clearance, and contract execution real-time simulations, predictive modeling, and better resource management.
- v. Green Technology and Sustainability: ports will likely to adopt renewable energy sources (e.g. solar, wind, Green hydrogen) for operations, electrify vehicles, and use hybrid systems to reduce carbon footprints.
- vi. 5G and IoT Connectivity Internet of Things (IoT) devices will be enabling real-time monitoring of cargo conditions (e.g., temperature, humidity) and equipment 5G will enable faster data transfer and create smart port ecosystems where every component of the logistics chain is interconnected and optimized.
- vii. Cyber security and data protection.

1.8 Environmental and Social Impact Assessment

1.8.1 The Employer has already appointed Environmental Advisor to prepare EIA/EMP Study, CRZ Mapping and all connected documents and reports required for Environmental /CRZ Clearances and assist the Port in obtaining Environmental Clearance going through steps /procedures prescribed by

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MoEF&CC. The assistance and coordination if required in the process of obtaining Environmental/CRZ Clearances or approvals from various regulatory bodies at State level and National level shall be provided by the IIT-M.

1.8.2 Social Impact Assessment: The IIT-M shall undertake social impact assessment due to the improvements such as Port Layout, Road and Rail connectivity and other related facilities proposed on the Project (like weighbridges, crane section, ATM building or other require facilities).

1.8.3 The feasibility cum detailed project report shall also include the followings but not limited to:

- i. Executive Summary: A summary covering all aspects of Techno Economical Feasibility Report.
- ii. Introduction
- iii. Past performance of the Port
- iv. Estimation of capacity of project facility including Traffic Projection with detailed evaluation and rationalized analysis.
- v. Project description in detail.
- vi. Project implementation: Analysis and workout in details various activities for implementation of the project and activity-wise time to ascertain the entire realistic time for implementation of the project as whole. This also include the CPM chart.
- vii. Requirement of staff for implementation of the scheme: To analysis & workout category-wise / designation-wise the requirement of staff for implementation of the project including evaluation of amount.
- viii. To analysis & work out direct and Indirect employment may be generated with implementation of the Project facility.
- ix. Tariff and Pricing Strategy: - A detailed examination of the existing tariff structure, benchmarking against competitor ports, and recommendations for optimal pricing strategies to maximize returns without compromising competitiveness. This will include elasticity analysis to assess how changes in pricing could impact demand.
- x. Operation & Maintenance (O&M) cost: The O & M cost shall include but not limited to cost towards:
 - a. Water, Power & Fuel requirement
 - b. Maintenance Dredging requirement
 - c. Maintenance & Civil structure
 - d. Operation & Maintenance of Mechanical equipment.
 - e. Operation & Maintenance of Electrical Equipment's
 - f. Administrative & Management cost.
 - g. Operation & Maintenance of Tugs & Launches for Pilotage & berthing of Vessels.

- h. Operation & Cost for any other facilities required for implementation of the Project facility
- i. Capital Cost in form- "Quantity (volume of the required resource or item (e.g., number of units, tons, square meters), Prevailing Market rates, Unit, Amount & Remarks.

If requires, the Rate analysis for the Rate considered for particular item(s) should also be submitted by the Advisor. The content of capital cost shall include but not limited to

- a. Cost of Berthing structure & mooring aids with approach trestle.
- b. Cost of Road & Rail connectivity
- c. Cost of Breakwater if found necessary & possibility
- d. Cost of conveyor system
- e. Cost of Dredging
- f. Cost of development of land development, Backup area/ storage area including ground treatment, if required.
- g. Cost of cover storage with fencing
- h. Cost of handling equipments
- i. Cost of Marine equipments and ancillary facilities
- j. Cost of electrification include illumination, transmission lines etc
- k. Cost of Water supply & firefighting system
- l. Cost of Environment measures
- m. Cost of Studies & Investigation.
- n. Cost of any other facilities required for implementation of the Project facility

xi. Viability Analysis - This shall include but not limited to Financial and Economic Benefits, Project IRR, Equity IRR, DSCR, Net Present Value, analysis of cash flow, phasing of expenditure, payback periods. The Financial and Economic Viability Analysis, will incorporate a detailed Financial Model, which includes capex/ capex schedule, revenue assumptions & projections which includes tariff/reference tariff, opex assumptions & projections, P & L, Tax, Depreciation, Repayment schedule, viability gap, WACC, Capacity Calculation, Area Assessment, sensitivity analysis (such as capex, throughput, tariffs, and operational costs) affect revenue and returns. and scenario planning to assess various outcomes with Assessment of potential financial Risk and its impact and proposed mitigation strategies

xii. Revenue/ Return from the project.

- a. Detailed revenue assessment and projections from various sources such as cargo handling, storage, transshipment, port-related services, and terminal operations etc. The analysis will assess tariff structures and potential ancillary revenues.

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- b. Evaluation of royalty payments / profit sharing arrangements to be consider which calculate the return from project.
- xiii. To establish & detailed out rationalised & detailed justification towards setting up the Project.
- xiv. Identify the studies / Investigations required to be carried out for further course of action
- xv. Identify the statutory approvals/ clearances, if any required for setting up the facility.
- xvi. To analyse and establish all requisite allied facilities required for operation of the Project which includes but not limited to Container Freight Station, Godowns, warehouses, etc.
- xvii. Evaluate and prepare project structuring, implementation scheduling and selection of suitable PPP framework including short term and long-term measures.
- xviii. IIT-M has to submit the detailed estimate with supporting document for rates (As per DPA SOR, Rate Analysis, CPWD), BoQ, detailed drawing, Tender document etc. and assist client to getting approval from respective authority.

Note: It is envisaged that the project may be developed by the Port on PPP mode. Hence, the operation & maintenance cost (OPEX) and capital cost (CAPEX) of the project should be in consonance with the guidelines issued by Tariff Authority of Major Ports (TAMP)/Competent Authority from time to time for PPP Projects.

- 1.9 After establishing the layout of Berthing Facility, make a presentation in presence of Port Officials for discussions.
- 1.10 After preparation of draft Techno-Economic feasibility report make a presentation in presence of Port Officials for discussions.
- 1.11 Based on the suggestions/comments/observations of the Port on Draft Report to frame final Techno-Economic feasibility report.
- 1.12 Three hard copies of presentation, report and plans at desired scale in AUTOCAD format along with soft copies.
- 1.13 The tentative layout showing the proposed berth of 6000m x 60m (approx.) and 600 Ha (approx.) of backup as well as the road & rail connectivity is attached at annexure for kind reference. However, the actual area will be derived by IIT-M at the time of studies.


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2. Scope of work for Model study for the subject work as under;

- 2.1. Wave, Tide and Current Measurements: Carry out wave, tide and current measurements required for river/coastal modelling studies. The location and equipment to be deployed for the measurements as well as the duration of the measuring campaign shall be approved by the Engineer.
- 2.2. Water sampling: Carry out water sampling to estimate the concentration of suspended sediments which are required for river/coastal modelling studies. The number and arrangement of the water sampling locations shall be approved by the Engineer.
- 2.3. In addition to the Kandla creek, Nakti creek & Khor creek to be considered for Mathematical Model Studies to analyse the Impact of Dredging.
- 2.4. Coastal and River modelling studies
 - (i) Offshore met ocean study shall be undertaken to characterize winds, waves, tides and river flow conditions a location of relevance for the project site. Hindcast datasets with a minimum of 30 consecutive years of data shall be obtained from reputable data sources. Climate and extreme conditions shall be estimated for all relevant directional sectors.
 - (ii) Offshore to nearshore wave propagation numerical modelling study shall be undertaken using SWAN or similar software packages. Nearshore climates and nearshore extreme conditions shall be provided at several locations in the vicinity of the container terminal.
 - (iii) A hydrodynamic modelling study shall be conducted with the DELFT, TELEMAC or DHI-MIKE21-HD software packages to characterize water levels and current fields in the vicinity of the proposed container terminal. In addition to astronomical tides, the effects of winds and river/creek flows shall be included as part of the hydrodynamic modelling study. As a minimum, two representative monsoon seasons shall be considered in this study.
 - (iv) Sediment transport / morphodynamic modelling study shall be undertaken using DELFT, TELEMAC or DHI-MIKE21 software packages to compare existing and post-development scenarios and assess potential coastal erosion / accretion trends, maintenance dredging needs, and riverbank areas that may need coastal protection.
- 2.5. A desktop navigational study shall be undertaken adopting two-dimensional real-time navigation software to assess the performance of the attached conceptual layout. Updates to the conceptual layout may be

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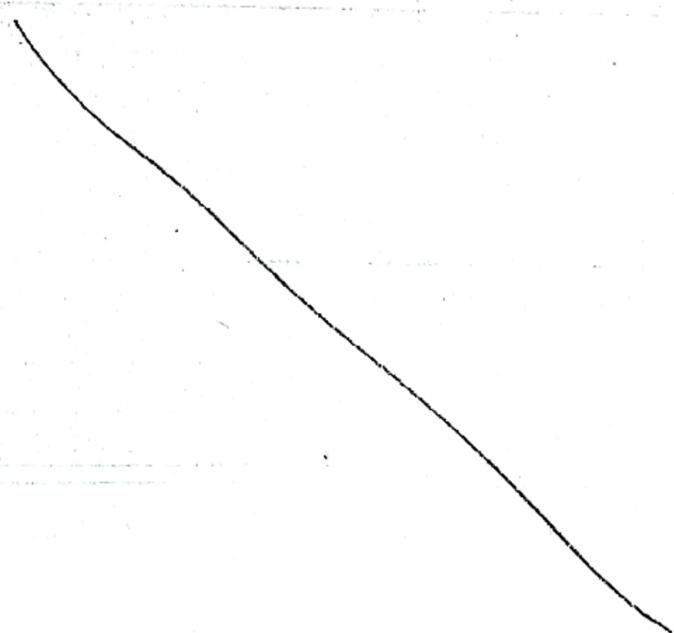
required based on preliminary model results. The recommended changes to the layout shall also be modelled.

2.6 Dynamic Mooring Analysis (DMA) shall be undertaken based on the environmental conditions identified during the coastal/river modelling studies. Waves due to passing ships shall also be considered, as well as potential increased current velocities due to the presence of the large displacement vessels at the berths. As part of the DMA, the following shall be determined:

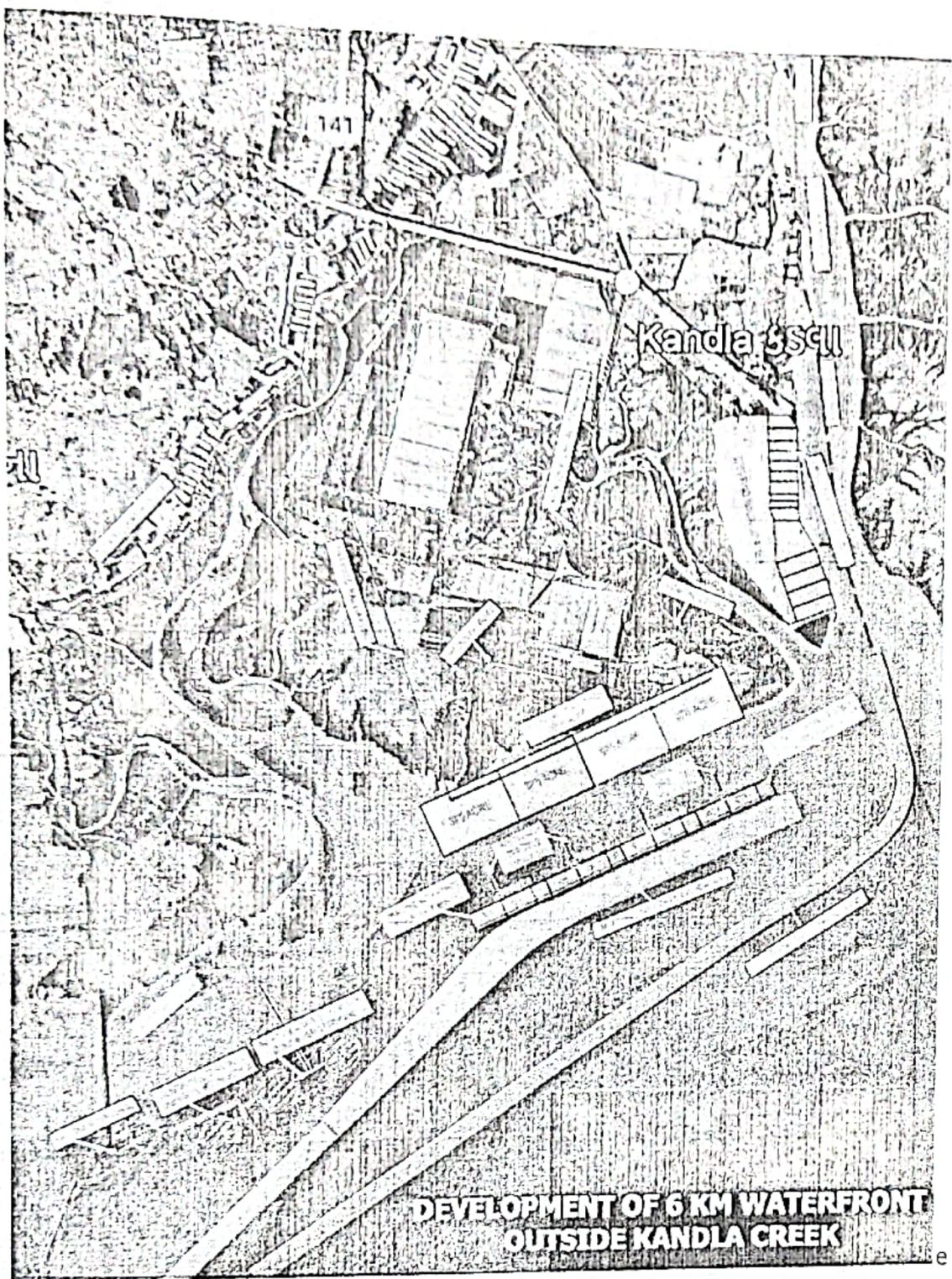
- i. A suitable mooring arrangement shall be recommended for each of the design vessels that will berth at the container terminal.
- ii. Establish normal and extreme operating conditions for each design vessel.
- iii. Define the environmental limits at which the vessel motions are exceeded and/or line loads of the design vessels exceed their MBL.

2.7 Based on the environmental conditions identified during the coastal/river modelling studies and DMA study, a downtime assessment shall be carried out to determine the probability of non-utilization of the container terminal.

2.8 The proposed location of 6 KM waterfront development is as under;



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3. General Terms & Conditions are as under:

- i. To interact with officials of various departments of Port like Engineering Department, Marine Department, Mechanical Engineering Department, Traffic Department, Finance Department etc. and take note of their requirements and incorporate the same in the proposals.
- ii. The Contract period / time limit for entire Job completion will be for:

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a period of 2 months from the date of commencement of Work or till completion.

- iii. The Lodging and Boarding arrangement for the Entire staff / Key personnel of the IIT-M, for the entire Contract period, shall be the responsibility of the IIT-M at his own risk and cost.
- iv. The Advisor should provide a detailed description of the resources that will be applied to the assignment, especially adequately experienced key personnel, capable of and devoted to the successful accomplishment of work to be performed under the contract.
- v. DPA may close liability the assignment at any stage for which further no payment will be made.
- vi. No escalation in cost of work shall be given till the completion of work.
- vii. IIT-M should have full knowledge of site of work and may visit the site before filling the tender.
- viii. The income tax & TDS shall be charges as per the prescribed role of IT Department.
- ix. All the costs are exclusive of GST.
- x. The payment shall be made through RTGS/NEFT.

Remarks:

- (1) Existing geotechnical report of adjacent area is to be collected from DPA.
- (2) Existing bathymetry data is to be collected from DPA.
- (3) Mathematical model study will be conducted by CWPRS accordingly changes is requiring to be done on basis of aforesaid study.
- (4) Any other input data for detailed study will be performed by IITM, Chennai.



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