SYAMA PRASAD MOOKERJEE PORT AUTHORITY, KOLKATA
HALDIA DOCK COMPLEX

"Integrated Development of Outer Terminal and Berth No. 11 & 12 at Haldia Dock Complex for Handling Containers & Multipurpose Clean Cargo (Dry and Break Bulk) through PPP mode"

RESPONSE TO QUERIES IN CONNECTION WITH THE PRE-BID MEETING HELD ON 23.02.2026

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
1.	RFP Cl. 1.1.3,	**Item Description**: Scope of Work Phase I (OT) and Phase II (Berth 11-12) development scope with specific equipment quantities **Query**: The scope mentions specific quantities of equipment (2 MHCs for OT, 2 RMQCs for Berth 11-12). The Authority is requested to clarify whether the Concessionaire can propose alternative equipment configurations.	For the Outer Terminal (Phase I), the Concessionaire has the flexibility to deploy 2 nos of Rail Mounted Quay Cranes (RMQCs) in place of Mobile Harbour Cranes (MHCs), provided the proposed equipment meets the minimum technical specifications and operational efficiency requirements as specified in the TEFR as well as to achieve the performance standard of the DCA. Please See **Corrigendum-VI.**
2.	DCA Article 1.1,	**Item Description:** Definition of Project Capacity Total project capacity defined as 0.693 MTEUs (OT: 0.231 MTEUs + Berth 11-12: 0.462 MTEUs) **Query**: The total land area being handed over is 58.62 acres (32.41 acres for OT + 26.21 acres for Berth 11-12). Kindly provide capacity calculation working.	Refer to Chapter 7 (Section 7.4 to 7.7) of the TEFR. Additional area may be provided as per article 9.3 of DCA. Also please See Sl. No. 23 of **Corrigendum-VI.**
3.	RFP Cl. 1.1.3, Construction Period	**Item Description:** Phase I: 24 months, Phase II: 12 months after Phase I completion **Query**: Considering the dismantling and realignment of existing Berth 11-12, equipment delivery lead times (RMQC typically 18-24 months) and potential coordination with ongoing port operations, we request Authority to extend Construction Period of 30 months for Phase -1 and 18 months for Phase II.	DCA condition prevails
4.	DCA Appendix 4, Equipment Specifications	**Item Description:** Specific equipment list provided including RMQC (40m outreach), MHC (30m radius), RTGs (7 row + 1 lane, 5+1 high)	Vessel of beam 32 m has been accommodated inside lock gates.

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		Query: The permitted vessel beam is only 25m for berths inside HDC and natural depth at OT is 9.0m CD. Given these constraints, can the RMQC outreach be reduced from 40m to 30-35m and MHC outreach from 30m to 25-28m to optimize capital costs while maintaining operational efficiency.	RMQC minimum outreach revised to 35 m, whereas for MHC will remain 30 m. Please see **Corrigendum-VI.**
5.	RFP Section 1.1.3, Scope of Work - Equipment	**Item Description:** Reach stackers and tractor trailers mentioned on hire basis with specific quantities **Query**: Kindly confirm that Reach Stackers (4 nos. for OT + Berth 11-12), Empty Container Handlers (3 nos.) and Tractor Trailers (total 35 nos.) can be deployed on lease/hire basis and that the Concessionaire has flexibility to deploy these numbers of equipment based on requirement & traffic pattern. Kindly also provide permissible age of the equipment which can be deployed on hire basis.	The Concessionaire is permitted to deploy Reach Stackers, Empty Container Handlers and Tractor Trailers on hire/lease basis. All equipment deployed on hire/lease basis shall comply with the age restrictions prescribed in the Government of India, Ministry of Surface Transport (Ports Wing) circular dated 28.09.1998 regarding "Life norms of the plant and machinery and norms for availability and utilization of Cargo Handling Equipment placed as **Annexure-I**" At any time during the concession period, the age of hired/leased equipment must remain below the prescribed limits specified in the said circular. Equipment exceeding these age limits shall be immediately replaced to ensure operational safety, efficiency, and compliance with prescribed norms.
6.	TEFR Chapter 5, Cl. 5.2.7, Berth Dimensions	**Item Description:** OT berth: 250m length x 35.5m width; Berth 11-12: 220m each x 16.4m width (existing) **Query**: For Berth 11-12 (existing width 16.4m), the scope mentions retrofitting and realignment. The Authority is requested to clarify whether the Concessionaire can propose modifications to increase berth width to 35.5m to match OT specifications for operational consistency and future-proofing or must the existing 16.4m width be maintained? What is the flexibility for structural modifications?	Please be clarified that for berth no. 11 & 12 there is no modification required in terms of increasing the width there are immediate back-up area/apron area connected to the berth which poses the limitation to increase the width. Existing berth no. 11 & 12 shall be retrofitted/repaired and maintained with respect to existing dimensions of the berth. Relating to structural modifications, the same is not suggested. However, bidder may do the structural changes as required at his own cost with no lability towards SMPK and without causing any damage to the existing

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			berth set-up. Any structural modifications shall be done only after the approval of SMPK and Independent Engineer (IE).
7.	TEFR Chapter 7, Cl. 7.2.3, Berth Location and Positioning	**Item Description:** OT berth to be constructed between HOJ-III and HFTPL jetty with berth positioning options discussed **Query**: The TEFR mentions three berth alignment options with IIT Madras recommendations. Kindly confirm which specific alignment (Case I/II/III) is finalized	The finalized alignment is Option-2, enclosed as **Annexure-II**.
8.	RFP Section 1.1.1, Project Information Memorandum - Project Site Area	**Item Description:** Total project area: 58.62 acres (32.41 acres OT + 26.21 acres Berth 11-12) **Query**: The original traffic forecast and RFQ indicated approximately 80 acres for OT and additional area for Berth 11-12 (total ~100+ acres). The reduced area to 58.62 acres significantly impacts ground slot availability and MGC achievement: i) In this regard, Can the Authority provide additional contiguous land (at least 15-20 acres) at token fee of Re. 1 instead of 1.2x SOR rate under Article 9.3? ii) Also provide basis of capacity calculation with reduced land area.	i) Refer reply to Sl. No. 2 above. For further additional area, the same may be provided as per the provisions of article 9.3 of DCA. ii) Refer para 7.6 & 7.7 of TEFR. Area requirements are clearly spelled out in the TEFR and in the DCA. The same shall be refer to Chapter-7 of TEFR and Drg. no. SMPK/PMS/2425-052/HDC/TEFR/0702 and SMPK/PMS/2425-052/HDC/ TEFR/0703. The bidder has the flexibility to design the overall project based on the project operational philosophy.
9.	DCA Appendix 4, Scope of Work,	**Item Description:** Railway yard development: New 10 acres for OT railway yard, retrofitting of existing yard for Berth 11-12. **Query**: The Authority is requested to provide: i. Detailed railway network drawings showing connectivity from Port Marshalling Yard to OT and Berth 11-12	i) Please refer to Chapter 7, Section 7.12 and 7.2.2 of TEFR and Drg. No. MPK/PMS/2425-052/HDC/TEFR/0707 and SMPK/PMS/2425-052/HDC/TEFR/0708 for railway details. ii) There are multiple locomotives deployed by HDC, SMPA to serve several sidings. Rakes, upon attaining fitness from SE Rly TXR, are given top priority for placement at designated sidings.

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		ii. Rake handling philosophy and allocation mechanism between multiple terminals. iii. Confirmation that railway lines will be electrified with overhead equipment (OHE) by SMPA iv. Signalling and safety approvals responsibility v. Maximum rake handling capacity (rakes/day) for OT and Berth 11-12 separately.	iii) Currently, there are no plans for the same in the near future. In case, the lines are electrified (OHE) in future, the Concessioning Authority will be responsible for electrifying the lines upto the take off point of the Concessionaire Line. Within the Concessionaire boundary line, the same shall be the responsibility of the Concessionaire. iv) Signalling and safety approvals responsibility, within the Concessionaire boundary line, shall be responsibility of the Concessionaire. v) Estimated Six (6) Rakes per day for OT and Berth 11 & 12 is envisaged as per TEFR for each terminal.
10.	TEFR Chapter 5, Cl. 5.3.1, Storage Area Requirements	Item Description: Ground slot calculations for filled containers, empty containers, reefer, and hazardous cargo Query: The TEFR calculates ground slots based on average stacking height (4 high for filled, 5 high for empty). For E-RTG operations (green port compliance), additional space is needed for bus bar ducts and service lanes. Kindly confirm: i) Can stacking height be increased to 5+1 high for filled containers to optimize land use? ii) Will additional backup area be provided to compensate for space lost to E-RTG infrastructure? iii) Are the 1,394 ground slots (OT + Berth 11-12) sufficient for MGC achievement.	i) The Concessionaire shall have the flexibility to design the project in accordance with the operational philosophy envisaged under the DCA. For the Outer Terminal, the entire design and construction shall be the responsibility of the Concessionaire. For Berths No. 11 & 12, any structural modification for achieving a stacking height of 5+1 shall be undertaken by the Concessionaire after obtaining approval of SMPA and Independent Engineer (IE). ii) Refer reply to Sl. No. 2 above. For further additional area, the same may be provided as per the provisions of article 9.3 of DCA. iii) The calculations have been provided in the TEFR.
11.	DCA Appendix 4, Civil Works Scope - Bank Protection	**Item Description:** Bank protection works required: 2,500 sqm at OT **Query**: The Authority is requested to provide: i)Design basis report for bank protection considering vessel	i) All the available details, as available/envisaged for Bank Protection, are already provided in the TEFR. Please refer to TEFR Section 7.3.3 and Drg. no. SMPK/PMS/2425-052/HDC/TEFR/0720. Bidder shall be

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		propeller action and hydrodynamic forces. ii)Suitability of dredged material for reclamation/filling behind bank protection. iii)Nearest disposal location with coordinates for unsuitable dredged material. iv)Whether existing river bank protection is adequate or requires upgradation. v)Approval requirement from IIT Madras/CWPRS for alternative bank protection schemes proposed by Concessionaire.	conducting the detail design for the same and put up for approval during the project development stage. ii) Dredged Material usage is not envisaged in the TEFR. Earth filling is considered with borrow pit soil. Any such usage shall be as per extant rules of SMPA. In case, if any dredge material to be used, Concessionaire shall be conducting the detail design and geo-technical assessment for suitability of usability of material for the same and put up for approval of IE during the Construction Phase. iii)Disposal location will be provided during the Construction Period. Disposal will be responsibility of Concessionaire. iv)Bank protection is envisaged in the Existing River bank in the OT area. v)The approval of Concessioning Authority and appointed Independent Engineer shall suffice provided that, the design addresses the required aspects of Bank Protection.
12.	TEFR Chapter 5, Cl. 5.2.6.3, Berth Pocket Specifications	**Item Description:** Berth pocket: 260m length x 35m width x 9.0m depth at OT; existing berth pocket for Berth 11-12 inside NSD **Query**: For OT, please clarify: i)Is the natural depth of 9.0m CD maintained throughout the year or only during certain tidal conditions? ii)What is the minimum guaranteed draft at berth face during lean season/neap tides? iii)Will SMPA undertake maintenance dredging to maintain -9.0m CD at OT berth pocket with zero downtime for operations? iv)What is the annual siltation rate and dredging frequency? v) For Berth 11-12, what is the current depth and maintained depth inside HDC lock gate.	(i), (ii) &(v) The envisaged 8.5m CD water depth at the berth face is expected to be all round the year in the Outer Terminal and Berth 11 & 12. iii) Concessioning authority will be responsible to provide 8.5 m CD at OT in the berth face. iv) Maintenance Dredging in the channel is the responsibility of Concessioning Authority.

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13.	TEFR Chapter 2, Cl. 2.2, Navigational Aspects - Lock Gate Operations	**Item Description:** Haldia Dock operates with lock gate system; vessel movement dependent on tides **Query**: For Berth 11-12 inside HDC: i) How many vessel movements (in + out) are possible per tidal window? ii) What is the current average and maximum draft forecast at HDC? iii) How many working tides are available per month (day vs night navigation)? iv) Lock gate maintenance schedule and annual downtime? v) Any plans for lock gate capacity enhancement or second lock gate construction during concession period? vi) Will Concessionaire receive priority berthing or preferential treatment over other HDC berths, and if yes, what is the mechanism.	i) 3 in and 3 out are normally possible inside dock per tidal window. For proposed OT, the lock operation is not required. ii) Current average is 8 mtrs (+). Maximum recorded draft is 9 mtrs (+). iii) 2 tides per day. iv) Lock gate maintenance is generally done in no vessel period. v) Not at present. vi) Please refer Article No. 7.1(b) (ii). Please see **Corrigendum-VI.**
14.	RFP Project Information, Design Vessel Specifications	**Item Description:** Design vessel: 210m LOA x 30m Beam x 10.8m Draft for OT; smaller vessels for NSD berths **Query**: The Authority is requested to provide complete design vessel particulars: i. For OT - Can vessels up to 3,000 TEU capacity (LOA ~250m, Beam 32m) be accommodated considering OT is outside lock gate? ii. For Berth 11-12 - Maximum vessel size constrained by lock gate (172m LOA x 25m Beam as per TEFR)? Please confirm.	(i) and (ii) Please refer to TEFR Chapter-4, Section 4.8 for vessel size analysis.

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15.	TEFR Chapter 3, Cl. 3.3, Existing Facilities - Cargo Handling Equipment	**Item Description:** Existing 3 RMQCs (2 from 2006, 1 from 2022) and 4 RTYGCs (from 2007) at Berth 11-12 **Query**: The TEFR states that equipment from 2006-2007 has exceeded design life (15 years) and is not considered for project planning. Kindly clarify: i. Can Concessionaire procure these old RMQCs and RTYGCs from SMPA at mutually agreed depreciated value for interim operations during Phase I construction? ii. If yes, will Concessionaire be obligated to dispose/replace them within Phase II construction period? Who bears disposal cost and liability?	Refer B1.1 of Appendix 4 of Stage-II of DCA. i. Concessionaire may procure old RMQC and RTGs during phase-II for interim operations during Construction phase at a value determined by Independent Valuer(s) engaged by the Concessioning Authority. ii. However, in such case, the disposal (at Concessionaire Cost)/replacement of the same within Phase II construction period will be the responsibility of the Concessionaire. However, in the event the Concessionaire opts not to procure the existing equipment, the responsibility for disposal of such equipment shall vest with the Concessioning Authority.
16.	DCA Article 3.1, Conditions Precedent	**Item Description:** Various clearances and permits required before Date of Award of Concession **Query**: Appendix 8 lists conditions precedent including Environmental Clearance (EC) by SMPA, CTE/CTO by Concessionaire, Dock Safety, Fire Safety clearances. The Authority is requested to provide: i. Current status and expected date of EC from MoEF&CC; ii. Validity period of EC; iii. Appendix 8 lists conditions precedent including Environmental Clearance (EC) by SMPA, CTE/CTO by Concessionaire, Dock Safety, Fire Safety clearances. iv. Any restrictions on dismantling existing Berth 11-12 and constructing OT under EC;	i) The Concessioning Authority has already applied for EC, CRZ and CTE Clearance for Outer Terminal and Berth 11 & 12. ii) NA (under application stage) iii) Factual information reproduced in the query. iv) No restriction as such. v) Please refer to article 3 of DCA.

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		v. Will delay in obtaining approvals (beyond Concessionaire control) result in Concession Period extension.	
17.	DCA Appendix 5, Project Schedule	**Item Description:** Phase I completion: 24 months from Date of Award; Phase II completion: 12 months after Phase I **Query**: Kindly confirm: i) project schedule with milestones; ii) Whether "Date of Award of Concession" is same as "Appointed Date" or different	i) Refer Appendix 5 of DCA for project Schedule. ii) The term "Appointed Date" does not find mention in Appendix 5 of the DCA.
18.	RFP Section 1.1.3, Phase II Development	**Item Description:** Phase II involves retrofitting of Berth 11-12, procurement of 2 new RMQCs, 9 new RTGs, development of 26.21 acres backup area **Query**: For retrofitting of existing Berth 11-12: i)The Authority is requested to provide structural assessment reports, design basis reports, as-built drawings, and remaining service life assessment of existing berth structures; ii)Scope of retrofitting work (wearing coat replacement, fender replacement, strengthening of deck, pile repairs, etc.) iii)Whether Concessionaire can continue interim operations during retrofitting with proper safety measures; iv)Who certifies structural adequacy post-retrofitting (IE/IIT Madras/third party)?	i) Please refer TEFR for available/ referred details of retrofitting. The available Drg. is provided in the TEFR. ii) For the Super Structure and Sub-Structure apart from the one referred under retrofitting as above, the remaining service life can be considered as minimum 30 years. However, the Concessionaire is to make their own assessment regarding the remaining life of the structures. iii) Concessionaire can continue interim operations during retrofitting with proper safety measures. iv) Structural adequacy post retrofitting to be certified from third party like IIT/NIT/ Other institution/agency at the cost of Concessionaire and shall be submitted for SMPK / Appointed IE for final consent.

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19.	RFP Section 1.1.3, Existing RMQC and RTYG	**Item Description:** PPP operator may procure existing 2 old RMQCs and 4 RTYGs from SMPA at mutually agreed price for early operations **Query**: Regarding procurement of existing equipment from SMPA: i) Will SMPA provide certified condition assessment reports and residual life certificates for the 2 old RMQCs (2006 vintage) and 4 RTYGCs (2007 vintage)? ii) What is the basis of valuation - depreciated book value or market value or scrap value? iii) Who appoints the independent valuer? iv) Is there mandatory requirement to dispose these within Phase II period and if so, can they be sold in secondary market or must be scrapped? v) Will there be any credit adjustment in Performance Security if Concessionaire purchases these assets.	i. Available Condition Assessment Report(s) for the existing RMQCs and RTYGs, as held in the records of the Concessioning Authority, shall be shared with the Concessionaire at the appropriate stage. ii. Refer reply to Sl. No. 15 above. iii. Concessioning Authority at its own cost. iv. It is mandatory requirement to dispose old RMQCs and RTGs within Phase II. The Concessionaire shall have the discretion to determine the most appropriate method. v. There will not be any credit adjustment of Performance Security.
20.	TEFR Chapter 7, Cl. 7.2.4.1, Dredging Requirements	**Item Description:** Capital dredging vs maintenance dredging responsibilities **Query**: Please clearly demarcate dredging responsibilities: i) For OT construction - who undertakes capital dredging of berth pocket to achieve -9.0m CD (Concessionaire or SMPA)? ii) Quantum of capital dredging estimated and included in Project Cost? iii) For Berth 11-12 - capital dredging required during realignment or existing depth adequate?	(i)&(ii) For the outer container terminal, no dredging has been envisaged as the planning and design has been done considering no dredging and based on the historical analysis of bathymetry charts, no dredging would be required. However, in case, if any capital dredging would be required in berth pocket of OT, the same have to be taken up by the concessionaire at his own cost (as they will retain the Berth Hire charge). iii) Berth 11-12 are existing berths and hence capital dredging is not required. iv) Refer reply to Sl. No. 12 above.

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		iv)Maintenance dredging - responsibility (SMPA), frequency, and guaranteed performance standards (maximum permissible downtime)? v. Suitability of dredged material for reclamation and disposal location with coordinates if unsuitable.	v) Refer reply to Sl. No. 11 (ii) above.
21.	TEFR Chapter 7, Cl. 7.4.3.4, Demolition Requirements	**Item Description:** Approximately 100 structures to be demolished at project site; debris disposal location not specified **Query**: Regarding demolition of existing structures: i. The Authority is requested to provide complete list and exact locations of all structures to be demolished with built-up areas. ii. Total quantum of demolition debris estimated; iii. Designated debris disposal location with coordinates and distance from site; iv. Whether any salvageable materials (steel, equipment, fixtures) become property of Concessionaire? v. Any contamination assessment required before demolition (hazardous materials, asbestos, etc.)? vi. Cost provision in Estimated Project Cost for demolition and disposal. vii. Further, the said demolition has to be in the scope of Authority and the vacant land has to be handed over to the Concessionaire.	i. Site will be handed over on "as is where is basis". ii. Cannot be pre-determined. iii. Will be provided within the dock premise. iv. Yes v. As applicable as per norms. vi. Factored in contingencies vii. Demolition is in the scope of Concessionaire.

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22.	DCA Appendix 4, Civil Works - Earth Filling and Pavement	**Item Description:** Earth filling (90,000 cum) and various pavement types required at OT backup area **Query**: For site development at OT (Greenfield site): i. Current ground levels and desired finished levels (FGL) with topography survey data? ii. Source of fill material (sand/soil) - nearest borrow area location and transportation distance? iii. Quality specifications for fill material and compaction requirements? iv. Geotechnical investigation reports for OT backup area to confirm bearing capacity for container stacking loads (RTG wheel loads ~50 T/sqm)? v. Ground improvement works required and cost provision? vi. Pavement design for different zones (RTG lanes, TT movement areas, container storage areas) with design traffic loads.	i. The finished GL for the back-up area of OT may be taken as +8.5m CD. The existing ground are having the levels varying from +7.5 to +8.5 m CD. On an average, the level may be considered as +8.0 m CD subject to actual measurement during the time of development. ii. Bidder to make his own assessment. Bidder shall be conducting the detail design of the various elements involved in the project development. iii. Refer above point. The general Specs are provided in the TEFR Section 7.9, Bidder shall be conducting the detail design for the same and put up for approval during the project development stage. iv. It is encouraged that, the bidders are acquainted with the site and existing situation on "as is where is basis" before submission of the bid. All the available details pertaining to Bathy, Geo-Technical data and Drg. are already provided in the TEFR. v. The ground improvement works and cost provisions is already in the TEFR. Please refer to Chapter-7 and Chapter-9. vi. Detail Engineering is in scope of Concessionaire.
23.	TEFR Annexure D, Design Drawings and Specifications	**Item Description:** Reference drawings provided in TEFR annexure **Query**: For detailed engineering and design: The Authority is requested to provide in AutoCAD/electronic format: i) As-built drawings of existing Berth 11-12 (structural details, berth cross-section, pile details, foundation design); ii) Topography survey of entire project area with benchmark levels;	i. As the detail engineering and design works are to be done by the Concessionaire during project development stage, AutoCAD Drawings, as available, will be shared with the successful bidder upon placement of Letter of Intent. ii. The establishment of survey control points, conduct of Topographical Survey, and synchronisation of the proposed works with the existing port infrastructure shall be the responsibility of the Concessionaire. HDC shall guide the Concessionaire to the nearest established permanent Benchmark at the time of commencement of the survey.

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		iii) Geotechnical investigation reports (boreholes, soil strata, bearing capacity, liquefaction potential) for both OT and Berth 11-12 areas; iv) Bathymetric survey charts for OT and approach channel; v) Layout of existing underground/overhead utilities (electrical cables, water pipelines, drainage, telecom) with relocation requirements; vi) Structural adequacy certificates for existing berthing structures	iii. Available Geotechnical investigation reports near proposed OT and nearest area of berth 11 & 12 are enclosed as **Annexure-III & IV**. iv. Bathymetric survey charts for OT and approach channel is attached as **Annexure-V.** v. The Layout of existing utilities will be made available to the successful bidder upon placement of Letter of Intent. vi. The existing berth structures are capable of bearing 5T/m2.
24.	TEFR Chapter 7, Cl. 7.2.5, Berth Structural Design	**Item Description:** OT berth on bored cast in-situ piles (1200mm dia); approach trestles (10m and 18m wide) **Query**: For OT berth structural design, Kindly clarify: a. Founding depth of piles (-48m CD) - is marine geotechnical data available to this depth? b. Design loads considered (crane loads, mooring loads, berthing forces, seismic loads)? c. Can Concessionaire propose alternative structural schemes (e.g., open piled jetty vs sheet pile quay wall vs cellular cofferdam) for cost optimization subject to IE approval?	a. Yes, it is available. Please refer the TEFR. b. All the available details are already provided in the TEFR Chapter No. 3 and 7. c. The concessionaire is to conduct the detail engineering for the applicable component as per the applicable Codal provisions and submit the same for approval of the Independent Engineer (IE). Required geo-technical investigations shall be conducted by the Concessionaire. The bidder has the flexibility to design the overall project based on the project operational philosophy. However, all minimum requirements, stipulated under the DCA, shall be duly complied with and the design shall be subject to the approval of the Independent Engineer (IE).
25.	DCA Article 7.1(c)(i), Obligations of SMPA - Approach Channel Maintenance	**Item Description:** SMPA to maintain navigational channels and provide access for vessels **Query**: Kindly clarify SMPA obligations for navigational infrastructure:	i. Please refer DCA article 7.1 (c) (i) (b) ii. Maintenance dredging is carried out round the year as per requirement. iii. No permissible downtime is applicable.

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		i) Guaranteed draft maintenance in approach channel throughout year? ii) Frequency and duration of maintenance dredging cycles? iii) Maximum permissible downtime for dredging operations affecting vessel movement? iv) Are there any performance standards/KPIs for SMPA regarding channel availability, draft provision, and vessel turnaround time? v) Compensation mechanism if SMPA fails to maintain agreed draft or if channel is unavailable beyond reasonable periods? Impact on MGC if draft limitations reduce vessel calls.	iv. No performance standards/KPIs for SMPA regarding channel availability, draft provision, and vessel turnaround time v. If there is any Concessioning Authority Event of Default, the relevant provision of DCA shall apply.
26.	DCA Article 7.1(c)(j) Railway Operations - Rake Placement by SMPA	**Item Description:** SMPA responsible for rake placement from port marshalling yard to concessionaire yard using SMPA locomotives **Query**: Regarding railway operations and SMPA obligations: i) Maximum rake handling capacity allocated to this terminal (rakes per day) at Port Marshalling Yard and within Concessionaire yard? ii) Rake allocation mechanism when multiple terminals compete for slots - seniority-based or first-come-first-served? iii) Average rake placement time from marshalling yard to concessionaire yard? iv) Any performance standards for SMPA regarding rake placement delays? v) If SMPA fails to place rakes timely causing detention/ demurrage to ICD/customer, who bears liability? vi) Details of railway haulage charges, terminal charges and loading/unloading charges applicable.	i. Please refer Sl. No. 9 of pre-bid replies. The port marshalling yard has an average interchange of around 40 rakes at present. ii. There are multiple locomotives deployed by HDC, SMPA to serve several sidings. Rakes, upon attaining fitness from SE Rly TXR, are given top priority for placement at designated sidings. iii. About 1 hour. iv. No performance standards for SMPA regarding rake placement delays. v. SMPA does not envisage any delay in normal course. vi. (a)Haulage & terminal charges are notified by SE Rly. Loading/ Unloading to be borne by Concessionaire. (b) No charge for the same is payable to Concessioning Authority.

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27.	DCA Article 7.1(a)(xiii),Minimum Guaranteed Cargo (MGC) Appendix - 13	**Item Description:** MGC obligations **Query**: Presently, Haldia dock is handling ~ 0.18 Mn TEU. Accordingly, we request you to rationalise the minimum guaranteed cargo volume considering the present traffic.	DCA condition prevails
28.	DCA Article 7.1(a)(ii), Berth 11-12 Retrofitting	**Item Description:** Concessionaire to undertake retrofitting of Berth 11-12 for safe MHC/RMQC operations **Query**: For retrofitting of existing berths: i. Request SMPA to provide baseline condition assessment reports for identifying exact scope of retrofitting required (wearing coat replacement, fender replacement, deck strengthening, etc.)? ii. If during retrofitting, Concessionaire discovers hidden defects or structural inadequacies requiring significantly higher investment than anticipated, will there be compensation mechanism or Project Cost revision? iii. Can retrofitting be staged (one berth at a time) to maintain partial operations?	i. No baseline condition reports are available. The scope of retrofitting is mentioned in the TEFR and included in cost estimate. ii. The jetties and back up area will be handed over in "as is where is basis". Bidders are requested to give due diligence before submission of their bids. iii) Please refer DCA article 2.2 (ii).
29.	TEFR Chapter 7, Cl. 7.4, Operational Layout and Facilities	**Item Description:** Container stacking area, reefer slots, hazardous cargo area, gate complex, scanning facility **Query**: For operational facilities, Kindly clarify: i. For Reefer slots - 24 points at Berth 11-12 and additional at OT - will SMPA provide electrical infrastructure (transformers, cabling to reefer area).	i. Presently at Berth 11 & 12, refer points (24 existing +26 proposed points only) will be handed over to the concessionaire during phase-II at its depreciated value. The concessionaire will be provided with power supply as per article 7.2 of DCA. OT is a green field infrastructure, hence concessionaire to develop. ii. Comprehensive Scanning facility is being set up by Customs inside the dock area of HDC. It is a common user facility.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		ii. For Container scanning facility - will SMPA provide common scanning facility at gate iii. For Hazardous cargo storage area - any restrictions on DG cargo classes permitted and distance from other facilities? iv. Gate complex - how many lanes to be developed and will SMPA provide pre-gate parking area?	iii. For handling Hazardous and DG cargo, the applicable norms of Customs or other applicable authority shall be followed by the bidder. iv. No Pre-Gate facility will be made available. The New Gate Complex of HDC is of 4 lanes (2 in and 2 out).
30.	DCA Article 7.1(a)(iii), Page 51, Equipment on Hire/Lease Basis	**Item Description:** Concessionaire to deploy Reach Stackers, Empty Handlers, Tractor Trailers on hire/lease **Query**: Regarding hired/leased equipment request for Confirmation that hired equipment need not be transferred to SMPA at Concession termination.	Hired equipment is not considered in Project Cost estimate. Post completion of the concession agreement either due to efflux of time or termination, all the hired/leased assets can be taken by the Concessionaire.
31.	DCA Article 7.2, Utilities and Services	**Item Description:** Water supply, power supply, utilities to be arranged by Concessionaire **Query**: Utilities and infrastructure: i. Water: Source, takeoff point, quality (raw/potable), tariff, and reliability for operational needs (firefighting, dust suppression, equipment washing, drinking water) - estimated 50 KLD minimum. ii. Will SMPA provide dedicated water line to terminal boundary? iii. Power: Location of nearest CESC substation for power tapping; available spare capacity; applicable tariff.	i. Refer Clause 7.2 of DCA. Potable water, if available, will be provided. However, no guarantee can be provided. Dock water will be used for firefighting and dust suppression system. ii. No. The same has to be installed by concessionaire at its own cost from the source to be provided during construction phase. iii. Please Refer to article 7.2 of DCA.
32.	TEFR Chapter 7, Cl. 7.8, Utilities - Fire Fighting	**Item Description:** Firefighting system, water source, pump house, hydrants **Query**:	

"Integrated Development of Outer Terminal and Berth No. 11 & 12 at Haldia Dock Complex for Handling Containers & Multipurpose Clean Cargo (Dry and Break Bulk) through PPP mode"

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		Fire safety infrastructure: i. Source of fire-fighting water - will SMPA provide takeoff from dock water or Concessionaire must construct independent intake from river? ii. Can existing fire-fighting infrastructure (if any) be utilized or complete new system required? iii. Will SMPA fire services provide backup support or Concessionaire must be fully self-reliant with fire tenders?	i. Please refer Sl. No. 31 of pre-bid reply. ii. The Concessionaire shall be required to develop an independent firefighting and dust suppression system for the concession area at both OT and berth 11 & 12. SMPA is separately developing a firefighting system for the port, from which designated tapping points shall be made available to the Concessionaire at the concession area boundary of berth 11 & 12. iii. Yes, HDC, SMPA will provide back up support.
33.	RFP Cl. 1.2.6, Royalty Structure and Applicability	**Item Description:** Royalty per TEU indexed to WPI; different rates for loaded, empty, transhipment, and multipurpose cargo **Query**: Regarding Royalty applicability and indexation, kindly clarify: i. Base year and escalation year for WPI indexation. ii. For multipurpose cargo, converting to TEU equivalent using 24.25 MT per TEU is very high. For empty container, the applicable royalty should be 80% of EXIM laden royalty, please modify the same.	i. Base year in which RFP submission date falls. ii. DCA condition prevails.
34.	RFP Cl. 1.2.6, Multipurpose Cargo Categories and Royalty	**Item Description:** Four categories: (1) Bulk cargo-24.25 MT/TEU; (2) Vehicles-2 TEU/unit; (3) Project cargo-divide by 7.5; (4) Break bulk-24.25 MT/TEU **Query**: Multipurpose cargo royalty structure concerns:	i. DCA Condition prevails.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		i. We request you to keep the multi-purpose cargo royalty equivalent to 75% of existing Scale of Rates. ii. How will Multipurpose cargo throughput be included in the MGC calculations.	ii. The total weight of multipurpose cargo handled (in MT) shall be divided by 24.25 MT to arrive at the equivalent TEU volume and the resultant figure shall be aggregated with the container throughput for the purpose of calculating MGC.
35.	DCA Article 9.1, License Fee of Re. 1/-	**Item Description:** Annual license fee of Re. 1/- for project land area of 58.62 acres **Query**: Additional land requirement and license fee: i. If Concessionaire requires additional land beyond 58.62 acres (for railway yard expansion, reefer depot, empty depot, ICD/CFS development), what is availability and pricing? ii. Article 9.3 mentions 1.2 times SOR rate for additional land - what is current SOR rate per acre per annum? iii. Can additional land for operational necessities (proved by independent expert) be provided at token Re. 1/- to ensure project viability? iv. Right of first refusal for adjacent land parcels during concession period? v. Can Concessionaire sublease portion of land to third-party service providers (freight forwarders, customs brokers, ICD operators).	Any allotment of additional land shall be as per Article 9.3 and terms and conditions as per DCA will prevail. i. Additional land will be provided as per article 9.3 of DCA. ii. Existing SOR of HDC is available in the SMPA website in estate corner. iii. No iv. Any additional land, if available, will be allocated as per article 9.3 of DCA only. Thus, the question of Right of first refusal does not arise. v. The land would allocated to the Concessionaire on License basis. The Concessionaire shall not be permitted to sublease the land to third-party service providers (freight forwarders, customs brokers, ICD operators).
36.	DCA Article 8.1, Tariff Setting - Market Determined Tariff	**Item Description:** Concessionaire free to fix tariff based on market conditions as per Tariff Guidelines 2021 **Query**: Tariff regulation concerns:	

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		i. Confirm that Tariff Guidelines for PPP Operators dated 21.12.2021 allow complete pricing freedom without any ceiling or reference tariff; ii. Are there any reporting obligations to Tariff Authority for Major Ports (TAMP) or only to SMPA Board ? iii. If Government mandates discounts/concessions for specific cargo types (coastal cargo, EXIM promotion schemes) in future, will such mandates be treated as Change in Law with royalty adjustment? iv. Can Concessionaire differentiate tariffs based on customer segments (shipping lines, BCOs, 3PLs), cargo types, and volume commitments etc?	i. Tariff Guidelines for PPP Operators, issued by the govt. vide no. PD-1 3/66 / 2020-PPP (Part-2) /e-347 563 dated 21.12.2021, as amended from time to time shall be applicable. ii. No Reporting obligations to TAMP. iii. It will not be considered as change in Law. Please refer article 9.2(b) of DCA for Royalty payment in such case. iv. The Tariff to be charged by Concessionaire shall be line with the Tariff Guidelines for PPP Operators issue by the govt. vide no. PD-1 3/66 / 2020-PPP (Part-2) /e-347 563 dated 21.12.2021 as amended from time to time
37.	DCA Article 1.1, Definition of Total Project Cost	**Item Description:** Estimated Project Cost Rs. 696.83 Crores; Total Project Cost includes cost overruns if approved **Query**: i) Regarding Project cost and financing: The Authority is requested to provide detailed breakup of Rs. 696.83 Cr estimated project cost (civil works, equipment, contingency, IDC, other costs); Basis of cost estimation and reference year. ii. If actual Total Project Cost exceeds Estimated Project Cost due to Change in Law, SMPA delays, or unforeseen ground conditions, will revise Total Project Cost be recognized for termination payment calculations?	i) Refer TEFR Chapter- 9 ii) No. The Total Project Cost will be as defined at Article 1.1 of DCA.

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Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
38.	DCA Article 12.2(c), Competing Facilities Clause	**Item Description:** 5-year exclusivity from Scheduled Completion Date but several exemptions listed **Query**: The competing facilities exemption has been enumerated in detail. You are kindly restricting it to container handling operation with specific container project only.	DCA condition prevails
39.	DCA Article 7.3, Liability for Shortfall in Performance	**Item Description:** Reference to performance standards in Appendix 14; liquidated damages for sustained underperformance **Query**: The Authority is requested to provide complete details of performance standards and penalty structure from Appendix 14: i) Gross Berth Output (GBO) target - moves per ship per hour for OT (MHC operations) and Berth 11-12 (RMQC operations) separately; ii) Truck/rail turn-around time - maximum time from gate-in to gate-out for receipt/delivery operations; iii) Transit storage dwell time - average days for import containers; iv)Crane/equipment availability percentage; If performance falls below standards due to lock gate breakdown, channel draft reduction (SMPA responsibility), equipment failure during warranty period, will penalties be waived? Measurement methodology and dispute resolution for performance calculation.	Please see **Corrigendum-VI.**

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
40.	DCA Appendix 18, Key Performance Indicators for Concessioning Authority	**Item Description:** KPIs and performance obligations of SMPA during concession period **Query**: The Authority is requested to provide detailed KPIs binding on SMPA with consequences for non-performance: 1) Lock gate operations: Minimum number of tidal lock openings per day; maximum vessel waiting time for lock transit; lock gate breakdown - maximum downtime per year; compensation to Concessionaire for lock gate failures exceeding acceptable limits; 2)Channel maintenance: Minimum maintained draft in approach channel and at berth face; frequency of maintenance dredging; penalty if draft falls below specified level affecting vessel operations; 3)Utilities: Power supply reliability (99.5% uptime? 4)water supply pressure and quality; penalty for prolonged outages; 5)Rake handling: Minimum rakes allocation per week to terminal; rake turnaround time at port marshalling yard; Security and common facilities: Gate processing time; customs/scanner availability; (f) If SMPA fails on any KPI causing revenue loss to Concessionaire, How is the compensation determined and the timeline of events followed? is compensation automatic or requires arbitration.	DCA condition prevails.
41.	TEFR Chapter 9, Traffic Forecast and Projections	Item Description: Traffic forecast assumptions and cargo projections for 30-year concession period Query:	

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		Traffic forecast validation and assumptions: i. The Authority is requested to provide year-wise traffic forecast (TEUs) for Years 1-30 showing: Loaded imports, loaded exports, empty containers, transhipment, multipurpose cargo; ii. What is base year of forecast and CAGR assumed (typically 5-7% for container sector)? iii. If actual traffic in first 5 years is <60% of forecast, will SMPA agree to MGC reduction or royalty restructuring.	(i)& (ii)For projection of container Cargo, please refer Chapter-4 of TEFR. In addition to container cargo, the Concessionaire is also permitted to handle multipurpose cargo at OT only. The Bidder is expected to conduct its own assessment of the market before bidding for this project. iii. No reduction of MGC or Royalty restructuring would be applicable for such cases.
42.	DCA Article 7.1(c)(i)(e), Maintenance Dredging by SMPA	**Item Description:** SMPA to carry out maintenance dredging in navigational channels to maintain agreed draft levels **Query**: Dredging responsibilities and cost allocation: i. For OT (outside lock gate): Natural depth 9.0m CD - is this maintained draft throughout year or only during high tide season? ii. Who does maintenance dredging of OT berth pocket (260m x 35m) - SMPA or Concessionaire? Annual siltation rate estimated? iii. For Berth 11-12 (inside HDC): Current maintained depth inside dock? iv. If dredging delayed causing vessel draft restrictions and cargo loss, will Concessionaire get MGC waiver and compensation.	i) Refer reply to Sl. No. 12 above. ii)Throughout the year, maintenance dredging is done by SMPA, iii)Current maintained depth inside dock is 8.5 m iv) No.
43.	DCA Appendix 20, Compliance to	Item Description: Concessionaire to comply with MoPSW Green Ports Policy	

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
	Green Ports Policy	measures Query: The Authority is requested to provide detailed requirements under Green Ports Policy with cost implications: i. E-RTG (electric rubber-tyred gantry) instead of diesel RTG - additional cost 30-40% over diesel, Shore power (cold ironing) for vessels at berth - infrastructure cost Rs. 50-100 Cr depending on capacity, LED lighting throughout terminal, Solar rooftop on buildings (how many kW required?), EV charging stations for internal vehicles, (vi) Dust suppression systems (water sprinklers, mist cannons), (vii) Effluent treatment plant, (viii) Rainwater harvesting; ii. Total incremental cost for green compliance estimated at Rs 75-100 Cr additional - will this be recognized as approved Project Cost variation for termination payment? Some measures may require R&D (e.g. hydrogen fuel cell equipment trial) - innovation grant or subsidy from MoPSW available? iii. Penalty for non-compliance with green norms? iv. If future green regulations mandate carbon-neutral operations requiring additional capex, will it be treated as Change in Law with relief.	i. Not envisaged. DCA condition prevails ii. No. iii. Penalty, if any, will be guided as per Harit Sagar Green Port Guidelines (**Annexure-VI**) iv. No.
44.	General	**Item Description:** Royalty indexation **Query:** Please confirm the first year in which WPI linked escalation will be applicable.	The article 9.2 (c) and 9.2 (f) of DCA may be referred for clarification.
45.	General	**Item Description:** Performance Standard **Query:**	Please see **Corrigendum-VI.**

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		We request to modify "moves per hour" norms for container vessels handled by MHCs to 12 moves/ hour (from existing 17 moves/ hour) and Steel/Bagged Cargo to 2,500 tonne per weather working day basis 4 hooks (existing 4,000 tonne/ day) in line with actual operations carried out in other major ports.	
46.	General	**Item Description:** Transit storage Dwell time **Query:** We request to revise dwell time for containers cargo to 7 days (import & export) and 30 days for all other cargo (bulk & break bulk) other than Container in line with industry practice.	Please see **Corrigendum-VI.**
47.	General	**Item Description:** Capital dredging and Maintenance dredging **Query:** (a) Capital & maintenance dredging (including berth pocket) is in the scope of the Authority, please confirm. (b) Further, please provide minimum draft.	Refer reply to Sl. No. 12 above.
48.	General	Item Description: Concession period Query: Model Concession Agreement, 2021 provides that the Concession Period for multi-phases project would be 45 years. As this Project is to be developed in 2 phases, we request you that the concession period should be 45 years.	Please See Clause 2.2 of DCA DCA condition prevails
49.	General	**Item Description:** Berth hire charges. **Query**: Presently, it is provided that berth hire charges of OT shall be collected by the Concessionaire and Berth hire charges for Berth 11 & 12 will be collected by Authority. Post retrofitting	Berth Retrofitting, as per the DCA, shall be undertaken by the concessionaire and maintenance of the berth is also under the concessionaire's scope of work. Insurance of Berths 11 & 12 as per prevailing norms will be the responsibility of the Concessioning Authority. All other insurance, as stipulated under Clause 12.1(c) of the DCA, shall be obligation of the Concessionaire.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		of berths by Authority, the berth maintenance, insurance will be continuing to be done by Authority during the entire concession period? Please confirm. Otherwise, we request you to keep Berth hire charges in account of Concessionaire.	The Berth hire charges for 11 & 12 will be accrued to the Concessioning Authority.
50.	General	**Item Description:** Extension in bid submission Timeline **Query**: We sincerely request the Authority to kindly extend the bid submission date of 26.03.2026 by at least 30 days, i.e., up to 25.04.2026, considering this is a single-stage tender requiring submission of extensive technical, commercial, and statutory documents, along with the time needed to obtain necessary certificates and supporting documents to ensure a complete and compliant bid.	Please see **Corrigendum-V.**
51.	Type of Cargo that can be handled	**Item Description:** DCA & TEFR- various clauses **Query**: Please provide the complete list of multipurpose clean cargo (Dry & Break Bulk) that can be handled at OT & berths -11 & 12. If there are any restrictions or conditions to handle any type or mode of containers or multipurpose clean cargo (Dry & Break Bulk), please provide details.	Refer Definition of Project in Article 1.1.
52.	General	**Item Description:** Existing cargo handled	

"Integrated Development of Outer Terminal and Berth No. 11 & 12 at Haldia Dock Complex for Handling Containers & Multipurpose Clean Cargo (Dry and Break Bulk) through PPP mode"

<table>
<tr><th>Sl. No.</th><th>Clause/Article No. /Page No./ Query Ref.</th><th>Pre-Bid Query</th><th>Response of HDC, SMPA</th></tr>
<tr><td></td><td></td><td><u>Query</u>:
Please provide details regarding the existing quantity handled at berths 11 & 12 – containers- loaded & unloaded quantity bifurcation & if any multipurpose clean cargo handled- quantity & cargo- for both the above; details of cargo in the last 3 Financial Years & the current FY till December 2025. This will provide greater clarity to understand the cargo, trend etc. & evaluate in a better way.</td><td><table><tr><th>Year</th><th>Import</th><th>Export</th><th>Total(TEU)</th></tr><tr><td>FY 2023-24</td><td>52178</td><td>58429</td><td>110607</td></tr><tr><td>FY 2024-25</td><td>94884</td><td>89850</td><td>184734</td></tr><tr><td>FY 2025-26</td><td>109314</td><td>106224</td><td>215538</td></tr></table></td></tr>
<tr><td>53.</td><td>DCA -Appendix 13</td><td><u>Item Description:</u>

Minimum Guaranteed Cargo / Container

<u>Query</u>:

i) Please confirm that any multipurpose clean cargo (dry & break bulk) handled also will be considered in MGT.
ii) Also please confirm that the conversion factor for MGT also will be as per clause 9.2 of the concession agreement.
Example:(24.25 MT is equivalent to 1 laden TEU– Categories: 1: For all types of clean dry bulk cargoes)</td><td>i) Yes
ii) Refer reply to Sl. No. Sl.34 (ii) above.</td></tr>
<tr><td>54.</td><td>DCA- Appendix 4</td><td><u>Item Description:</u>

Reg equipment's for the project

<u>Query</u>:

Request the Authority to allow the concessionaire to deploy new or old equipment as per their choice & feasibility as long as it meets the criteria of required handling capacity of the</td><td>Please see Corrigendum-VI.</td></tr>
</table>

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		project & ability to meet the performance norms & equipment's are in good condition. Insistence on new equipment's hamper the capex & viability.	
55.	General	**Item Description:** Back Up Area **Query**: Please confirm if there is any provision for allotment of additional storage space apart from 58.62 acres for storage of multipurpose clean cargo & also provision for office space & facilities in any common user building etc.	Please Refer to Article 9.3 of DCA.
56.	TEFR- various clauses	**Item Description:** Vessel Draft Restrictions **Query**: Please confirm if there is any concrete plan to for dredging of the approach channel to increase the draft to handle higher draft vessels of beyond 8 meters in future.	Please refer to TEFR for the Navigational Aspects. The same is covered in detail in TEFR Chapter-3.
57.	General	**Item Description:** Utilities, Access, Right of Way **Query**: Kindly provide details on the planned access and mobilization for the project site. Also, utilities availability & charges during construction / development phase & subsequently. Also, ROW & planned exit & entry for OT & berths 11 & 12	Refer Article-7 and Appendix -12 of DCA.
58.	General	**Item Description:** Documents Required	

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Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		Query: Please provide the following documents w.r.t. OT & berths 11 & 12 with all the details. 1. Environment Clearance 2. CRZ Clearance 3. Geo Technical Investigations Report 4. CAD files of any design layouts prepared for the project 5. Soil Testing reports for the Project area 6. Environmental Impact Assessment (EIA) report 7. Any other relevant document/layout/ drawing related to project.	1,2 & 6- Under the obligation of Concessioning Authority. 3. Available details are provided in the TEFR. Refer Sl.No. 23(iii) above. 4. To be provided to successful bidder upon placement of Letter of Intent. 5. Refer Sl.No. 23(iii) above. . 7. To be provided to successful bidder upon placement of Letter of Intent as available.
59.	Page 84 of the RFQ cum RFP	**Item Description:** Documents **Query**: Kindly confirm the process for obtaining the sign and seal of the Principal on the Integrity Pact. Do we need to submit a duly filled and signed copy of the document from our side for their signature and seal?	The bidder has to fill and signed/Sealed by Authorised signatory in specified format.
60.	age 71 of the RFQ cup RFP document	**Item Description:** Documents **Query**: It is mentioned that Appendix IB (Letter comprising the Financial Bid) should not be submitted with the Technical	The Financial Bid shall be submitted online in "www.eprocure.gov.in" in specified BOQ format.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		Bid; however, since this is a single-stage bid, kindly clarify whether we are required to submit it along with our proposal.	
61.	Bid Security Clause No. 2.23 (i) (pg-3	**Item Description:** The Bidder shall furnish as part of its Bid, a Bid Security referred to in Clauses2.1.7 and 2.1.8 hereinabove in the form of a bank guarantee issued by nationalized bank, or a Scheduled Bank in India having a net worth of at least Rs. 1,000 crores (Rs. one thousand crore), in favour of the Authority in the format at Appendix-II (the "Bank Guarantee") and having a validity period of not less than 180 (one hundred eighty) days from the Bid Due Date inclusive of a claim period of 60 (sixty) days, and may be extended as may be mutually agreed between the Authority and the Bidder from time to time. In case the Bank Guarantee is issued by a foreign bank outside India, confirmation of the same by any nationalised Bank in India is required. For the avoidance of doubt, Scheduled Bank shall mean a bank as defined under Section 2(e) of the Reserve Bank of India Act, 1934. **Query**: In line with the prevailing regulatory framework and with a view to promote ease of doing business, we request Authority to kindly consider acceptance of an "Insurance Surety Bond" issued by IRDAI approved Insurance Companies as a valid instrument towards Bid Security under the subjected tender. In this regard, we enclosed herewith a copy of Office Memorandum dated 24th September 2024 issued by Department of Financial Services, Ministry of Finance, Government of India	Please see **Corrigendum-VI.**

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		regarding use of Insurance Surety Bond in lieu of Bank Guarantee for EMD/Bid Security. Encl: Office Memorandum dated 24th September 2024	
62.	TEFR: Page 7,10,11 12 etc.	**Query**: The layout plan, Berth position and some other pictures in TEFR are largely ineligible. The Plans and the details given therein could not be read properly. Kindly provide us a readable document.	Published along with this reply.
63.	TEFR: Traffic Analysis, Chapter 4	**Query**: The Traffic Analysis has been done on 2021-22 traffic. Kindly revise it taking 2024-25 traffic.	SMPK has conducted the independent traffic study and the details are presented in the Chapter-4 of TEFR. The Bidder is expected to conduct his own assessment of the market before bidding for this project. DCA condition prevails.
64.	DCA , Appendix – 8, Cl (B)	**Query:** B. The Concessioning Authority is liable to obtain prior Environmental Clearance & CRZ Clearance for the Project." It is requested to kindly confirm whether the required statutory approvals, including Environmental Clearance (EC), CRZ Clearance, and any other applicable regulatory permissions for construction of the proposed berth over the river, shall be made available along with the Letter of Award (LOA). Since the proposed New Berth is not a standalone facility and shall form an integral part of the Port infrastructure, it is understood that the responsibility for obtaining EC, CRZ clearance, and all other statutory approvals required for commencement of construction shall rest with the Concessioning Authority. In this regard, it is further requested that the Appointed Date / Agreement Effective Date shall be declared only upon receipt of all mandatory statutory clearances, including EC for construction of the New Berth and development of the	Please see refer Clause 3.1(b) (a) of DCA.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		backup area, to avoid any delay attributable to pending approvals. Kindly confirm. The Outer Terminal is likely to experience current in the excess of ± 3 km of tidal surge alongside of berth as well as with the rise and fall of tide. In such cases how HMCs or any other equipment will ensure continuous spreader operation without damaging adjacent container or lashing unlashing crew or Vessel.	
65.	TEFR	**Query:** Kindly share feasibility and safety report for continuous operation at River front.	The available details are made in the TEFR. Further, the report prepared by IIT-Madras for extended monitoring study of shipping channel leading to Haldia Dock Complex is enclosed for reference as **Annexure-VII.**
66.	TEFR	Query: Phase I (0 to 24 months) consists of development of Outer Container Terminal. During this phase the Operator has option to start functioning by procuring 2 old RMQC/s and RTYG/s from Port. In that Case the Operator has the disposal liability of these units once they install new equipment. What if the Operator chooses not to procure the old RMQC/RTYG from Port !! Will Port dispose the units and clear the space ?	**If the Concessionaire opts to procure the old RMQC/s and RTYG/s:** Such procurement shall be permissible during Phase-II only as per article 2.2 of DCA. The disposal or replacement of these units, once new equipment is installed, shall be the responsibility and cost of the Concessionaire, to be completed within the Phase-II construction period. **If the Concessionaire opts NOT to procure the old RMQC/s and RTYG/s**: The disposal of these units and clearance of the space shall be the responsibility of the Concessioning Authority.
67.	TEFR	**Query:** How many 11 kV Electrical feeder station required for the entire project? Berth 11 & 12 has three RMQC/s . What happens to the 3rd RMQC ??	Refer to DCA article 7.2. The 3rd RMQC is to be handed over to the Concessionaire as per article 7.1 (a) (i) (o).
68.	TEFR	**Query:** The land (back up yard) earmarked for OCT , part of it is apparently occupied by some villagers. Please clarify the space will be made available to the Operator free of habitants and any other obstructions. Also some portion of the OCT back up area is marked as Indian Navy 40,000 sqm,, please clarify. Is there any dedicated plot available or	The earmarked area for the project, as per the DCA, will be made available free of Encumbrance. Indian Navy land has been handed back to HDC, SMPA in December 2025.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		earmarked for bulk storage near OCT ? If not then will be made available to the Operator as part of concession agreement for clean bulk handing operational convenience at OCT.	
69.	TEFR	**Query:** Any dust screen required to enclose the backup area around OCT or anywhere else ? Also there is an existing Road leading towards Lock Gate which cuts through the OT back up Yard and Dock. Please clarify whether this road will exist and if any repositioning will be required.	As the cargo considered is mostly clean Cargo in Nature, Dust Screen are not envisaged for the project. However, the same, if required, may be developed by the Concessionaire. The existing road of 3.7 m wide towards the Township passing through the proposed backup area has to be realigned to have effective planning and the same is under concessionaire scope as per the DCA. Please refer to Drg.No. MPK /PMS/2425052/HDC/TEFR/0202.
70.	TEFR	**Query:** Proposed OCT is well within 10m depth contour and average water depth is 8.0 to 9.0m. Now this is a constrain and doesn't match with HDC's daily draft forecast. Hence although OT will be able to accommodate bigger vessel but cargo carrying capacity will get restricted draft. Please clarify.	HDC draft forecasts are determined by channel depth and tidal rise.
71.	TEFR	**Query**: Plot "B" designated as additional back up Yard of berths 11 & 12 is basically a bulk handling yard. What is the nature of the bottom?? Will it require a thorough paving ??	The Plot-B designated area is Hard Stand Area. Minor pavement upgradation works are envisaged over an area of approximately 4,000 Sqm out of the total designated back-up area, to bring the surface up to the requisite operational standards. Bidders are advised to note the above as a broad indicative assessment provided by the Authority. Bidders are encouraged to undertake its own independent site investigation, structural assessment, and pavement evaluation and factor the same into their bid submissions accordingly.
72.	TEFR	**Query**: By virtue of this Project Container traffic is expected to go up from existing 0.24 million teu's to 0.70 million teu's or even more. Evacuation by Road: Rail ratio is 80:20. Is the Road and Rail capable enough to take the additional load or will	Major evacuation is envisaged through Road and Rail and the same is adequate for catering to the anticipated traffic.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		it call for Riverine connectivity. If so, then any provision has been kept for that ??	
73.	TEFR	**QUERY:** Understand the preferred berth location (OCT) is planned towards HFTPL aimed at navigational safety and vessel maneuverability within basin. However this might be a cause of concern while approaching or casting off the vessel during flood tide.	Berthing/de-berthing is the exclusive responsibility of the Concessioning Authority.
74.	DCA clause A Page No.8	**Query :** The project envisages development of Berth No. 11 & 12 for handling container and multi-purpose clean cargo primarily Agri commodity • However, it is understood that adjacent berths and surrounding areas within the port premises are presently engaged in handling dusty cargo including coal and other bulk commodities, and that coal residues are being present within operational zones of Berth No 11&12 and may also be present in the Outer terminal. i) The Authority is requested to clarify how it envisages ensuring a contamination-free environment for container and clean cargo operations as no specific measures have been mentioned in the RFQ ii) We request authority to clarify: (1) whether segregation measures between dusty bulk operations and container areas are planned, (2) whether dedicated dust suppression, boundary walls, wind barriers, or paved/covered handling zones are proposed, and (3) whether the Authority will ensure environmental compliance standards suitable for containerized EXIM cargo and (4) Obligations of the authority during the entire concession period with respect to provision for contamination -free environment.	(i)&(ii) HDC has invited bids for Mechanisation of Berth Nos. 9 & 10 (the berths immediately adjacent to Berth No. 11) under a PPP framework, wherein dedicated dust suppression infrastructure has been incorporated as part of the scope of that concession. Additionally, an independent, area-dust suppression system for entire operational zone of HDC is presently at the planning stage. Also, the Concessionaire shall have the flexibility to propose and incorporate any further site-specific engineering, operational or environmental measures that it deems appropriate to ensure effective segregation of its project area from adjoining operations and to maintain a contamination-free environment.

"Integrated Development of Outer Terminal and Berth No. 11 & 12 at Haldia Dock Complex for Handling Containers & Multipurpose Clean Cargo (Dry and Break Bulk) through PPP mode"

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
75.	RFQ Cum RFP Clause.1.1.3,Page 11	**Query:** As per the tender document, overall project capacity of 0.693 MTEUs per annum is envisaged, however, the existing container throughput at HDC is presently around 0.2 MTEUs per annum, which includes a substantial volume of containers destined for Kolkata that are currently moved by rail from Haldia. • With the availability of PPP-operated, dedicated, and modernized container terminals at Kolkata Dock System, there are strong indications that such Kolkata-bound volumes may be directly handled at Kolkata instead of routing through Haldia. i) In view of the above, the Authority is requested to provide the detailed rationale, traffic study basis, assumptions, and working adopted for arriving at the projected capacity of 0.693 MTEUs, including commodity-wise projections, source of incremental traffic, and diversion assumptions considered in the demand assessment. This clarification is essential for realistic traffic estimation, financial modelling, and risk assessment by bidders. ii) Authority is requested to confirm the volume of traffic moved through Rail/Road to/from Kolkata for the last five years this will enable us to arrive at the realistic volume of Haldia. In addition, we would request the authority to confirm the correctness of the volume of Haldia as stated below: • FY 20-21 – 1,49,479 TEUs • FY 21-22 – 1,65,412 TEUs • FY 22-23 – 1,07,182 TEUs • FY 23-24 – 1,10,607 TEUs • FY 24-25 – 1,84,734 TEUs	i) SMPK has conducted the independent Traffic study and the details are presented in the Chapter-4 of TEFR. The share of KDS and HDC has been separately studied and accounted for duly applying the basket theory. The study conducted by SMPK is indicative in nature and in no case the same shall be binding. The Bidder is expected to conduct his own assessment of the market before bidding for this project. DCA condition Prevails. ii) The numbers mentioned are correct.
76.	DCA Clause 7.1(c) page 44	DCA does not explicitly specify the assured minimum draft to be maintained at the Outer Terminal berth face, berth	(1) Refer reply to Sl. No. 12 above.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		pocket, approach channel, and turning circle, nor does it clarify whether such draft will be available throughout the year, including during monsoon and high siltation periods. • In this context, the Authority is requested to clarify the following: (1) The minimum assured draft that will be provided by Authority at the Outer Terminal (berth pocket, approach channel, and turning circle), and the reference datum (Chart Datum / LAT). (2) Whether the assured draft will be maintained on a year-round basis or whether vessel operations will be tidal-window dependent. (3) Whether capital and maintenance dredging of the approach channel, turning circle and berth pockets shall be entirely under the scope and cost of the Concessioning Authority throughout the Concession Period. (4) In the event that the assured draft is not maintained for reasons not attributable to the Concessionaire, resulting in lightloading of vessels, reduced parcel size and thereby reduced throughput, or revenue loss, whether the Concessionaire shall be entitled to suitable relief including waiver/adjustment of Minimum Guaranteed Cargo (MGC) mechanism under Concessioning Authority Event of Default provisions.	(2) Maintenance dredging of the approach channel, turning circle and berth pockets shall be entirely under the scope and cost of the concessioning authority. (3) Please refer article 7.1 (c) (i) (b)&(d) of DCA. (4) If there is any Concessioning Authority Event of Default, the relevant provision of DCA shall apply.
77.	General	**Query :** i) Kindly confirm whether separate entry and exit points or dedicated lanes will be provided to manage cargo traffic towards Berth 11 & 12 and the Outer Terminal and specify who will be responsible for manning and controlling these points.	i. No dedicated entry and exit point (single gate) for road borne containers can be provided for container handling. The Gates are manned by CISF.

"Integrated Development of Outer Terminal and Berth No. 11 & 12 at Haldia Dock Complex for Handling Containers & Multipurpose Clean Cargo (Dry and Break Bulk) through PPP mode"

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		ii) In case containers/cargo for Berth 11 & 12 and the Outer Terminal use the common main gate complex, it may lead to congestion, as all cargo movements to other berths would also pass through this gate. Please clarify how the Port proposes to manage or ease such congestion to ensure smooth and timely traffic flow. iii) In case containers/cargo for Berth 11 & 12 and the Outer Terminal use the common main gate complex, we would request the authority to remove the performance standard obligations with respect to the transit time (both Rail and Road) and dwell days from the concession agreement.	ii. A new main gate complex is under construction with multiple lanes 4 lanes (2 in and 2 out) for entry/exit which shall facilitate smooth movement. iii. Please see **corrigendum-VI.**
78.	DCA Clause-4 Page-106	**Query:** i. The Phase II development envisages a total backup area of 26.21 acres to support Berth Nos. 11 & 12 operations at a projected capacity of 0.462 MTEUs p.a. Currently, these berths are having a capacity of 0.24 MTEUs p.a. with ~22 acres backup area. Hence, the proposed additional area appears insufficient to sustain the projected capacity. It is requested that the Concessioning Authority clarify how the proposed 26.21 acres will adequately support 0.462 MTEUs DCA provides that the PPP Concessionaire may commence early operations at Berth No. 11 & 12 by procuring the existing RMQCs and RTGs from the Concessioning Authority. ii. However, it is understood that the Authority has awarded an O&M contract for container operations at Berth No. 11 & 12 for the period from 1st March 2025 to 28th February 2030, which may overlap with the proposed early operations and handover to the PPP Concessionaire. In view of the above, the Authority is requested to clarify the	i. Please refer to chapter 6 of TEFR for the underlying assumptions. Additional land will be provided as per article 9.3 of DCA. ii.(a)The existing O&M contract is valid for 3 years wef Mar 1,2025 which may be further extended by another 2 years as per requirement of HDC, SMPA. (b) The effective date of handover of Berth No.11&12 will not be earlier than Mar 1,2028. (c) No cool off period/ transition period has been envisaged

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		following: (a) The proposed transition mechanism from the existing O&M operator to the PPP Concessionaire in the event early operations at Berth No. 11 & 12 are triggered. (b) The effective date of physical and operational handover of Berth No. 11 & 12, associated backup area, equipment, and utilities to the Concessionaire. (c) Whether any cool-off / transition period is envisaged between cessation of the existing O&M operator's activities and commencement of Concessionaire's operations and the duration of such period	
79.	CA Clause 4 B1.2 Page -107	**Query:** The DCA stipulates deployment of 2 new Rail Mounted Quay Cranes (RMQCs) with 40 m outreach for Phase II at Berth 11 & 12 operations. However, the TEFR specifies that the present maximum vessel dimensions accepted at Haldia Dock are LOA 240 m and Beam 32.26 m, which raises the question of the operational necessity of 40 m outreach cranes. We suggest that the Concessionaire be allowed flexibility in designing the RMQC gauge/outreach, based on vessel size and operational efficiency.	Refer reply to Sl. No. 4 above.
80.	DCA Clause 3 B 3.1 Page-105	**Query :** The DCA mandates procurement and installation of 5 Rubber Tyre Gantry (RTG) Cranes for Phase I Outer Terminal. However, the terminal is intended to handle multipurpose cargo mainly bulk and break bulk, for which RTG cranes are not suitable. • Considering the cargo mix, the Concessionaire could instead focus on bulk and breakbulk handling equipment's (like	The project is envisaged as Container intensive with provision to handle Multipurpose Cargo as well and accordingly the minimum equipment plan has been prescribed in Appendix 4. Also, refer **Corrigendum-VI.** The Concessionaire is free to mobilize additional equipment for handling clean cargo as per requirement.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		Reach Stacker, Forklifts etc.), which would be more aligned with operational needs. This approach allows for significant CAPEX reduction without compromising operational efficiency. • We request that the Authority reconsider the mandatory RTG requirement and permit flexibility in equipment selection based on cargo mix and operational strategy, to ensure alignment with Performance Standards while optimising Capex	
81.	DCA Clause 3A2.26 & A2.28	**Query:** The DCA requires the Concessionaire to undertake the installation of new railway tracks and the development of a new railway yard for Phase I Outer Terminal. In this regard, we request the Authority to provide the following details to facilitate accurate design and planning: • Number of railway sidings proposed and whether each siding is full-length; if so, the proposed length of each siding. Platform dimensions envisaged. • Can the siding be notified under Gati Shakti Cargo Terminal Policy • Detailed layout and specifications of the proposed railway infrastructure within the terminal premises	Please refer to the Section 7.12 of TEFR and TEFR Drawings. The siding may be notified under Gati Shakti Cargo Terminal Policy. The railway layout in indicative in nature and is at the TEFR level. Concessionaire to prepare the detail Designs.
82.	TEFR Page 381	As per the development plan for Berth 11 & 12, it is understood that in addition to the primary ~22 acres of backup area, the Authority has earmarked a separate parcel of approximately 4 acres adjacent to the main backup land. However, the said 4-acre parcel appears to be physically separated from the 22-acre area by an existing road that connects to Berth No. 13. • It is requested to clarify whether this road is a common user road serving other berths/port users. If the road remains a common access corridor, the movement of containers,	The understanding is correct; the road in between is a common user road.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		handling equipment's and internal transfer vehicles between the two parcels may lead to operational congestion, safety concerns, and productivity loss.	
83.	RFQ Cum RFP Clause.1.2.6 Page-17	**Query:** The tender stipulates that royalty for Empty Containers shall be the same as that for Loaded Containers. Since empty containers generate significantly lower revenue compared to loaded containers, a uniform royalty structure may adversely impact project viability. We request the Authority to consider differential royalty structure for Empty Containers in tune with other Major Ports wherein the applicable Royalty for empty Container is 0.8 times of the Royalty on the laden Container.	DCA condition prevails.
84.	RFQ Cum RFP Clause.1.1.3 Page-13	**Query:** The tender provides that the PPP Concessionaire may commence early operations by procuring the existing 2 old RMQCs and RTGs from the Concessioning Authority for Berth 11 & 12. In this context, kindly clarify what will be the status of the manpower (>600 personnels) presently engaged in container operations under the existing O&M contract at Haldia Dock Complex. Whether such manpower is required to be absorbed by the Concessionaire, or whether their services and associated liabilities shall remain with the Authority / existing contractor.	There is no obligation on the part of Concessionaire to engage man power of the existing O&M operator.
85.	RFQ Cum RFP Clause.1.28 Page-18	**Query** : Request the Authority to share the following reports for Berth 11&12 and Outer Terminal: • Topography survey report	Refer reply to Sl. No. 23 above.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		• Bathymetry survey report • Geotechnical study report • Auto CAD Map of the Project Area • As Built Drawing of Berth 11 & 12 and Proposed Design for Outer Terminal • Rail line plan for the Outer Terminal • Electrical Source and Distribution Map for the Project Area • Water Supply system's drawing or Map for the Project Area	
86.	RFQ Cum RFP Clause.2.1.3Page-21	**Query:** It is mentioned that "The Feasibility Report of the Project is being provided only as a preliminary reference document by way of assistance to the Bidders who are expected to carry out their own surveys, investigations and other detailed examination of the Project before submitting their Bids." •We believe that the successful bidder is free to, with prior approval of the authority, make changes to the engineering, design, capacity of equipment, etc. to achieve minimum defined productivity parameters and enhance the overall capacity / efficiency of operations. Authority to confirm the same.	The parameters provided in the Bid documents are minimum. This may be upgraded with approval of Independent Engineer and Concessioning Authority.
87.	RFQ Cum RFP Clause.2.12Page-34	**Query:** The tender document states that the Technical Bid and Financial Bid shall be submitted online through the e-procurement portal http://etenders.gov.in. However, it is also mentioned that the RFQ-cum-RFP document can be downloaded from https://eprocure.gov.in. Kindly clarify the exact portal through which the bid submission is required to be made	https://eprocure.gov.in.
88.	DCA Article-7 Page-39	**Query:** The DCA under "Obligations of the Concessionaire" stipulates that the Concessionaire shall provide	

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		locomotive(s) including manpower, fuel, repair/maintenance and operation at its own risk and cost. i. However, under "Obligations of the Concessioning Authority," it is stated that empty rakes received at the Port's railway yard shall be hauled by Port Railways and handed over to the Concessionaire's operation yard, and loaded rakes shall be hauled back by the Port's locomotive. In view of this apparent inconsistency, kindly clarify the exact demarcation of responsibilities for locomotive deployment and rake movement within the Port limits. iii. Further, the Authority is requested to provide details regarding the availability & number of locomotives presently available at the Port.	i. Please refer article 7.1 (c) (k) along with article 8.4 (a) of DCA. ii. Please refer article 8.4 (a). Presently 9 locomotives (owned and hired) are available with HDC, SMPA.
89.	DCA Clause 7.2(A) Page-45	**Query:** The tender indicates that electrical power for the Project shall be sourced from the nearest available power source. In this context, the Authority is requested to clarify the following: (1) The location of the nearest power Sub-station / power source identified for supplying electricity to the Project site. (2) The approximate distance of the said power source from the Project site and the proposed routing of the power line / cable corridor. (3) The available contracted and spare capacity (in MVA) at the identified power source.	i)Please refer article 7.2 of DCA. ii)The GC berth substation is in proximity to Berths 11 & 12. iii)In case, overall contract demand increases; port will go for upward revision of demand with WBSEDCL accordingly.
90.	DCA Clause 7.2(B) Page-46	**Query:** Article 7.2 states that water shall be supplied from the nearest fresh water source and take-off point. Kindly clarify the exact demarcation point of supply.	For Berth 11 & 12, water supply is available near to berth vicinity. For OT, the water source will be provided from HOJ-III.

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Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
91.	DCA Clause 8.4 Page-47	**Query:** The DCA provides that the Authority shall collect Railway Terminal Charges directly from importers/exporters during the Concession Period. However, as per Phase I Scope of Work, the Concessionaire is required to develop the new railway yard (20,000 sqm) and install 2,700 m of railway tracks at its own cost and maintain the same during the Concession Period. In view of the capital investment, operational responsibility, and maintenance obligations being borne by the Concessionaire, it is requested that the right to levy and collect terminal charges be vested with the Concessionaire	DCA condition prevails.
92.	DCA Clause 12,2© Page-60	**Query:** Authority is requested to clarify whether it proposes to develop, award, or permit any competing container or multipurpose clean cargo terminal outside the lock gate at HDC or in its immediate vicinity during the Concession Period. • Any such competing facility may materially divert traffic from the Project, reduce berth utilization, impact throughput, and adversely affect the revenue assumptions and bankability of the Project. • The Authority is therefore requested to confirm: (1) Whether any competing container or multipurpose clean cargo facility is planned or contemplated outside the lock gate during the Concession Period. (2) If yes, the broad scope, location, and indicative timeline of such facility. (3) Whether protection against competing facilities, or appropriate relief mechanisms, shall be available to the Concessionaire in case of material traffic diversion impacting Project viability.	Please refer Clause 12.2(c) of DCA.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
93.	DCA Clause 12,1(g) Page-60	**Query**: As per Harit Sagar policy: Ports shall make efforts to achieve the target for Electrification of Vehicles/Ports equipment's as envisaged in MIV 2030 / Blue Economy 2047 and accordingly, should target more than 50 percent electrification by the Year 2030 which is to be further increased to more than 90 percent by the year 2047. Ports should target retro-fitment / conversion of Diesel-powered equipment's / cranes / forklift / pay loader / vehicles etc. to electrically powered in a phased manner by making suitable plans. All future procurements of Port vehicles and cargo handling & other equipment's shall preferably be electrically driven / electrically powered or should be compatible with low carbon greener fuels viz., CNG, Methanol, Ethanol, Ammonia, Hydrogen Fuel Cell etc. Given that the present tender is for a 30-year concession period, the above policy provisions are expected to be factored into the bid framework. However, the tender document is currently silent on electrification obligations, phased conversion requirements, or procurement conditions. In view of the long tenure and associated capital planning implications, it is requested that the Authority explicitly clarify and incorporate the applicable electrification targets and compliance requirements under this tender.	The existing Harit Sagar Policy is enclosed.
94.	CA Appendix 4.3 Page-104	**Query:** The DCA stipulates a Construction Period of 24 months for development of the Outer Terminal. Considering the scale of marine works, berth construction, railway yard development, dredging requirements, statutory approvals, and riverine working constraints at site, the prescribed timeline appears challenging. It is requested that the	DCA condition prevails.

<table>
<tr><th>Sl. No.</th><th>Clause/Article No. /Page No./ Query Ref.</th><th>Pre-Bid Query</th><th>Response of HDC, SMPA</th></tr>
<tr><td></td><td></td><td>Construction Period for the Outer Terminal be revised to 36 months to ensure realistic execution planning, quality construction, and financial closure comfort.</td><td></td></tr>
<tr><td>95.</td><td>DCA Appendix 4 Page-106</td><td><u>Query:</u>
The details of container traffic handled at HDC during last 16 years is as below:
<table>
<tr><td>Sl. No.</td><td>Financial year</td><td>Volume in TEU No of RMQCs</td></tr>
<tr><td>1</td><td>2009-10</td><td>1,27,248 2</td></tr>
<tr><td>2</td><td>2010-11</td><td>1,24,112 2</td></tr>
<tr><td>3</td><td>2011-12</td><td>1,49,339 2</td></tr>
<tr><td>4</td><td>2012-13</td><td>1,37,214 2</td></tr>
<tr><td>5</td><td>2013-14</td><td>1,12,720 2</td></tr>
<tr><td>6</td><td>2014-15</td><td>1,01,928 2</td></tr>
<tr><td>7</td><td>2015-16</td><td>85,534 2</td></tr>
<tr><td>8</td><td>2016-17</td><td>1,35,820 2</td></tr>
<tr><td>9</td><td>2017-18</td><td>1,56,690 2</td></tr>
<tr><td>10</td><td>2018-19</td><td>1,78,262 2</td></tr>
<tr><td>11</td><td>2019-20</td><td>1,69,323 2</td></tr>
<tr><td>12</td><td>2020-21</td><td>1,49,479 2</td></tr>
<tr><td>13</td><td>2021-22</td><td>1,65,412 2</td></tr>
<tr><td>14</td><td>2022-23</td><td>1,07,182 2</td></tr>
<tr><td>15</td><td>2023-24</td><td>1,10,607 2</td></tr>
<tr><td>16</td><td>2024-25</td><td>1,84,734 2</td></tr>
</table>
Now, the DCA stipulates procurement of 02 new RMQCs by the Concessionaire along with payment of depreciated cost of 01RMQC procured by HDC in 2022, effectively resulting in deployment of 03 RMQCs for Berth 11 & 12. Considering the historical cargo volumes and operational patterns at Berth 11 & 12, operations have been carried out using 02 RMQCs. Deployment of 03 RMQCs may lead to</td><td>DCA condition prevails.</td></tr>
</table>

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		underutilization and increased operating cost without commensurate throughput. It is therefore requested that SMPK reconsider the mandatory requirement of 03 RMQCs and permit cargo operations using 02 RMQCs, subject to meeting prescribed productivity norms	
96.	DCA Appenix-8 Page-129	**Query:** The Concessioning Authority is liable to obtain prior Environmental Clearance for the Project. • Kindly confirm if the Authority has obtained Environmental Clearance (EC) for the Project from the Ministry of Environment, Forest, and Climate Change (MoEFCC), GOI. • If yes, kindly share the copy of the EC.	Environmental Clearance (EC), Coastal Regulation Zone (CRZ) clearance and Consent to Establish (CTE) from the West Bengal Pollution Control Board and other competent authorities, as applicable, shall fall within the scope and responsibility of the Concessioning Authority. All other clearances are in the scope of Concessionaire. Relevant documents and clearances in possession of the Concessioning Authority shall be shared with the successful bidder upon placement of Letter of Intent.
97.	DCA Gross Berth Output Page-179	**Query:** The DCA stipulates a Gross Berth Output (GBO) of 25 moves per hour for mainline container vessels and corresponding norms for feeder vessels. Considering the prevailing draft constraints (~8 m), vessel mix, tidal working conditions, and operational experience at Berth 11 & 12, the prescribed GBO appears aggressive. Historically, operations have been aligned closer to ~20 moves per hour for mainline vessels under similar constraints. It is therefore requested that the GBO for mainline vessels be revised from 25 to 20 moves per hour, with proportional adjustment for feeder vessels, to reflect realistic operational conditions and ensure sustainable performance compliance.	**Please see corrigendum-VI**
98.	eneral	**Query:** • As per the tender Project comprises development of the Outer Terminal (greenfield, riverfront) and Berths No. 11 & 12 (inside HDC) under a single concession. However, it is observed that the physical distance between the Outer	**Please see corrigendum-VI**

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		Terminal and Berths 11 & 12 is significant and the two facilities are not contiguous, resulting in limited operational and functional synergy between the terminals. • Given the spatial separation, each terminal would effectively function as an independent operational unit, requiring separate terminal administration, control rooms, gate operations, security, utilities, IT systems, firefighting arrangements, maintenance teams and manpower deployment, thereby increasing operating complexity and fixed costs. • In view of the above, the Authority is requested to clarify and confirm whether the Concessionaire shall be provided flexibility in selection, sizing, and deployment of cargo handling equipment independently for each terminal, based on terminal-specific cargo mix, vessel size, productivity requirements, and operating philosophy, instead of mandatory uniform equipment deployment as presently stipulated in the DCA.	
99.	General	**Query**: Authority to carry out an independent study of the design of the existing Berth 11 & 12, to assess their strength & suitability of the Berth and provide a copy of this report to the Bidders.	Berth Nos. 11 & 12 are existing, operational berths currently in active service. The berths are presently equipped with Three (3) Rail-Mounted Quay Cranes (RMQCs) and are operationally handling approximately 0.215 Million TEUs (MTEUs) annually. The berths have been performing consistently under the loads imposed by deployed equipment without reported distress or operational disruption attributable to berth structure. Bidders may, at their own discretion and cost, carry out any technical assessment they deem appropriate as part of their due diligence.
100.	General	**Query**: Kindly share the details of all the consultants engaged by the Authority for preparation of any documents, design or technical specification of the Project.	Technical Consultant: M/s Voyants Solution Pvt. Ltd Legal & Financial Consultant: M/s IDECK

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Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
101.	General	**Query:** We understand that the Authority will carry out dredging operations for provision and maintenance of desired depth/ draft at berth pockets for the project area	The obligation of Concessioning Authority has been mentioned in article 7.1 (c) (i) of DCA.
102.	General	**Query:** Concessioning Authority is requested to provide the relevant information of any underground pipelines / electrical cables/ etc. in the project premises/ boundary limits for the Outer Terminal. Further, as matter of general practice, the cost of shifting of any such obstructing utilities including electric lines, water pipes and telephone cables, to an appropriate location or alignment within or outside the site is always borne by the Concessioning Authority	Relevant information pertaining to underground pipelines, electrical cables and other sub-surface utilities within the project premises, to the extent available with the Concessioning Authority, shall be shared with the Selected Bidder upon placement of Letter of Intent. However, the Concessionaire is expected to undertake necessary cross-cuts and investigations at site during the construction phase to independently identify any underground obstructions or utilities that may impact project execution and to promptly report the findings thereof to the Concessioning Authority. The responsibility for re-routing or relocation of any such utilities, where necessitated by project requirements, shall vest with the Concessioning Authority.
103.	General	**Query**: The Authority is requested to provide details of clean cargo handled at Haldia Dock Complex (HDC) on a berth-wise and commodity-wise basis for the period FY 2020-21 to FY 2024-25.	Attached as **Annexure-VIII** to pre-bid reply.
104.	FQ Cum RFP Clause No.1.3(5) Page-18	**Query**: We request that the Authority consider extending the Due Date by at least (8) Eight weeks from the date of reply of additional queries by the Authority. This extension will enable us to conduct a thorough site visit, assess site conditions and conduct detailed feasibility and complete necessary internal process for approvals, ensuring our effective participation.	**Please see corrigendum-V.**

<table>
<tr><th>Sl. No.</th><th>Clause/Article No. /Page No./ Query Ref.</th><th>Pre-Bid Query</th><th>Response of HDC, SMPA</th></tr>
<tr><td>105.</td><td>DCA Clause 4,Page-106</td><td><u>Query:</u>
The Phase II development envisages a total backup area of 26.21 acres to support Berth Nos. 11 & 12 operations at a projected capacity of 0.462 MTEUs per annum. At present, these berths are handling approximately 0.2 MTEU per annum with an existing backup area of about 22 acres. In this context, the incremental backup area proposed appears inadequate to sustainably support the envisaged increase in throughput.
Based on the details provided in the TEFR, the effective container stacking area is approximately 36,787 sqm (i.e., 9.09 acres), corresponding to 1,519 ground slots. Accordingly, the maximum terminal capacity is estimated at 231,522 TEUs, derived as follows:
<table><tr><td>Area (sqm)</td><td>36,787</td></tr><tr><td>Total Ground Slots</td><td>1,519</td></tr><tr><td>Stack Height</td><td>3.8</td></tr><tr><td>Operational Days</td><td>365</td></tr><tr><td>Dwell Days</td><td>7</td></tr><tr><td>Peaking Factor</td><td>1.3</td></tr><tr><td>Capacity (TEUs)</td><td>2,31,522</td></tr></table><u>Note:</u>
1) The actual dwell time for CY25 is 14 days; however, assuming a 100% improvement in dwell time, 7 days has been considered.
2) As per 2008 normative guidelines the peaking factor considered at 1.3
3) 1,519 ground slots also include slots for reefer and over-dimensional containers, where the stack height is</td><td>Please refer to TEFR Chapter 5, 6 and 7 and Drg. for detailed Calculations of the Container Storage area. These chapters and Drg. are to be read in TOTO. The dwell time as applicable to SMPK/HDC container operations is clearly spelled out in section 5.3.1. All calculations are based on dwell time consideration. Accordingly, all the calculations are provided in the TEFR.

For detailed area statement, please refer to Drg. No. MPK/PMS/2425-052/HDC/TEFR/0604. As per the area statement, 9.09 Acres are the footprint area only for container storage and not the total area. Further, 2.96 acres for reach stacker movement and 5.22 Acres for road and vehicle movement between the stackyard has been provided. Hence, the area to be read in TOTO shall be about 17.273 Acres i.e. about 70,000 SQM area is already provided. Additional area may be provided as per article 9.3 of DCA.</td></tr>
</table>

<table>
<tr><th>Sl. No.</th><th>Clause/Article No. /Page No./ Query Ref.</th><th>Pre-Bid Query</th><th>Response of HDC, SMPA</th></tr>
<tr><td></td><td></td><td>significantly lower than 3.8.
Considering the above the projected capacity of 0.23 MTEU is significantly lower than the projected capacity of 0.462 MTEUs per annum shown as per TEFR
To achieve the additional capacity, the required additional area is as follows:
<table>
<tr><td></td><td>As per TEFR</td><td>Actual Required</td><td>Difference</td></tr>
<tr><td>Area (sqm)</td><td>36,787</td><td>73,000</td><td>36,213</td></tr>
<tr><td>Total Ground Slots</td><td>1,519</td><td>3,042</td><td>1,523</td></tr>
<tr><td>Stack Height</td><td>3.8</td><td>3.8</td><td></td></tr>
<tr><td>Operational Days</td><td>365</td><td>365</td><td></td></tr>
<tr><td>Dwell days</td><td>7</td><td>7</td><td></td></tr>
<tr><td>Peaking Factor</td><td>1.3</td><td>1.3</td><td></td></tr>
<tr><td>Capacity (TEUs)</td><td>2,31,522</td><td>4,63,603</td><td></td></tr>
</table>
Based on the above, we request the Authority to either provide additional yard space or reconsider/reduce the terminal capacity (including equipment requirements, capital cost, and MGT).</td><td></td></tr>
<tr><td>106.</td><td>DCA Clause xii Page-42</td><td><u>Query;</u>
The container throughput at HDC has not exceeded 0.20</td><td>DCA condition prevails</td></tr>
</table>

<table>
<tr><th>Sl. No.</th><th>Clause/Article No. /Page No./ Query Ref.</th><th>Pre-Bid Query</th><th>Response of HDC, SMPA</th></tr>
<tr><td></td><td></td><td>MTEUs per annum in the past 10 years, with an average growth of only 2.5% per annum, indicating:
1) Projected volumes of 0.24 to 0.28 METUs per annum in next 10 years.
2) Projected volume .26 to 0.30 METUs per annum in next 15 years.
Further, with the modernization and expansion of container terminals at Kolkata Dock System, a portion of Kolkata-bound container cargo earlier handled at Haldia is expected to shift directly to Kolkata, thereby impacting Haldia volumes.
In view of the above, the Minimum Guaranteed Cargo (MGC) as per the table below appears significantly higher than the realistically achievable traffic levels.
<table><tr><td>Minimum Guaranteed Cargo</td><td>Year 1-2: Nil
Year 3: 0.0693 MTEU
Years 4-6: 0.207 MTEU
Years 7-8: 0.346 MTEU
Years 9+ (to Concession End): 0.485 MTEU</td></tr></table>Therefore, we request the Authority to cap the MGC at 40% of the declared capacity (0.693 MTEUs), i.e., 0.277 MTEUs per annum.
Alternatively, we request the Authority to revisit the declared capacity of the terminal, as highlighted in our earlier query as per Sr. No.1
As per the Concession Agreement, failure to achieve the MGC for a consecutive period of 3 years may constitute a Concessionaire Event of Default, which significantly increases the project risk and adversely affects the financial viability of the project.</td><td></td></tr>
</table>

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
107.	RFQ Cum RFP Clause 1.2.6 ,Page-17	Query: The tender stipulates that the royalty for Empty Containers shall be the same as that for Loaded Containers. However, empty containers generate significantly lower revenue while requiring similar handling infrastructure and operational resources. In this regard, the Tariff Guidelines for Major Port Authorities, 2021 stipulate that the royalty outgo for empty containers shall be 0.8 times that of laden containers. Considering the above, it is pertinent to note that the tender document for Reconstruction of Berth No. 8 and Mechanization of Berth Nos. 7 & 8 at NSD, Kolkata Dock System contains a similar provision under Article 9 of the Draft Concession Agreement (DCA), as referenced below: "Empty containers less than or up to 20' shall be reckoned as 0.8 TEU; and Empty containers more than 20' and up to 40' shall be reckoned as 1.2 TEU." In view of the above, we request the Authority to consider adopting a similar provision in the present tender for the purpose of royalty computation for empty containers, in line with the Tariff Guidelines for Major Port Authorities, 2021.	DCA condition prevails. As per clause 9.4 of the Tariff Policy for Major Port Authority 2021, the charges for ship shore handling of loaded and empty containers shall be same and not different.
108.	DCA,Clause- 3B 1.3,Page 105	**Query:** As per the tender documents, it is observed that: 1) Berths 11 & 12 and the proposed Outer Terminal are located at different locations within the port with independent backup areas and operational layouts. 2) Cargo projections for the Outer Terminal have not been clearly segregated, while the proposed equipment configuration (procurement or hiring) has been indicated without a detailed cargo-wise operational justification. 3) The yard layout for Berths 11 & 12 includes a railway siding located between the container yard and the empty container	**Please see corrigendum-VI.**

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		stacking area, which is away from the main yard and may restrict seamless RTG movement and limit operational synergy between different yard blocks. This may adversely impact the efficiency of RTG-based yard operations under the proposed configuration. Further, considering the dynamic nature of cargo traffic, Evolving cargo mix and changing operational requirements over the concession period, the handling systems and equipment requirements are likely to evolve over time. Accordingly, it is requested that the Authority provide flexibility in the selection and deployment of yard handling equipment, including the option of procurement or leasing, instead of prescribing specific equipment at the bidding stage, which may constrain operational flexibility and limit optimisation of terminal operations. For instance, Jawaharlal Nehru Port Authority has adopted complete equipment flexibility in its tender for "Upgradation, Equipping, Operation, Maintenance and Transfer of Shallow Water Berth (SWB) Facility and Newly Constructed Coastal Berth (CB) through PPP Mode." The provisions under Appendix 4 of the Concession Agreement provide flexibility to the Concessionaire in the deployment of equipment as follows: "The Concessionaire is free to plan the deployment of equipment. The Concessionaire shall be allowed to deploy equipment on lease." and "The deployment of equipment shall be planned and executed by the Concessionaire in order to achieve the Project Capacity. However, the deployment plan shall be submitted to JNPA and/or the Independent Engineer for approval and shall be finalized in consultation with the	

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		Port." In view of the above, we request the Authority to provide flexibility in the selection of terminal handling equipment and reconsider the mandatory requirement of RTGs, allowing bidders to determine the most appropriate equipment configuration based on cargo mix, yard layout, operational strategy and evolving operational dynamics, while ensuring compliance with the prescribed Performance Standards. The Authority may consider prescribing broad sustainability or electrification requirements for equipment, as envisaged under national initiatives such as Maritime India Vision 2030 and Blue Economy 2047, rather than specifying the exact type of equipment to be deployed.	
109.	RFQ cum RFP 1.3	**Item Description:** Schedule of Bidding Process: 2nd round of queries submission Pre-bid meeting **Query**: After furnishing the response of the first round of the queries, we request Authority for second round of submission of critical queries for clarification and pre-bid conference to address the critical queries related to the project.	**Please see corrigendum-V.**
110.	RFQ cum RFP 1.3	**Item Description:** 2nd Pre-bid Meeting **Query**: We request to organize the second pre-bid meeting in order to discuss and resolve the issues which are identified /	Not agreed to.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		remain after the first set of responses to the queries raised by bidders in the first pre-bid meeting. This will help to close the critical issues or concerns of the bidders in a conclusive manner.	
111.	FQ cum RFP ppendix IA – Annexure 3 (Instructions Point 3)	**Item Description:** Net Worth Definition **Query**: We request authority to restore the definition of Net worth as per the language given below: **Net Worth shall mean (Subscribed and Paid-up Equity + Reserves) less (Revaluation reserves + miscellaneous expenditure not written off + reserves not available for distribution to equity shareholders).** This extract is given as per the Model RFQ which is used across all Major Ports PPP Projects.	Appendix-I A (Annex-II) of RFQ cum RFP may be referred.
112.	FQ cum RFP	**Item Description:** Project Cost **Query**: We request Authority please clarify year of estimation of the Project Cost.	The TEFR was prepared in the year 2025.
113.	FQ cum RFP	**Item Description:** Current Traffic **Query**:. To have a better understanding of the traffic potential of	Attached as **Annexure-VIII.**

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		the project, we request the Authority to provide the breakup of container traffic for the last 5 financial years in terms of laden-empty, TEU-FEUs, import-export and major commodities carried in container. Further, please provide the breakup of container traffic into DPD and Non-DPD data for the last 5 Financial Years.	
114.	**DCA 2.2**	**Item Description:** Concession Period **Query**: The concessionaire is required to deploy RMQCs at Berth Nos. 11 and 12. Any new RMQC procured may be of a different make and may not be compatible with the existing RMQCs, which could lead to operational challenges. These challenges may include the need to maintain separate inventories of spares, higher costs and longer lead times for critical components, coordination with multiple OEMs, and difficulties in system integration, all of which would result in an increase in the concessionaire's operating costs. Further, such an obligation restricts design flexibility and limits the concessionaire's ability to select equipment best suited to its operational requirements, thereby making it difficult to achieve the desired performance levels. In view of the above, we request the Authority to remove the obligation of procurement of RMQCs from the Authority.	DCA condition prevails

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
115.	DCA 2.2 (c) (ii)	**Item Description:** Handover of berth 11 & 12 **Query**: We request Authority to handover the berth no. 11 & 12 immediately after the award of the concession which will help the concessionaire to start the operation immediately and enhance the overall attractiveness and viability of the project. However, the concessionaire will ensure that container handling operations at HDC remain uninterrupted and are not adversely impacted upon handover of Berth Nos. 11 and 12.	DCA condition prevails.
116.	**CA 3.2**	**Item Description:** Conditions Precedent **Query**: Based on our experience of PPP projects, it is not feasible achieve the financial closures in a span of 180 days. We request Authority to increase the conditions precedent period from 180 days to 270 days. Further, MCA 2021 also provides this flexibility to the Concessioning Authority.	DCA condition prevails
117.	**DCA 4.1**	**Item Description:** Performance Guarantee **Query**: Vadhavan Port and Outer Harbor at VOC Tuticorin Port is allowing to submit insurance surety bond for performance	Please see **Corrigendum-VI.**

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		guarantee and bid security. Hence, we request Authority to allow the concessionaire to submit insurance surety bond for the performance guarantee, bid security and deemed performance guarantee	
118.	**DCA Clause 9.2**	**Item Description:** Payments of Royalty **Query**: The escalation for the Royalty starts from the January month of the year in which bid is submitted while the actual revenue will start from at least 3 to 4 years from the bid due date. Further, the MCA 2021 doesn't have any provision for escalation from January month in which bid is submitted. Hence, this will create burden on the financials of the concessionaire as the royalty escalates by 100% of variation in WPI. We request Authority to start the escalation of the royalty after the completion of construction period and / or start of commercial operation date and accordingly modify the clause	DCA condition prevails.
119.	**DCA Clause 9.2**	**Item Description:** Payment of Royalty **Query:** We understand that the rate of royalty of empty containers would be same as that applicable for loaded container. As per the Industry practice, the tariff for handling of empty container is 80% of tariff of the loaded container. Hence, we request Authority to reduce the	DCA condition prevails

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		royalty for empty container from 100% to 80% of the loaded container. This will increase the commercial viability and bankability of the project.	
120.	**DCA 7.1 (c)**	**Item Description:** Obligations of the Concessioning Authority **Query:** Increase in navigation channel draft should be responsibility of the Authority as the marine charges is collected by the port authority and not by the concessionaire. In case of cost sharing, the authority should also formulate mechanism to share the revenue with the concessionaire.	Please refer to article 7.1 (c) (i) (b) of DCA.
121.	**DCA 7.1 (c)**	**Item Description:** Obligations of the Concessioning Authority- Berth hire **Query:** The concessionaire is responsible for retrofitting the berth no. 11 & 12 and will spend capex for the same. However, there is no provision in the concession agreement to recover this capex incurred by the concessionaire. Further, we would like to bring to your kind notice that the Authority has allowed the concessionaire to collect berth hire for the berth no. 7 (which was constructed by Port Authority but retrofitted) for the recent concluded PPP project of Re-Construction of Berth No. 8 and Mechanization of Berth Nos. 7 and 8 at NSD of KDS, Syama Prasad Mookerjee Port. In view of the above, we request that the concessionaire may be	Please refer article 8.4 (b) of DCA. The cost incurred may be recovered by the Concessionaire by way of Tariff Charged as per article 8.1 of DCA.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		permitted to collect revenue through berth hire for the said berths.	
122.	**DCA Appendix 4**	**Item Description:** Scope of Work **Query:** Operator should not be obligated to purchase the two old RMQC which have already lived their useful life for start of the operation during the construction period of Phase I. Operator should be allowed for early with their own equipment using MHC or RMQCs for operation at Berth no. 11 & 12 during the construction period of Phase I.	There is no such obligation on the part of Concessionaire to procure the two old RMQCs which has crossed its economic life. It is a matter of discretion on the part of Concessionaire.
123.	**DCA Appendix 4**	**Item Description:** Phase II scope of work **Query:** Please specify the work to be carried out by the concessionaire for retrofitting. As the concessionaire is going to spend capex for retrofitting of the berth, hence the concessionaire should get at least 50% of the berth hire from the authority.	DCA condition prevails
124.	**DCA_OT_11_and_ 12**	**Item Description:** Clause 9.1.1: Agreement or on account of failure of the Concessionaire to comply with Applicable Laws and Applicable Permits. Clause 7.1(a) (i) (j): Obtaining, Maintenance of Applicable Permits and Compliance of Applicable laws	Refer reply to Sl. No. 96 above.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		Query: Provide the following existing clearances & permission obtained for development of project: i. EC&CRZ clearance, amendment and validity extension. ii.Valid and old CTE and CTO obtained from WBPCB including application submitted at WBPCB. iii. Last 2 years Half yearly compliance report and Form-V submitted at MOEF&CC and PCB. iv. Details and documents of ongoing EC&CRZ Clearance, if any v.Environmental Impact Assessment report (submitted at the time of EC application), Show cause Notices & Legal case (If any) etc	
125.	**DCA Appendix 4**	**Item Description:** Scope of Work- equipment **Query:** Concessionaire should be allowed to select yard side equipment on owning or hire basis which will help to optimize their capex. However, the concessionaire will comply performance standard of the concession agreement.	Please see **Corrigendum-VI**.
126.	**DCA Appendix 13**	**Item Description:** Minimum Guaranteed Cargo / Container **Query:** The Minimum Guaranteed Cargo / Container (MGC) is 70% of the project capacity. Considering the traffic growth and the increase in the capacity along mechanization of container terminal at NSD Kolkata, the MGC is practically impossible to achieve. Hence, we request Authority to reduce the MGC as given below:	DCA condition prevails

<table>
<tr><th>Sl. No.</th><th>Clause/Article No. /Page No./ Query Ref.</th><th>Pre-Bid Query</th><th>Response of HDC, SMPA</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><td>Sl. No.</td><td>Period from the Date of Award of Concession</td><td>MGT (in Million TEUs per annum)</td></tr>
<tr><td>1</td><td>1st month to 24th Month (Construction period of Phase-I)</td><td>Nil</td></tr>
<tr><td>2</td><td>25th month to 36th month (Construction period of Phase-II & Operation period of Phase-I)</td><td>0.0693 MTEU</td></tr>
<tr><td>2</td><td>4th Year starting to 6th Year ending (Operation period Phase II)</td><td>0.139 MTEU</td></tr>
<tr><td>3</td><td>7th Year starting to 8th Year ending (Operation period Phase II)</td><td>0.208 MTEU</td></tr>
<tr><td>4</td><td>9th Year starting onwards till end of the Concession Period (Operation period Phase II)</td><td>0.347 MTEU</td></tr>
</table>
</td><td></td></tr>
<tr><td>127.</td><td>RFQ –Cum RFP, SL. No. A2.25 , page no. 13</td><td><u>Item Description:</u>

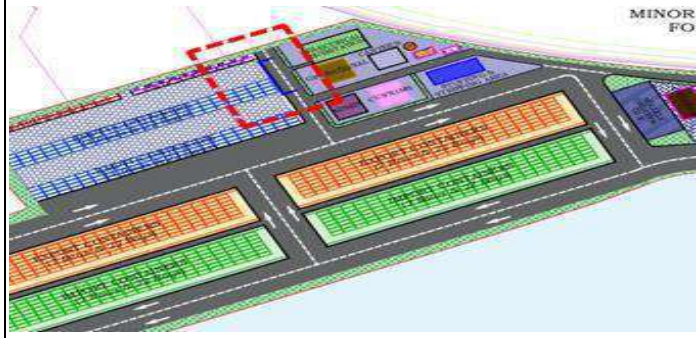
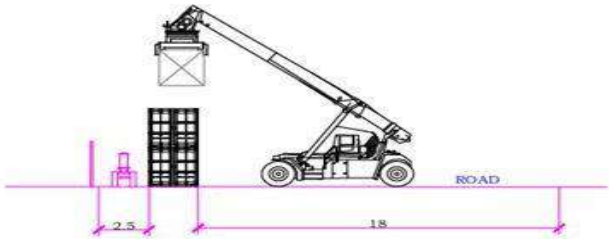
11 kV Electrical feeder station

<u>Query:</u>
Please confirm whether 11 kV power supply is available within the port boundary. If available, kindly provide the details as mentioned below:
1. Tapping / Termination Location: Please share the exact</td><td>Please refer article 7.2(a) of the DCA.</td></tr>
</table>

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		point where 11 kV power can be tapped or terminated. 2. Available Spare Power: Kindly confirm how much spare load is currently available in the existing 11 kV system. 3. VCB Rating and Fault Level: Please provide the Vacuum Circuit Breaker (VCB) rating along with the corresponding system fault level.	
128.	RFQ – Cum RFP	**Item Description**: Information Technology **Query:** 1. For the Pilotage Service, what interfaces will be required to communicate with the TOS System? 2. Please specify all integrations or interfaces required with the existing Port System and kindly provide detailed information regarding each interface. 3. We adhere to ISO 27001 cybersecurity compliance; if you require any additional compliance standards, kindly inform us	1. Integration Method with HDC, SMPK system: Communication should be via secure web based APIs or Web Services to ensure seamless data flow. 2. The proposed system must be capable of interfacing with the following existing frameworks: i. SAP-EBS (ERP) ii. NLP-Marine (National Logistics Portal) iii. Legacy EBAS (where applicable) Specific API schemas and documentation will be shared with the successful bidder upon placement of Letter of Intent. during the system design phase. 3. While ISO 27001 is a mandatory baseline, the solution must strictly comply with: • The cyber Crisis Management Plan (CCMP) of SMPK. • Latest cyber security guidelines and circulars issued by the MoPSW & MeitY. • Periodic audit requirements and security hardening guidelines from CERT-In.
129.	RFQ –Cum RFP, SL. No. C1.2 , pg no. 13	**Item Description**: Illumination with high mast towers and lighting system **Query**: We have considered an average illumination level of 35 lux and a minimum illumination level of 15 lux, with a	The IS 10947 (1984): Code of Practice for Lighting for Ports and Harbours and Dock safety norms shall be generally followed. Lux level shall be such that the same conforms to relevant IS as well as Dock safety norms.

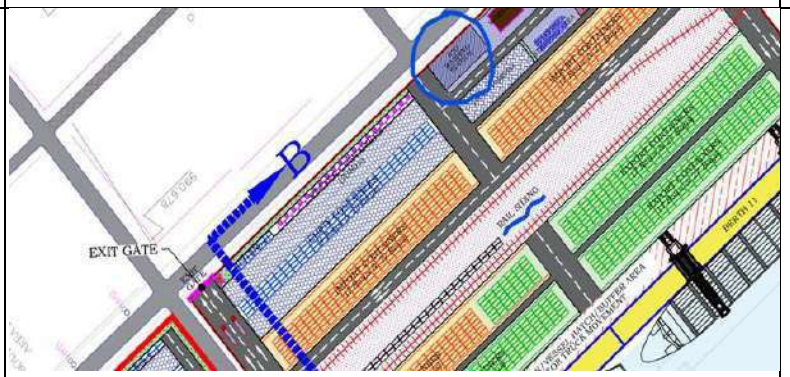
Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		Light Loss Factor (LLF) of 0.85 for our lighting design calculations. If there are any specific lux level requirements different from the above values, kindly confirm.	
130.	Annexure 11.1 - drawings	**Item Description**: Page-391 - REEFER CROSS SECTION OF HDC OUTER TERMINAL **Query**: Drawing - SMPK/PMS/2425-052/HDC/TEFR/0711 Reefer container ground slots are provided in separate yard areas with reach stacker operations (reefer parks) which results in inefficient planning of the yard space. We are planning to develop the reefer yard in the container yard which will help to save not only space but also result in efficient utilization of the equipment. Hence, we request Authority to provide flexibility to the concessionaire to plan, design and develop the reefer yard as per their requirement	The bidder has the flexibility to design the overall project based on the project operational philosophy and submit to Independent Engineer and Concessioning Authority for the approval. However, the minimum requirements as laid in DCA shall be followed.

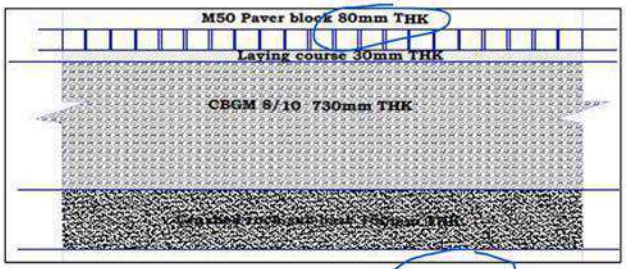
"Integrated Development of Outer Terminal and Berth No. 11 & 12 at Haldia Dock Complex for Handling Containers & Multipurpose Clean Cargo (Dry and Break Bulk) through PPP mode"

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		  CROSS SECTION -CC (HDC OUTER TERMINAL CONTAINER)	
131.	Annexure 11.1 - drawings	**Item Description**: Page 389-390 -Typical cross-section of HDC outer terminal (Section A-A and B-B) **Query**: Drawing number - SMPK/PMS/2425-052/HDC/TEFR/0709 & SMPK/PMS/2425-052/HDC/TEFR/0710 We understand that the current layout doesn't consider deployment of the E-RTG. Please confirm.	The planning parameters considered by the Concessionaire are already provided in the TEFR Chapter 5, 6 and 7. For the yard handling, the flexibility is provided for hiring the equipment. Hence, bidders may opt for E- RTG without any change in the project cost. The bidder has the flexibility to design the overall project based on the project operational philosophy. However, the minimum requirements, as laid in the tender, shall be duly complied to.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		 Further, we would like to bring to the notice of the Authority that in order to comply with Green Port Policy, we are considering E-RTGs which will require the Bus Bar utilities which has not been factored in the yard planning provided by the Authority. The allocated land parcel will not be able to achieve the desired capacity as bus bar will occupy space and will reduce the space for the ground slots. We request to consider above issue of deployment of E-RTG and revisit the land area being provided for the Project. We request to provide the requisite additional area in addition to the existing area to achieve defined capacity. We also request that the additional area should not be charged 1.2 times SOR rate under Article 9.3 of the Concession Agreement, instead the same should be provided under the token fees of Re. 1 as per Article 9.1.	For any additional area, the same may be provided as per the provisions of the article 9.3 of DCA
132.	Page-264 of TEFR - Clause 7.10.1 Water	**Item Description:** Water requirement **Query**:	Water will be provided from the nearest water line tap off point. No drawing could be provided.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
	Requirement	Please provide a drawing showing the water line tap off point in drawing.	
133.	age-255 – Clause 7.10.4 Power Requirement	**Item Description:** Electrical power requirement **Query**: Please provide a drawing showing the electrical power supply connection from outside in drawing. Existing survey drawing required showing levels and locations of various existing yard services.	Please refer article 7.2 of DCA.
134.	Annexure 11.1 - rawings	**Item Description:** Rail siding interface **Query**: Page 390 - Typical cross-section of HDC outer terminal (Section B-B) There is a proposal for RTG washing station at the end of yard beyond rail siding in the middle. How will RTG go up to the washing station location during ongoing operations? We understand that Rail siding is at grade and all the yard vehicles will pass the rail tracks to go from south to north of yard and back. Please confirm our understanding.	The concessionaire is required to develop the project area as per requirement. The understanding is correct.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
			
135.	Page-252 Clause-7.9	**Item Description:** PAVEMENT IN CONTAINER YARD **Query**: Pavemen-1 and 2 shows the crust composed of 80mm thick paver blocks. We understand that pavement-2 has been designed for no container stacking or reach stacker operations; however, pavement-1 is exposed to heavy operational traffic and stacking load. Please provide a design report for the 80mm thick paver top pavement-1 and 2 crust design.	The preliminary Design Basis is already provided in Section 7.9 of TEFR. Bidder shall be required to conduct the geo-technical assessment and detail design and put up for approval during the project development stage.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		 Figure 7-13: Typical Cross Section of Pavement I Table 7.20 Flexible Pavement Type I Material / Thickness (mm) 80 30 730 150	
136.	TEFR Clause 2.4.2	**Item Description:** Geotechnical data **Query**: Please share the following reports in full. i. Geotechnical Investigation Report for the "Multipurpose Riverine Jetty at Upstream of 3rd Oil Jetty at Haldia", prepared by Constell Consultants Pvt. Ltd., covering the outer terminal area. ii. Geotechnical Investigation Report for the "Proposed Construction of Hardstand/Road inside the Dock Area of Haldia Dock Complex", prepared by Techpro Engineers Pvt. Ltd., focusing on Berth No. 11 & 12.	Refer Sl.No. 23 (iii) above.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
137.	TEFR	**Query:** Please share the bathymetry file in AutoCAD for reference for both berth 11 & 12 area as well as outer terminal berth.	Refer Sl. No. 24 (iv) above.
138.	TEFR Clause 2.4.2	**Query**: Kindly furnish the details of any ground improvement works carried out in the proposed yard area of berth-11 & 12.	As per the TEFR Cost Estimate (Table No. 9.3, Item No. A 4.1), a provisional area of 4,000 sqm has been considered for retrofitting of existing hard stand/developed area within the project boundary. Although the back-up area is largely developed, minor upgradation or retrofitting may be required in certain patches. Accordingly, this provisional area has been adopted in line with the TEFR. However, notwithstanding the provisions of the DCA/TEFR, the bidder shall independently assess the extent of repairs, upgradation, and retrofitting required for the existing hard stand and account for the same in their bid/proposal based on their own requirements. Any improvements required to the existing hard stand shall be fully factored into the bidder's scope without cost liability to SMPK.
139.		**Query:** Please furnish the topography layout of the stack area proposed for the outer terminal.	Topography layout of the proposed stack area for the Outer Terminal is not available. Bidders are accordingly advised to conduct site survey of their own.
140.		**Query**: Kindly furnish the detailed Geotechnical report of the stack area proposed for the outer terminal. No geotechnical data is available for the same in TEFR.	Geotechnical report of the backup area of OT is not available. To be conducted by the concessionaire.
141.		**Query:** Please confirm that the necessary ground improvement works have already been taken up at the proposed stack area proposed for the outer terminal area as there is no item / cost has been captured in the TEFR. Hence, the bidder is excluding the same from the scope of works considering the GI works are already completed.	Ground Improvement shall become the essential part of back-up area development and shall be undertaken by the bidder. As per the TEFR, Cost Estimate (Table No. 9.2, Item No. A 4.1. 4.2 and 4.3 and 4.6) and Chapter 7, Section 7.9, the Ground improvement is already considered in the TEFR. However, notwithstanding the provisions of the DCA/ TEFR, the bidder shall independently assess the requirements.

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Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		Please confirm.	Any GI required shall be fully factored into the bidder's scope without cost liability to SMPK and detail design are to be undertaken by the bidder.
142.		**Query:** Shore protection sketch shown in SMPK/PMS/2425-052/HDC/TEFR/0720 doesn't specify the boulder thickness or size of boulders presently used in the shore protection works. Please share the details for the same. Please share the as-built drawing of the shore protection drawing for better understanding.	Bolder size varies between 250-500 mm.
143.		**Query:** Kindly confirm that the required capital and maintenance dredging (of approach channel, berth pockets, turning circle, and alongside berths including allowance etc.) is not in the scope of the bidder.	Refer reply to Sl. No. 12 above.
144.		**Query:** Please share the design basis of the berth (250m length) to be constructed in the outer terminal.	Design Basis Report for the subject berth is not available. However, indicative structural drawings depicting the proposed layout, cross-sections, and structural configuration of the berth and approach trestle are available in the TEFR and may be referred to for preliminary understanding. The responsibility for carrying out all detailed engineering design, surveys and site investigations necessary for the construction of the berth shall vest entirely with the Concessionaire.
145.	Berth Structure	**Query:** i. Please provide load carrying capacity of berth 11,12. ii. Please provide design basis/design document of existing berth 11 and 12 iii. Please provide Report showing health of existing berth 11 and 12 requirements of retrofitting.	i. Load carrying capacity of Berth 11 & 12 is 5 T/m2. ii. The design basis reports are not available with the Concessioning Authority. iii. Health study to be conducted by the consultant. Estimate of retroffiting is available in the cost estimate.

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Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		iv. Provide detailed drawings of existing berth 11,12 and proposed berth. v. Please provide detail drawings of riverbank protection vi. Provide cost breakup of cost berth, rehabilitation and bank protection. vii. Please confirm for seismic design Code 1893 2002 shall be followed as mentioned on TEFR pg no 47.	iv. Please refer drawing No. SMPK/PMS/2425-052/HDC/TEFR/0501 of the TEFR for berth 11 & 12. For OT, drawing No. SMPK/PMS/2425-052/HDC/TEFR/0718/0719 of TEFR to referred. v. Not available . vi. Please refer chapter 9 of TEFR. vii. Code 1893 latest edition/revision to be followed.
146.	Benchmark and Reference control points	**Query:** The TEFR does not mention the details of Benchmark and control points referred to establish the position of the existing structures and utilities and to develop the drawings attached with TEFR. Please share the details of Reference Bench mark and control point as will be required to carry out the Topographical survey by the Concessionaire and to synchronize the proposed works with the existing port infrastructure.	The CD shall be referred as Benchmark for the Project. The layout is marked as per Universal Transverse Mercator (UTM) coordinate system in the TEFR. The establishment of survey control points, conduct of Topographical Survey and synchronisation of the proposed works with the existing port infrastructure shall be the responsibility of the Concessionaire. HDC shall guide the Concessionaire to the nearest established permanent Benchmark at the time of commencement of the survey.
147.	Topography survey & Geotechnical survey	Please provide the Topography survey and Geotechnical survey of area proposed for the concession.	Refer Sl. No. 23 (iii) above.
148.	On-co-ordinates Drawing for concession area	**Query:** Please provide the drawing (ACAD COPY) on UTM Co-ordinates with precisely marking the proposed land area for the subjected project duly marking the area proposed for new railway siding as well as the existing railway line, if proposed to be given to concessionaire for utilization.	The drawings, as available with the Concessioning Authority, will be handed over to the successful bidder upon placement of Letter of Intent. Drawing enclosed in TEFR may be referred.
149.	Railway siding area for outer	**Query**: The TEFR drg. No. SMPK/PMS/2425-052/HDC/	Please refer to following Drg. No. earmarked for railway area in OT:

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
	terminal	TEFR/0203 shows the location of earmarked backup area for Outer terminal, wherein the proposed 10-acre area for railway yard is not mentioned. Please clarify and clearly earmarked the area for Railway siding of outer terminal with dimensions and co-ordinates.	(a)SMPK/PMS/2425-052/HDC/TEFR/0202, (b)SMPK/PMS/2425-052/HDC/TEFR/0207 and (c)SMPK/PMS/2425-052/HDC/TEFR/0701
150.	Railway facility for berth 11 & 12	**Query:** The TEFR drg. No. SMPK/PMS/2425-052/HDC/ TEFR/ 0204 shows the location of earmarked backup area for berth 11 & 12. It is observed that the two railway lines are passing through the area shown as 425m x 213m. Since the proposed railway plan for outer terminal shows the connectivity of the outer terminal from dead end of this line, only one line out of these two lines will be used to handle berth 11 & 12 traffic. Further, the handling length available in this area for only half rake. Hence, the rail infra proposed for handling the projected rail traffic of approx. 3 trains/day from berth 11 & 12 observed to be inadequate. It is requested to please clarify the plan for handling the rail traffic from berth 11 & 12.	Please see **Corrigendum-VI.**
151.	Drawings & details of existing railway lines	**Query:** Details plan of existing Railway infra - Please provide the following railway approved drawings of existing railway for the subjected project- * Engineering Scale plan, * L-section * Bridge / Culvert drawings Sectioning & Wiring Diagrams if, existing railway is electrified	All railway approved drawings of existing railway as available with HDC will be provided to the successful bidder upon placement of Letter of Intent. Bidders are encouraged to visit the site and collect information.

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Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
152.	Drawings & details of existing railway lines	**Query**: Please provide the details of existing line that will be serving the proposed siding- i. What is the track structure for the existing lines? ii. Whether the existing lines are suitable for 25T axle load or 32.5T axle load? iii. Whether the existing lines are electrified or Non-electrified? iv. Whether the existing lines are interlocked or Non-interlocked?	i. The existing track structure is 52 kg/1540 sleeper density. The same will be upgraded shortly. ii. Maximum of the required network is suitable for 25 T axle load. The remain portion will be upgraded. iii. Non-electrified iv. The portion of track in the project area of Berth 11 & 12 is non-interlocked.
153.	Modus operandi for development of railway infra and Railway approvals	Query: Modus operandi for development of railway infra and Railway approvals - The concessioning authority is requested to please clarify the modus operandi for development of railway infra and Railway approvals i.e.- 1) What is the status of existing railway infra of HDC i.e. under which policy it is notified, whether it is a Private siding, Private Freight Terminal (PFT), Gat-Shakti Cargo Terminal (GCT) or one of the models under PPP policy such as NGR. 2) The proposed railway infra will be developed as an extension of existing railway infra under existing policy or the concessionaire shall be developing the railway infra as a separate siding and will be notified from Indian railway as a separate individual siding with dedicated alpha numeric code. Please clarify. 3) Whether the concessionaire shall require approaching Indian Railway for the various approvals which in general required	1. HDC, SMPA is a terminal agent of SE Rly and the operations are guided by extant agreement with the trunk railways. 2. Proposed railway infra will be developed as an extension of existing railway infra under existing policy.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		for development of a individual siding i.e. Detailed Project Report, Engineering Scale Plan, L-section, Bridge Drawings, SIP, LOP etc.	3. No. The approval of Detailed Project Report, Engineering Scale Plan, L-section, Bridge Drawings, SIP, LOP have to be approved by IE and SMPA.
154.	General	**Query:** Whether the railway infra (i.e. existing line or proposed new line) for the subjected project will be a facility dedicated for the concessionaire or will it be a common user facility? Please clarify. If it will be a common user facility, please provide the details - - Rail Traffic of other users with details of their cargo volumes and nos. of trains/day? - Total Capacity of the proposed railway siding in terms of Trains/day Available capacity for the concessionaire.	Existing line along with the proposed new line for the subjected project will be a facility dedicated for the concessionaire. Please refer **Corrigendum-VI.**
155.	Proposed railway plan	To ascertain the technical feasibility of the railway connectivity and yard is very crucial. So it is requested to please provide the drawing (Autocad Copy) on co-ordinates showing the following details i. Existing railway infra at Haldia port ii. Location of proposed siding take-off with alignment and yard plan of proposed tentative railway siding as envisaged during the feasibility stage various existing utilities (Road, Rail, conveyors, Overhead & underground power lines, pipelines, drains etc.) crossings the proposed railway alignment.	i. Will be provided to the successful bidder upon placement of Letter of Intent. ii. Refer reply to Sl. No.170 below. Bidders are encouraged to visit the site and collect information.
156.	In-motion Railway weigh bridge	In-motion Railway weigh bridge - Please clarify the following a) The location of existing IMWB on Haldia port railway	

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		network. b) Whether concessionaire will be allowed to use the existing IMWB of port or a new IMWB shall have to be installed by the concessionaire? c) Whether the In-motion weigh bridge will be operated by the concessionaire or the concessioning authority? d) Whether the In-motion weigh bridge will be connected to the FOIS? If yes, whether this will be integrated to the existing FOIS system of paradip port or to be connected directly to Indian Railway?	(a), (b) and (c) New in motion weigh bridge at suitable location shall be installed and operated by the concessionaire. (d)The same needs to be connected to the FOIS system of SMPK and Indian railways, as applicable, by the Concessionaire.
157.	apacity of HDC Railway yard	Query: Please confirm that the adequate capacity is available in Port's yard to handle the peak traffic load from Concessionaire's yard.	The query pertains to operational capacity management within the Port's yard, which is subject to dynamic traffic conditions and operational planning at any given point in time.
158.	Signaling of existing & PROPOSED tracks	**Query:** Signaling of existing & proposed tracks – Please clarify the Signaling arrangement envisaged for the proposed Railway yard of Concessionaire.	Concessionaire to develop/revamp signaling system in terms with the guidelines circulated by SE Rlys from time to time in their yard. Time to time PWI certification is be maintained for the track and fixtures during the pendency of concession.
159.	Loco for placement and removal of rakes at Concessionaire's yard	Loco for placement and removal of rakes at Concessionaire's yard – Since the rake placement and removal from concessionaire's yard will be done by locomotive of Concession authority, whether the proposed railway facility is required to be Top wired enabling placement with Electric locomotive? Please confirm.	Rake placement and removal from concessionaire's yard will be done by locomotive of Concessioning Authority. Presently , OHE is not envisaged. HDC maintains diesel locomotive (Owned/Hired) for its railway operations.
160.	Brake Van (BV) Reversal	Brake Van (BV) Reversal - The configuration of rake while placement to the Concessionaire's yard by port locomotive may please be clarified i.e.-	i. BV reversal to be done by the concessionaire in his yard to complete train formation. ii. BV reversal is to be carried out by concessionaire's loco.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		i. Whether the BV reversal (as required for dispatch of rake after handling) will be carried out by Port locomotive within Port railway yard or concessionaire is require to reverse the BV in their yard? ii. In case BV reversal is to be carried out by concessionaire in their yard, whether the same will be carried out by locomotive of Concessioning authority? Please clarify	
161.	Maintenance of Railway connectivity up to the Concessionaire's yard	We understand that up to the Concessionaire's yard the railway connectivity will be provided and maintained by the concessioning authority? Please confirm.	Yes.
162.	Existing Overhead and underground utilities	Existing Overhead and underground utilities - Since the port is operational, we understand that there must be various Overhead and underground utilities running across and along the proposed alignment, the mapping of such utilities are	Relevant information pertaining to underground pipelines, electrical cables and other sub-surface utilities within the project premises, to the extent available with the Concessioning Authority,

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		very critical from safety as well as operational point of view. Please provide the as-built details of such utilities. Also please confirm that the concessionaire will be provided with the clear front after re- location of such utilities by the Concessioning Authority.	shall be shared with the successful bidder upon placement of Letter of Intent.. However, the Concessionaire is expected to undertake necessary cross-cuts and investigations at site during the construction phase to independently identify any underground obstructions or utilities that may impact project execution, and to promptly report the findings thereof to the Concessioning Authority. The responsibility for re-routing or relocation of any such utilities, where necessitated by project requirements, shall vest with the Concessioning Authority.
163.	TEFR Clause no. 5.8.1 Water requirement	**Item Description**: Response of HDC – Water for firefighting and dust suppression has may be taken from the dock basin by concessionaires at their own cost & arrangement, as per the approved plan. **Query:** For utilizing the Dock basin water, please provide the location of the pump house for the Intake Pump, the water quality report, and the tide level.	The Concessionaire shall independently identify an appropriate location within the Concession Area and design and establish the intake pumping infrastructure for drawing water from the dock basin (for Berths 11 & 12)/river(for Outer Terminal), conveying it to the fire water reservoir and ensuring its availability for the firefighting system and dust suppression system.
164.	DCA Appendix 8	**Item Description:** EC & CRZ clearance **Query:** The Authority is requested to share the present status of the EC and CRZ applications, along with the EIA report submitted for EC approval, for understanding the technical details of the application.	EC, CRZ and CTE is in the scope of Concessioning Authority. Rest all are in scope of concessionaire.
165.	DCA Appendix 4	**Item Description:** 10 acres area is earmarked for dedicated rail yard **Query:** The Authority is requested to confirm that the 10-acre	It is exclusively for Outer Terminal.

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		area is exclusively allocated to the Outer Harbour Container Terminal under this concession and is not a shared facility.	
166.	DCA Appendix 8	**Item Description**: Permit & Clearance **Query:** Road and railway connectivity has been considered from the Haldia Dock Complex area to the Outer Harbour, which may require extension of the Customs boundary. Accordingly, construction works and statutory approvals related to the extension of the Customs boundary shall be in the scope of the Concessioning Authority. Request confirmation.	Construction works, as per requirement of customs, related to the extension of the Customs boundary for Outer Terminal shall be in the scope of the Concessionaire. Refer section 5.3.2.4 of TEFR.
167.	DCA Appendix 14	**Item Description**: Gross Berth Output **Query:** Due to depth/draft limitations at Haldia Dock Complex, the gross berth output specified for main line container vessels and 30,000 MT bulk parcel operations is not applicable.	**Please see corrigendum-VI.**
168.	DCA Appendix 14	**Item Description**: Transit Storage Dwell time **Query:** The transit storage dwell time norms indicated appear optimistic. Request the Authority to confirm the transit storage dwell time currently being achieved at the port for container and bulk cargo, for both import and export. Further, please share the bifurcation based on road- and rail-bound cargo.	**Please see corrigendum-VI.**

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169.	DCA Appendix 19	**Item Description**: Supporting Project Infrastructure **Query:** Road and railway connectivity from the existing road and railway network up to the proposed Outer Harbour Terminal boundary shall be within the scope of the Concessioning Authority. Please confirm	Railway: The railway siding (2 tracks including the engine escape line) for the OT along with connecting the same track to existing HDC network will be within the scope of concessionaire. Also, refer **Corrigendum-VI.** Road: The road for OT will be connected with the existing road of 3.7 m wide towards the Township passing through the proposed backup area has to be realigned in order to have effective planning and the same is under concessionaire scope as per the DCA. Please refer to Drg.No. SMPK /PMS/2425052/HDC/TEFR/0202. Any other road/rail development outside the project boundary shall be Concessioning Authorities responsibility and will be taken up as per the requirement.
170.	TEFR Drawing no 0203 & 0204	**Item Description**: Land boundary for proposed facilities **Query:** Drawing no SMPK/PMS/2425-052/HDC/TEFR/0203 & 0204: i. Please share clear demarcation of OT backup land and Railway yard (23+10 acres). ii. Please clarify status of Navy Area shown near the proposed OT—any access restrictions? iii. Any encroachments, utilities, or underground services in the OT backup land and railway handling yard. iv. For Berths 11 and 12, it is understood that the rail line is available up to Berth 14. Please confirm	i. Please refer to following Drg. No. for earmarked area for OT and railway yard. (a)SMPK/PMS/2425-052/HDC/TEFR/0202, (b)SMPK/PMS/2425-052/HDC/TEFR/0203 (c)SMPK/PMS/2425-052/HDC/TEFR/0207, (d)SMPK/PMS/2425-052/HDC/TEFR/0701 ii. Navy Land has been handed over back to SMPA. No restrictions. iii. The earmarked area for the project, as per the DCA, will be made available free of Encumbrance on "as is where is basis". The utility details of the area will be provided to

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		whether the same rail connectivity will be dedicatedly available for handling operations at Berths 11 and 12.	the successful bidder upon placement of Letter of Intent. Any utility relocation (if required) will be under Concessioning Authority. **iv.** Yes, it will be dedicated for Berth 11 & 12 operations. **Please see corrigendum-VI.**
171.	General	Any capital dredging for outer harbour and maintenance dredging for OH and Berth 11-12 will be responsibility of Concessioning Authority. Please confirm.	Refer reply to Sl. No. 12 above.
172.	General	Please share the navigational channel marking plan along with turning circle location.	Please refer to TEFR Section 7.3.
173.	General Equipment	Authority to clarify and approve that the bidder is free to select the terminal equipment technical specification, configuration, and equipment category to achieve terminal capacity and best suit with integration needs.	**Please see corrigendum-VI.**
174.	General - Equipment	Authority to clarify and approve that equipment can be deployed based on sole direction of terminal operator on hire or owned basic, new or used and can be procured from anywhere from the globe.	**Please see corrigendum-VI.**
175.	General	Please confirm whether any vessel navigation and/or mooring study has been carried out for the proposed Outer Harbour (OH) berth. If so, kindly share the relevant study/report.	Vessel navigation, berthing/de-berthing is in the scope of Concessioning Authority.
176.	TEFR	**Item Description**: Traffic Plan **Query**: Drawing No. SMPK/PMS/2425-052/HDC/TEFR/0717 indicates entry and exit of the proposed container terminal traffic through the HDC gates.	Refer reply to Sl. No. 29 above.

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		Please confirm whether pre-gate processing is proposed to be carried out at the HDC gate. Further, please confirm whether the provision of pre-gate parking facilities shall also be under the scope and responsibility of the Concessioning Authority.	
177.	General	As per TEFR, 80% container traffic will be through road. Please confirm whether the proposed entry/exit arrangement through the HDC gates is adequate to handle the projected container traffic volumes for the Outer Harbour Terminal without impacting existing HDC operations.	Confirmed.
178.	General	Kindly clarify whether any modification, widening, or upgradation of the existing HDC gate infrastructure (including gates, lanes, security systems or traffic management systems) is envisaged and confirm that the same shall be under the scope of the Concessioning Authority.	Main Gate of HDC is under modification. Any further upgradation, internal to HDC as per requirement, will be taken up from time to time and will be under the scope of the Concessioning Authority.
179.	General	Please confirm whether traffic management, security screening and Customs-related checks at the HDC gate for Outer Harbour Terminal traffic shall be integrated with existing HDC systems or provided separately, and clarify the responsibility for implementation and operation of the same.	Traffic management inside the project area for OT and berth 11 & 12 will be the responsibility of the Concessionaire. Security screening and Customs-related checks at the HDC gate will be responsibility of HDC/Custom Authority. The integration of such systems with the existing HDC infrastructure, to the extent required, shall form part of the Concessionaire's scope of work under the Concession Agreement. The design, implementation, operation, and maintenance of the same shall accordingly be planned and executed by the Concessionaire at its own cost, in compliance with applicable statutory and regulatory requirements.

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180.	General	Please confirm whether a road container scanning facility is required and/or available for container traffic at the HDC gate / Outer Harbour access under this concession.	A container scanning facility is available and is not required separately.
181.	RFQ cum RFP Clause 1.2.4	**Item Description:** Return of Bid Security upon selection **Query:** We understand that upon selection of the Bidder, the Bid Security shall be retained till a Performance Security is provided by the Concessionaire. However, the period within which the Bid Security shall be returned to the Selected Bidder is neither specified in the RFQ cum RFP nor the DCA. We request the Authority to clarify the same.	The bid security of the successful bidder will be returned within 90 days of submission of Performance Security.
182.	**RFQ cum RFP Clause 2.1.2**	**Item Description**: Validity of Registration **Query:** Clause 2.1.2 of the RFQ cum RFP states that the Bidder should be validly registered at the time of submission and acceptance of bids. Request the Authority to please clarify if such registration refers to: (i) registration from the Competent Authority as defined in Public Procurement Order No. F. No. 6/18/2019-PPD dated 23rd July 2020 in accordance with Clause 2.12(l); or (ii) registration with e-procurement portal of the Authority in accordance with 2.15; or (iii) any other registration.	Registration with e-procurement portal of the Authority in accordance with 2.15 of RFQ cum RFP.
183.	**RFQ cum RFP Clause 2.1.3**	**Item Description**: Techno-Economic Feasibility Report **Query:** As per Clause 2.1.3 of the RFQ cum RFP, the Authority does not take any liability/ responsibility for the data in	The data and information contained in the Techno-Economic Feasibility Report (TEFR) are indicative in nature and are provided purely for reference purposes. Prospective bidders are advised to exercise independent due diligence and satisfy themselves on all technical and commercial parameters before submission of their bids.

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		the Techno-Economic Feasibility Report. We suggest that if any data/ information under the Techno-Economic Feasibility Report is found to be incorrect during the performance of the works, then an amendment to the bid price or such other resolution between the Parties may be allowed but not solely at the cost of the bidder	Tender condition prevails.
184.	**RFQ cum RFP Clauses 2.2.1(c)(v)**	**Item Description**: Conflict of Interest **Query:** Clause 2.2.1 (c)(v) of the RFQ cum RFP provides that in case any bidder is in a position to access any information of other bidder, it will be deemed to have a Conflict of Interest. Considering the Authority has the right to disqualify the bidder and forfeit the Bid Security, please clarify that sub-clause (v) is restricted to access by a Bidder to bidding proposals of another Bidder and which can substantially impact the bidding process of the Authority	Tender condition prevails
185.	RFQ cum RFP Clause 2.2.1 (c)(vii) and 2.2.1(d	**Item Description**: Legal, Financial or Technical Adviser of the Authority **Query:** The Authority has the right to disqualify the bid of the Bidder in case if any Bidder engages the legal, financial and technical advisors engaged by the Authority, in relation to the Project. In order to avoid any conflict, request the Authority to provide the names and details of all its legal, financial and technical advisors engaged for the Project**.**	Legal & Financial Advisors: M/ s IDECK Ltd. Technical Advisor : M/s Voyants Ltd.
186.	RFQ cum RFP Clauses 1.2.4, 2.1.7, 2.19 (i) and (ii), 6.1.2,	**Item Description**: Return of the Bid Security **Query:** Clause 2.19 (i) read with Clause 2.19 (ii) of the RFQ cum RFP provides that notwithstanding anything contained in the	**Please see corrigendum-VI**

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	2.23 (iv) and Point 8 of Appendix 1A	RFQ cum RFP, the Authority reserves the right to reject any Bid, to annul or not proceed with the Bidding Process and reject all Bids at any time without any liability or any obligation for such acceptance, rejection or annulment, and without assigning any reasons therefor. Clause 2.23 (iv) of the RFQ cum RFP provides that the Authority will return the Bid Security promptly and in any case within 180 (one hundred and eighty) days from the Bid Due Date in case the Bidding Process is cancelled by the Authority. We suggest that the non-obstante language under Clause 2.19 (i) be deleted and instead Clause 2.19 (i) and Clause 2.19 (ii) be made subject to Clause 2.23 (iv). In any case, it needs to be clarified that the Bid Security paid by the bidder as a part of the Bid will be returned/ refunded by the Authority in case the Authority unilaterally rejects any Bid.	
187.	**RFQ cum RFP Clauses 2.23(vi**	**Item Description:** Damages **Query:** Clause 2.23 (vi) of the RFQ cum RFP provides that the Authority can forfeit the Bid Security as Damages, *inter alia*, for any default of the Bidder during the Bid validity period. This is too broad and should be restricted only to defaults enlisted in Clause 2.23 (vii).	**Please see corrigendum-VI.**
188.	**RFQ cum RFP Clauses 2.23(vi**	**Item Description:** Damages **Query:** Clause 2.23(vii)(a) of the RFQ cum RFP states that "If a Bidder submits a non-responsive Bid. Subject however that in the event of encashment of Bid Security occurring due to	**Please see corrigendum-VI.**

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		operation of para 2.23.vii, the Damage so claimed by the Authority shall be restricted to 5% of the value of the Bid Security." Request the Authority to please confirm if the threshold of 5% of the value of the Bid Security will apply to all events mentioned under Clause 2.23(vii) (from paragraph (a) to (f)) or shall be limited to submission of a non-responsive Bid stated under Clause 2.23(vii)(a).	
189.	**RFQ cum RFP Clause 3.8.2**	**Item Description:** Selection of Bidder **Query**: Clause 3.8.2 stipulates that in the event two or more Bidders quote the same amount of Royalty, a draw of lots will be conducted in presence of the Tie Bidders who choose to attend. We suggest that to ensure transparency and fairness, the draw of lots be conducted in the presence of an independent third party agency or all the selected bidders who have submitted their financial bids, in addition to the Tie Bidders who choose to attend**.**	Tender condition prevails
190.	**RFQ cum RFP Clause 4.1**	**Item Description:** Fraud and Corrupt Practices **Query**: We note that Clause 4.1 allows the Authority to reject a Bid, withdraw the LOA, or terminate the Concession Agreement without liability, if it determines that the Bidder or Concessionaire has, directly or indirectly or through an agent, engaged in corrupt, fraudulent, coercive, undesirable, or restrictive practices during the Bidding Process. In such an event, the Authority is also entitled to forfeit and	Tender condition prevails.

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		appropriate the Bid Security or Performance Security as Damages, without prejudice to any other rights or remedies available under the Bidding Documents, the Concession Agreement, or otherwise. Moreover, such a Bidder or Concessionaire shall be ineligible to participate in any tender or RFP issued by the Authority for two years from the date they are found to have engaged in any such corrupt, fraudulent, coercive, undesirable, or restrictive practices. We suggest adding a clarification that the Authority shall only be entitled to take such steps upon a definitive judgment of conviction by an appropriate court of law. This ensures the Bidder or Concessionaire's right to be heard, in line with the principles of natural justice. Additionally, the Authority may consider establishing a mechanism for adjudicating such decisions or providing notice before taking any action.	
191.	**RFQ cum RFP Clause 6.1.2**	**Item Description**: Right to suspend or cancel the Bidding Process **uery:** Clause 6.1.2 provides a right to the Authority to suspend or cancel the bidding process or amend the Bidding Process or modify the dates or conditions relation to the Bidding Process at any time. We propose that Authority should in the event of any amendment to the Bidding Process provide notice of any such change and/or amendment to the Bidders in advance such that Bidders can make amendments to their respective bids in line with the amendments proposed.	Yes, the Concessioining Authority will publish any such communications.
192.	**RFQ cum RFP**	**Item Description**:	

"Integrated Development of Outer Terminal and Berth No. 11 & 12 at Haldia Dock Complex for Handling Containers & Multipurpose Clean Cargo (Dry and Break Bulk) through PPP mode"

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	Appendix II	Form of Bank Guarantee **Query:** The bank guarantee shall clarify that it will be immediately released by the bank upon receipt of notice from the Authority or the Bidder in case the bid of the Bidder is unilaterally rejected, or the bid is not proceeded by the Authority.	The BG would have to be provided as per format prescribed Appendix II of the RFQ cum RFP. The Concession Authority will release the BG as per condition of RFQ Cum RFP.
193.	**DCA Article 1.1**	**Item Description**: Definition of Agreement **Query:** The expression "*Agreement*" is defined to mean "*..this agreement as of date hereof, including Appendices 1 through 17 as may be amended…*". The DCA contains total of 23 Appendices. We suggest the definition of "Agreement" to be modified accordingly.	**Please see corrigendum-VI.**
194.	**DCA Article 1.1**	**Item Description**: Definition of Debt Due **Query:** Kindly clarify the following: (i) The expression 'Debt Due' includes only those sums which are expressed in Indian Rupees. Kindly clarify whether 'Debt Due' can include any financial facilities that may be availed by the Concessionaire in foreign currency for funding the Project. The definition of 'Debt Due' does not include intercorporate loans. Kindly clarify whether the Concessionaire can opt to finance the Project through	DCA condition prevails

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		intercorporate loans. If yes, the definition of Debt Due should cover intercorporate loans in order to protect the Termination Payment. We note that the Concessionaire can avail subordinated debt for the purpose of funding the Project. However, the term is undefined in the DCA. Authority to kindly provide a definition of the same in line with the model concession agreements in order to avoid inconsistencies. Further, the definition of "Debt Due" includes debt availed by the Concessionaire towards the Total Project Cost of the Project. However, it does not include the debt which may be availed by the Concessionaire for funding any additional cost (i.e. the capital expenditure incurred by the Concessionaire as a result of change in law or change in scope proposed by the Concessioning Authority). As a result, such additional cost will not be taken into account while determining the termination payments under the DCA and will not be compensated by the Authority. Therefore, it is recommended that the additional cost (to the extent that is not compensated by the Authority under the provisions of the DCA and against which facilities have been availed by the Concessionaire from the lenders) should be included while calculating the termination payments due to the Concessionaire on the Transfer Date.	
195.	**DCA Article 1.1**	**Item Description**: Definition of Debt Due and Limitation on Termination Payment **Query:** Article 1.1 of the DCA defines "*Debt Due*" and imposes a	DCA condition prevails

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		cap stating that "*the Debt Due, on or after COD Phase II, shall in no case exceed 85% of the Total Project Cost*." This 85% cap directly impacts the calculation of Termination Payment across various termination scenarios.	
196.	**DCA Article 1.1**	**Item Description**: Definition of Equity and Adjusted Equity **Query:** The expression "*Equity*" and "*Adjusted Equity*" include only those equity and sums which are expressed in Indian Rupees, respectively. We request that references to Indian rupees in the above definitions should be deleted.	DCA condition prevails.
197.	**DCA Article 1.1**	**Item Description**: Definition of "Senior Lenders" and "Senior lender" **Query:** Authority to kindly confirm whether the term "Senior Lenders" as used throughout the Concession Agreement should be interpreted as the defined term "Senior lender" (with lowercase "l") as defined in Article 1.1 of the DCA. Further, it is recommended that the defined term be amended to "Senior Lenders" (plural with uppercase "L") to align with its actual usage throughout the agreement and avoid any ambiguity in interpretation.	DCA condition prevails.
198.	**DCA Article 1.1**	**Item Description**: Definition of Senior Lenders **Query:** The definition of "Senior Lenders" does not include in its purview intercorporate loans. The Concessionaire should be provided a flexibility to finance the Project through intercorporate loans. Accordingly, it is requested that the definition of "Senior Lenders" should be amended	DCA condition prevails.

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		accordingly to include the intercorporate loans lenders	
199.	**DCA Article 1.1, 10.2 and 2.1**	**Item Description**: Definition of Financing Agreements **Query:** We note that the expression 'Financing Agreements' has been used in the definition of 'Senior Lenders', Articles 10.2 and 12.1(c)(i) of the DCA but the same is undefined. However, we note that the term 'Financing Documents' has been defined in Article 1.1 (Definitions) of the DCA. We understand that the definition of the terms 'Financing Agreements' and 'Financing Documents' both refer to the documents in respect of raising finance for the Project. Kindly clarify.	The term 'Financing Agreements' shall refer to the agreements entered into with the Senior Lenders, by the Concessionaire in respect of the Financial Assistance relating to the financing (including any re-financing) of the Total Project Cost.
200.	**CA Article 1.1**	**Item Description**: Definition of Performance Standard **Query:** We note that the minimum performance standard for both the Concessionaire and the Concessioning authority is provided under Appendix-14 and Appendix-18 respectively. However, Appendix-18 does not contain any details and states that it is "*Not Applicable*". Kindly clarify whether Appendix-18 will be applicable for the DCA and if yes, the same will need to be populated.	DCA condition prevails.
201.	**DCA Article 1.1**	**Item Description**: Definition of Project Site **Query:** The DCA uses the expression "*Project Site*" and the term "*Site*" interchangeably. The term "Site" is not defined in the DCA. We suggest that the definition of "*Project*	References to site ordinarily shall be considered as Project site.

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		Site" be amended to include reference to "*Site*".	
202.	**rticle 1.1**	**Item Description**: Definition of Total Project Cost **Query:** "Total Project Cost" is defined as follows: "Total Project Cost" means the capital cost incurred on construction and financing of the Project and shall be limited to the lowest of: a) the capital cost of the Project, as set forth in the Financial Package at the date of Financial Close; b) the actual capital cost of the project upon completion approved by Independent Engineer and Statutory Auditor and submitted to Concessioning Authority at the time of issuing Completion Certificate; c) a sum of Rs. 696.83 crores (Rupees Six Hundred Ninety Six Crores Eighty Three Lakhs). i.e. Rs. 429.46 Crores (Rupees Four Hundred Twenty Nine Crores Forty Six Lakhs) in Phase I and 267.37 Crore (Rupees Two Hundred Sixty Seven Crores Thirty Seven Lakhs) in Phase II. provided further that in the event of termination, the Total Project Cost shall be deemed to be modified to the extent of variation in Price Index occurring in respect of Adjusted Equity, as the case may be, in accordance with the provisions of this Agreement" We request the Authority to consider limiting the definition of Total Project Cost to the highest of the costs set out under paragraphs (a) to (c) in the definition of Total Project Cost. This will ensure bankability of the Project and will provide the Senior Lenders the requisite comfort in extending the financial assistance in the Project in accordance with the terms of the DCA.	DCA Condition prevails.

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203.	**rticle 1.3 (k)**	**Item Description**: Validity of electronic communications **Query:** Article 1.3(k) of the DCA requires that communications be "in writing under the hands of duly authorized representative" which may be interpreted to exclude digital/electronic communications. However, Rule 3.3 of the SAROD-PORTS Arbitration Rules (Appendix 21) expressly recognises that written communications may be made by fax, email, or any other means of electronic transmission. Authority to clarify that exchange of email correspondences and other electronic communications (duly sent from authorised email addresses of the Parties' authorised representatives) will constitute valid and effective communication under the DCA, and that Article 1.3(k) shall be deemed to include electronic communications and not be limited to physical/hard copy communications only.	It is confirmed that exchange of email correspondences sent from official email address of the parties' authorized representative will be considered as valid communication.
204.	**ticle 2.2(f)**	**Item Description:** Peaceful occupation **Query:** Kindly clarify that in the event the Concessionaire's peaceful occupation is obstructed due to any reason, then the Concessionaire will have the right (i) of specific performance under the applicable law; and (ii) to claim indemnification from the Authority for any loss, damage, costs, or expenses of whatever kind and nature arising due to such obstruction of the peaceful occupation of the Project Site. Additionally, in case such peaceful occupation of the Project Site is obstructed by any claims and proceedings, then the Authority will defend such claims and proceedings, and the cost of defending such claims	DCA condition prevails.

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		and proceedings will be exclusively borne by the Authority. Kindly also clarify that in case the Concessionaire also have the right to ask for relaxation on the Minimum Guaranteed Cargo payable by the Concessionaire under the DCA to cover for losses incurred due to obstruction of Concessionaire's peaceful occupation.	
205.	**Article 3.1 (a) (vii) and Article 17.1(b)**	**Item Description:** Condition Precedent **Query:** The award of Concession is subject to the satisfaction or waiver of the conditions precedents provided in Article 3.1. Concessionaire is required to submit Financial Packages, Financial Model and Financial Documents for the Project demonstrating financial Close. Authority to kindly clarify the following in relation to the same: (i) We understand that the Concessionaire can finance the Project through equity and/or subordinated debt. In case the Project is financed initially through equity and/or subordinated debt, it is requested that the Concessionaire should be provided the flexibility to raise financing through Senior Lenders at a later stage. (ii) In case where the Project is solely funded by equity or subordinated debt and the financing from Senior Lenders is not availed by the Concessionaire, the Conditions Precedent relating to Financial Close should be waived off by the Authority. Further, in light of the above, the Termination Payment for Concessionaire Default should also include	(i) and (ii) DCA condition prevails.

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		Adjusted Equity under Article 17.1(b)(i).	
206.	**rticle 3.6**	**Item Description :** Condition Precedent **Query:** (i) We suggest that before the Authority exercises its discretion to terminate the DCA under Article 3.6 of the DCA, it should mutually discuss and agree for a reasonable extension for fulfilment of Article 3.2 to 3.5. (ii) Kindly clarify the time period within which the Bid Security/ Performance Guarantee will be returned to the Concessionaire, if the agreement is terminated on account of failure of the Authority to fulfil the CPs under Article 3.6 of the DCA.	1.DCA condition prevails. 2. Bid Security/ Performance Guarantee will be returned to the Concessionaire within 90 days
207.	**Article 4.2**	**Item Description :** Deemed Performance Security **Query:** We note that the expression 'Performance Security' has been used in Article 4.2, but the same is undefined in the DCA. We have assumed that the Performance Security will mean the first and exclusive charge of balance in the Escrow Account equivalent to the Performance Guarantee for INR 34,84,00,000/. Kindly confirm	The expression "Performance Security" as appearing in Article 4.2 is to be read as referring to the Performance Guarantee as defined in the DCA and detailed under Article 4.1 — i.e., the bank guarantee of Rs. 34.84 Crores furnished by the Concessionaire during the Construction Phase. Upon release of the said Performance Guarantee six months after COD (Phase II), the Deemed Performance Security is created by operation of Article 4.2.
208.	**Article 4.3**	**Item Description:** Appropriation of Deemed Performance Security **Query:** We note that the Authority shall be entitled to appropriate the	Concessionaire default is same as the term Concessionaire Event of Default.

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		relevant amount from the Deemed Performance Security as damages for "Concessionaire Default". However, the term "Concessionaire Default" is not defined in the DCA. Kindly clarify what is included in "Concessionaire Default" and/or whether it is the same as "Concessionaire Event of Default" under Article 15.1 (a).	
209.	**rticle 5.1 (f)**	**Item Description:** Interim Independent Engineer **Query:** We note that in case the Authority has not appointed an Independent Engineer, or the Independent Engineer so appointed has relinquished its functions or defaulted in discharge thereof, the Authority may, in the interim, designate and authorize any person for a maximum duration of 90 days to discharge the functions of the Independent Engineer. However, such interim Independent Engineer shall not have any right to exercise functions in respect of review, comment, approve or inspect under this Agreement. In light of the above: (i) Kindly clarify the consequences in case the Authority is unable to appoint an Independent Engineer within the 3-month period specified in Article 5.1(a), pursuant to termination of the appointment of Independent Engineer under Article 5.1(d). (ii) In case of delay in the Project due to the non-appointment or delay in appointment of the Independent Engineer by the Authority, kindly clarify that: (a) the Concession Period will be proportionately increased; and (b) the Concessionaire shall not be deemed to be in default of its obligations under the concession	For (i) & (ii), please refer clause no.6.2(e)of DCA.

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		agreement on account of a failure by the Authority to appoint an Independent Engineer or the Independent Engineer relinquishing its functions or defaulting in discharge thereof. In relation to Article 5.1(f), kindly clarify how the issues to be reviewed or approved by an Independent Engineer will be handled during the interim period of appointment of the Independent Engineer. Also, whether under such circumstances, the Concessionaire shall have the right to seek extension in the scheduled timelines.	
210.	**Article 6.2 (b) and Appendix-7**	**Item Description**: Review of the Designs and Drawings **Query:** Article 6.2(b) of the DCA provides that the Independent Engineer shall review the Designs and Drawings submitted by the Concessionaire and provide its comments/observations and suggestions including comments/observations and suggestions of the Authority on the same within 21 (twenty one) days from the date of the receipt of such Designs and Drawings. Clause 4.2 of Appendix 7 provides for such timeline as 7 (seven) days. Kindly remove the discrepancy on the timeline and provide the exact period for review of Designs and Drawings by the Independent Engineer and the Authority	As per Clause 6.2 (b) of DCA, the concessionaire has to submit Design & Drawing initially and Independent Engineer will give his comments and acceptance within 21 days of submission. Para 4.2 states that after compliance of comments of Independent Engineer Concessionaire will resubmit the modified drawing to Independent Engineer, and Independent Engineer will revert it within 7days.
211.	**rticle 6.4 (c)**	**Item Description**: Obligations of the Concessionaire **Query:** We request Authority that the period for notifying any	DCA condition prevails.

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		material modification or change in any of the Financing Documents and/or any Equity Documents by the Concessionaire and its submission thereto may be increased from 7 (seven) days to 14 (fourteen) days.	
212.	**rticle 6.5**	**Item Description**: Suspension of Works **Query:** Article 6.5 (d) of the DCA states that if suspension of Construction Works is for reasons not attributable to the Concessionaire, the Independent Engineer shall determine the extension of dates set forth in the Project Completion Schedule, to which the Concessionaire is reasonably entitled, and shall notify the Authority and the Concessionaire of the same. Kindly clarify, whether the Concessionaire will also be entitled for payment of costs incurred by the Concessionaire due to such suspension of Construction Works for reasons not attributable to the Concessionaire. We suggest that the Concessionaire should also have the right to ask for rebate on the Royalty payable by the Concessionaire under the DCA to cover for losses incurred due to suspension under Article 6.5 (d). Kindly confirm.	DCA condition prevails
213.	**rticle 6.6 (b)**	**Item Description**: Cost for Additional Testing **Query:** Article 6.7(b) of the DCA states "For the avoidance of doubt, it is expressly agreed that the Independent Engineer may require the Concessionaire to carry out or caused to be carried *out additional Tests, in accordance with Good Industry Practice, for determining the compliance of the Project with*	DCA condition prevails.

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		specifications and standards." Request the Authority to clarify that the cost of any unilateral additional testing instructed by the Independent Engineer and not provided in the Agreement will be borne by the Authority.	
214.	**rticle 6.6 (d)**	**Item Description**: Completion of Punch List Items **Query:** This Article states that the Concessionaire's failure to complete Punch List items within 90 (ninety) days and additional cure period as may be determined by the Authority, entitles the Authority to terminate the Concession Agreement. We note that the termination of Concession Agreement for incomplete Punch List items appears disproportionate to the nature of such defects. We request that the Authority consider providing additional cure periods or alternative remedies such as damages or completion by third parties at Concessionaire's cost before exercising termination rights for Punch List defaults	DCA condition prevails.
215.	**Article 6.6 (e)**	**Item Description:** Failure to complete construction due to Force Majeure, etc **Query:** Article 6.6 (e) of the DCA provides that if the Concessionaire fails to complete any Construction Works, on account of Force Majeure or for reasons solely attributable to the Authority, the Authority may, in its discretion, reduce the scope of the Project, as the case may be, and the Total Project Cost will be reduced to such	DCA condition prevails.

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		extent. Kindly clarify the rationale behind reduction of the Total Project Cost on Construction Works by the Authority under Article 6.6(e) because the reduction of scope of the Project is due to reasons not attributable to the Concessionaire. We suggest that in such case, the reduction of scope of the Project by the Authority should not be unilateral, and the process for Change of Scope as provided in Article 6.7 of the DCA should be applicable to situations contemplated under Article 6.6(e). Further, the Concessionaire should be entitled to proportionate relaxation in Minimum Guaranteed Cargo, in case the reduction of scope of the Project significantly reduces the cargo handling capacity of the Concessionaire. We also suggest that to the extent the reduction of scope of the Project is due to reasons solely attributable to the Authority, the Authority should be liable to repay such portion of the Debt Due to the Senior Lenders that pertains to the reduced Total Project Cost	
216.	**rticle 6.7 (a)**	**Item Description**: Pecuniary Limitation in Change of Scope **Query:** We suggest non-applicability of the pecuniary limitations on the cost of implementing the Change of Scope (both single and cumulative) as set out in Article 6.8 (a) to the change of scope proposed by the Concessionaire, particularly when the Authority has complete discretion in accepting or rejecting such suggestions.	DCA condition prevails.
217.	**rticle 6.7(g)**	**Item Description**: Power of the Authority to Undertake Works	DCA condition prevails.

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		Query: This Article states that the Authority can award Change of Scope works to third parties on the basis of open competitive bidding with Concessionaire having the right to match the first ranked bid only if its bid is within 10% of the winning bid, subject to payment of 2% of the bid amount to the Authority. We note that the requirement for 2% payment to the Authority when exercising matching rights appears unfair, may discourage competitive pricing and is penal in nature. We request that the Authority clarify the rationale for imposing a 2% penalty when the Concessionaire exercises its legitimate matching right. This penalty should be deleted. In any case, it will need to be clarified that the Concessionaire shall not be responsible or liable for the works done by such third party contractor or for any acts or omission of such third party contractor.	
218.	**Articles 6.7 (c), (d), (g) nd (h)**	**Item Description:** Change of Scope **Query:** We suggest that apart from the details of the adverse impact of such change on the Project, and the estimate of cost to be incurred, the Authority should also consider the estimated time of carrying out of the Change of Scope and upfront agree on such timelines and if required, consider an extension to the Concession Period. Kindly clarify the timelines for seeking intervention of the Independent Engineer under Article 6.7 (d), and for resolution of such differences between the Parties by the	DCA condition prevails.

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		Independent Engineer. The assets created pursuant to the Change of Scope (whether under the provisions of Article 6.7 (a) to (d) or Article 6.7 (g) (i.e. through competitive bidding)) should also form part of the concession. Kindly clarify that, pursuant to competitive bidding under Article 6.7(g) of the DCA, the Authority shall incorporate a provision in the agreement with the new contractor requiring the contractor to perform its scope of work in a manner such that it causes minimum disruption to the performance of work by the Concessionaire. Further, kindly clarify that the Authority will not undertake competitive bidding (pursuant to Article 6.7(g)) at the same time when the disagreement on the Change of Scope is being resolved by the Independent Engineer in accordance with the provisions of Article 6.7 (d). Kindly clarify the timeline for payment from Authority to the Concessionaire in case a Change in Scope (which is determined and proposed by the Concessionaire) is implemented by the Concessionaire in terms of Article 6.7(h). It is suggested that the period for notifying any adverse impact of a Change of Scope pursuant to the Change of Scope Notice may be increased from 30 (thirty) days to 60 (sixty) days, since relevant studies and estimations may be required to be conducted by the Concessionaire in order to determine the adverse impact prior to such notification to the Authority.	
219.	**Article 7.1(a)(vii)**	**Item Description:** Access for Inspection **Query:** The Article requires the Concessionaire to extend all co-	Expert means any person having a great deal of knowledge or skill in safety aspects, as decided by Authority. Regarding appointment of Expert, same will be dealt with at the time of requirement.

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		operation and information required by the "Experts" appointed by the Authority for conducting a safety audit and verifying that the Project/Project Facilities and Services are in strict compliance with the Safety Standards. We note that the term "*Expert*" is not defined in the DCA. Accordingly, the Authority is requested to provide the definition of the same and clarify the how such Expert shall be appointed.	
220.	**Article 7.1 (a) (ix)**	**Item Description:** Computer System and Network **Query:** We understand that Government of India ("*GoI*") is developing a Port Community System that will be implemented at all ports in India. Kindly confirm that Concessionaire is required to implement the same Port Community System of GoI and is not required to develop any new or individualised Port Community System for the Port. Further, request the Authority to clarify, if the Authority will provide IT support and personnel as may be required to enable the Concessionaire to carry out the aforesaid obligations.	The Concessionaire shall mandatorily adopt and comply with the Port Community System / NLP Marine / SagarSetu portal framework (GOI initiative) as implemented in accordance with Government of India initiatives such as MIV 2030, MAKV 2047, ONOP, PM Gatishakti and other applicable guidelines. The Concessionaire shall also be required to provide required data in the form and manner desired by the Authority for its EBS/ERP System.
221.	**rticle 7.1(a)(x)**	**Item Description:** Security Arrangements **Query:** We understand that since waterfront security involves national security, the responsibility for the same shall lie with the Authority. Kindly clarify.	The responsibility for the same shall lie with the Authority.
222.	**rticle 7.1(c)**	**Item Description:**	DCA condition prevails.

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		Obligations of the Concessioning Authority during Construction Phase and Operations Phase **Query:** Kindly clarify that all support, assistance and services to be provided by the Concessioning Authority to the Concessionaire under Article 7.1(c) and other provisions of the DCA will be provided at the sole cost and expense of the Concessioning Authority, and the Concessionaire shall not be liable for any costs incurred by the Authority in fulfilling such obligations.	.
223.	**rticle 7.1 (c)(i)(a)**	**Item Description:** Marine and Port Services **Query:** Article 7.1(c)(i)(a) of the DCA provides that the Authority shall provide marine and port services including "*scheduling the entry, berthing and sailing of the vessels, pilotage and towage on a non-discriminatory basis subject to priority berthing norms and the sailing schedule as determined by the Deputy Conservator of the Port depending on individual ship characteristics and tidal conditions*." We note that the term "*Deputy Conservator*" has been used in Article 7.1(c)(i)(a) but the same is not defined in the DCA. The Authority is requested to kindly clarify the following: (a) definition of the term "*Deputy Conservator*" and clarify the role, authority, and responsibilities of the Deputy Conservator of the Port under the DCA.	The Term Deputy Conservator of Port shall mean "General Manager (Marine) of Haldia Dock Complex".
224.	**Article 7.1(a) (vii)**	**Item Description:** Inspectio**n** **Query:** Kindly clarify in the DCA, that the Independent Engineer,	DCA condition prevails.

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		Authority's representatives inspecting the Project Site, Construction Works, and/or the Project Facilities and Services being undertaken at the Port shall strictly follow the safety standards and precautions applicable to the Project Site, failing which the Concessionaire shall not be responsible for any damage to life or property. eir is suggested Authority shall indemnify, defend, and hold harmless the Concessionaire from any losses, costs or damages arising due to any such non-compliance by the authorized representatives of the Authority. Further, it should be clarified that the representatives of the Authority and the Independent Engineer shall have the right to access the Site during normal business hours and after the Authority providing prior written notice of at least 48 (forty-eight) hours to the Concessionaire in this regard.	
225.	**rticle 7.1 (a)i.j)**	**Item Description:** Obligation of the Concessionaire in relation to berth and terminal operations. **Query:** Kindly clarify that the Concessionaire will not be liable for any other obligations apart from those in relation to the Project under the Major Port Authorities Act, 2021 cast on the Authority. To the extent the Authority is in breach/non-compliance with such obligations, it will defend, indemnify and hold the Concessionaire harmless against any losses, damages or liabilities incurred by the Concessionaire due to such breach/ non-compliance.	DCA condition prevails.

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226.	**rticle 7.1 (a) (ii), (iii) and (iv)**	**Item Description:** Repairs, Replacement or Restoration **Query:** We suggest that the Concessionaire be obligated only for such loss/ damage/ destruction which is directly attributable to the Concessionaire and not due to acts or omissions of the Authority or any third person.	Concessionaire has no obligation for loss/damage/destruction which is directly attributable to the Concessioning Authority.
227.	**rticle 7.1 (b) (ii)**	**Item Description:** Preferential and Priority Berthing **Query:** Article 7.1 (b) (ii) of the DCA provides that preferential berthing may be done in accordance with preferential berthing norms agreed between the Concessionaire and the Authority. Kindly clarify that if the Concessionaire will be entitled to a rebate/relaxation in the Minimum Guaranteed Cargo during the period of preferential berthing.	DCA condition prevails. No rebate/ relaxation on MGT shall be admissible.
228.	**rticle 7.1 (c)(i)(a)**	**Item Description:** Marine and Port Services **Query:** Article 7.1 (c)(i)(a) of the DCA states that the Authority will undertake scheduling of entry, berthing and sailing of vessels, pilotage, towage and other marine related services on which the contractor will have no say. It should be clarified in the DCA that the Concessionaire will not be liable for any delay or shortfall in container handling due to any delay or default by the Authority in performing its obligations of scheduling of entry, berthing of vessels, and other services specified above	DCA condition prevails.

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229.	**lause 7.1(c)(iii)**	**Item Description:** Additional Land, Utilities and facilities **Query:** This Article states that if land/utilities/facilities are insufficient, Concessionaire may approach Authority for additional resources. Authority shall consider providing additional resources if necessary, but if unable to provide, Concessionaire gets no relaxation from Scope of Project obligations. We note that this provision creates a potential mismatch between project scope and available resources without providing adequate relief to the Concessionaire. We request that the Authority provide assurance that if Authority-provided resources prove insufficient for completing the Scope of Project, appropriate relief including timeline extensions and scope modifications will be granted to the Concessionaire	DCA condition prevails.
230.	**Article 7.1 (d)(iii)**	**Item Description:** Authority's right to take remedial measures **Query:** This Article states that Authority can undertake remedial measures at Concessionaire's cost and recover directly from Escrow Account. We note that direct recovery mechanism bypasses normal dispute resolution procedures. We request that the Authority consider requiring dispute resolution before exercising direct recovery rights from the Escrow Account	DCA condition prevails.
231.	**rticle 7.2**	**Item Description:**	

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		Utilities and Services **uery:** s per Article 7.2(a) of the DCA, the power made available shall be as received by the Concessioning Authority from West Bengal State Electricity Distribution Company Ltd. from the general cargo berth substation at 33kV Level. The Concessionaire shall be required to furnish appropriate Security Deposit to Concessioning Authority and sign the agreement, with electricity charges determined on the basis of applicable rate of West Bengal State Electricity Distribution Company Limited (WBSEDCL) as specified in Appendix-12. uthority is requested to kindly clarify the following: (a) the approximate amount of Security Deposit required to be furnished by the Concessionaire for electricity connection; (b) whether such Security Deposit is accounted for in the Total Project Cost; and (c) whether any charges or costs incurred by the Concessionaire in arranging such Security Deposit shall be reimbursed or borne by the Authority.	a) Refer Appendix-12, Para -4 b) Security Deposit, being refundable amount, is not separately accounted for in the Total Project Cost. c) The charges or costs incurred by the Concessionaire in arranging such Security Deposit shall not be reimbursed or borne by the Authority.
232.	**rticle 7.2**	**Item Description:** Utilities and Services **Query:**	DCA condition prevails.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		We note that the Concessionaire is required to arrange and install electrical sub-station and apply to local electricity service provider for meter connection. Additionally, the water shall be made available by the Authority to the Concessionaire. As per Article 7.2 (b), the Concessionaire will have to utilize the power from the general cargo berth substation at 33kV Level. Further, as per Article 7.2 (c), the Authority does not warranty the reliability, quality and quantity of water and power and will not be liable in any manner for the shortage in or non- supply of these utilities. Authority to kindly clarify that, in case, due to the shortage in or non-supply of these utilities, the Performance Standards, Constructions Works, over all operation of Concessionaire including the payment obligations of the Concessionaire thereto are affected, the Concessionaire shall not be made liable for the same under the DCA and necessary relaxations may be provided to the Concessionaire in such a situation until supply of such utilities regain its normalcy.	
233.	**rticle 7.3**	**Item Description:** Liability for shortfall in performance **Query:** We note that Article 7.3 sub-clause (a) outlines the mechanism for calculating liquidated damages payable by the Concessionaire in the event of non-compliance with or failure to meet the Performance Standards, as detailed in Appendix-14.	DCA condition prevails.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		owever, the DCA does not contain any corresponding provision requiring the Concessioning Authority to pay liquidated damages to the Concessionaire in the event that the Authority fails to comply with or falls short of any Performance Standards applicable to it under the DCA. APSEZ Team to kindly note that that while Appendix-18 is referenced in the definition of "*Performance Standards*" under Article 1.1 of the DCA as setting out minimum standards of performance for the Concessioning Authority, Appendix-18 merely states "*Not Applicable*" and does not specify any Performance Standards for the Authority or any mechanism for calculating liquidated damages payable by the Authority for shortfall in performance. Authority is requested to kindly clarify whether the Concessioning Authority will be subject to any Performance Standards under the DCA and the corresponding mechanism for calculating liquidated damages payable by the Authority to the Concessionaire in the event of non-compliance with or failure to meet such Performance Standards.	
234.	**rticle 8**	**Item Description:** Tariff **Query:** We understand that the Central Government has issued the "*Tariff Guidelines, 2021 for the Future PPP Concessionaires*" ("**Tariff Guidelines**"), wherein a discount on Royalty has been provided in case of transhipment containers (foreign/coastal) and coastal containers under Clause 3.4 of the Tariff Guidelines.	Refer DCA article 9.2

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		Accordingly, the Royalty on transhipment containers (foreign/coastal) and coastal containers would be computed in line with said Tariff Guidelines. Authority to confirm the understanding and the applicability of the Tariff Guidelines.	
235.	**rticle 9.2 (a)**	**Item Description:** Payments of Royalty **Query:** We suggest that the provision of monthly payment of the Royalty by the Concessionaire be amended to quarterly payment of the Royalty to the Authority. This will optimise the requirement of working capital for the Concessionaire	DCA condition prevails
236.	**ticle 9**	**Item Description:** Payments to the Concessioning Authority **Query:** Please confirm that apart from the charges and fees as mentioned under Article 9 of the DCA, no other charges and fees shall be payable by the Concessionaire to the Authority.	The charges, as specified in Article 7 & 8 , would also be payable to the Concessioning Authority including any other charges as specified in the DCA.
237.	**rticle 9.2 (c)**	**Item Description:** Payment of Royalty **Query:** We understand that the Royalty per TEU /per MT/ CBM is to be indexed as per the variation in the Wholesale Price Index (WPI) annually. In the current competitive environment, the indexation structure proposed by the Authority will adversely impact the operating margins in future years. To ensure the level playing with the existing concessions/competition at the port, we request the Authority to index the Royalty at 60% (sixty percent)	DCA condition prevails

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		of the WPI annually	
238.	**rticle 9.2**	**Item Description:** Payment of Royalty **Query:** Authority to confirm whether the Concessionaire is required to pay the Royalty along with applicable GST.	Concessionaire is required to pay the Royalty with applicable GST.
239.	**rticle 9.4**	**Item Description:** Certified Accounts **Query:** Article 9.4 of the DCA requires the Concessionaire to submit to the Authority a financial statement including quantity of different types of cargo /category wise containers (TEU) handled for every 6 (six) monthly period. It is requested that the concessionaire may be allowed to submit such financial statement to the Authority annually instead of 'every 6 (six) monthly period'	DCA condition prevails. Further, necessary reports for determination of performance standard as prescribed in Article 14 shall also be furnished by the Concessionaire on quarterly basis.
240.	**rticle 9.4**	**Item Description:** Special Audit by Additional Auditor **Query:** Kindly clarify the following: (i) in case of failure of the Additional Auditor and Statutory Auditor to resolve any differences, such difference shall be resolved by the Parties in accordance with the dispute settlement mechanism provided under Article 19 of the DCA; (ii) in the meantime, the Concessionaire may elect to pay the Royalty (under protest) based on the quantity of different types of cargo/ category wise containers (TEU) handled computed by the Additional Auditor, and in case of favourable order for the Concessionaire, the amount of	DCA condition prevails.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		royalty paid (under protest) by the Concessionaire should be adjusted in subsequent payments of Royalty due and payable by the Concessionaire; and the Concessionaire shall not be liable to reimburse to the Authority any costs, charges or expenses in relation to the Special Audit in case there are no discrepancies found in the financial statements of the Concessionaire by the Additional Auditor, and the Authority will bear all the cost incurred for conducting the Special Audit in such case.	
241.	**rticle 9.5.4**	**Item Description:** Withdrawal during Concession Period **Query:** This Article provides for payment waterfall mechanism which places Authority payments (including Royalty Payment) ahead of debt service. We note that this payment priority may conflict with standard lender requirements and create financing difficulties. We request that the Authority consider revising the waterfall to prioritise debt service payments, as this is typically required by lenders and essential for project financing viability.	DCA condition prevails.
242.	**rticle 10.2**	**Item Description:** Permitted assignment and charges **Query:** We note that Article 10.2 of the DCA provides certain exceptions to the Concessionaire to assign or create encumbrances (excluding Project Assets) under the DCA. We request that the Article also allow the Concessionaire to create encumbrances over the Project Assets in favour of the Senior Lenders, to	DCA condition prevails.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		secure financing under the Financing Agreements.	
243.	**rticle 10.2(b)**	**Item Description:** Permitted assignment and charges **Query:** In light of Article 10.2(b), kindly clarify that the Concessionaire will be permitted to assign/ charge its rights under the Project Contracts in favour of the lenders. We note that under Article 10.2(b), Project Assets have been carved out/ excluded from assets which the Concessionaire is permitted to assign/ charge. However, the definition of the expression 'Project Assets' includes "*all rights of the Concessionaire under the Project Contracts*".	DCA condition prevails. Further, Clause- 10.2 (c) of DCA may be referred.
244.	**rticle 11.2**	**Item Description:** Shareholding **Query:** Article 11.2 of the DCA does not specify a definitive timeline within which the Authority is required to provide its approval to a Change in Ownership or Change in Management Control request of the Concessionaire. We suggest that a timeline be specified and approval for such matters shall not be unreasonably withheld by the Authority.	Change in Ownership or Change in Management require Security Clearance from appropriate Ministry, Govt. of India. Hence, timeline cannot be specified by Authority for Change in Ownership.
245.	**rticle 12.1 b) and 17.3**	**Item Description:** Taxes and Duties Transfer Fee and Charges **Query:** To enhance viability and attractiveness of the project, Authority is requested to provide exemption or waiver	DCA condition prevails

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		of stamp-duty and registration charges on signing of Concession Agreement as well as Project Agreements.	
246.	**Article 12.1 (c) (i)**	**Item Description:** Insurance **Query:** We note that the list of insurances required to be obtained by the Concessionaire is indicative and non-exhaustive. Further, the scope and ambit of Applicable Laws and Good Industry Practice is too wide to ascertain an exhaustive list of insurance covers. Please provide an exhaustive list of insurance covers required to be obtained by the Concessionaire under the DCA.	1) loss, damage or destruction of the Project Facilities and Services, at replacement value; 2) Insurance during Transportation 3) Builders all risk insurance 4) Professional Indemnity 5) Comprehensive Third Party Liability Insurance including injury or death to personnel of the CA and others who may enter the project site or the ports asset. 6) Workmen Compensation Insurance 7) Employer Liability 8) Insurance from Lenders point of view perspective 9) Environmental/Pollution Liability Insurance 10) Marine cum storage cum erection insurance 11) any other insurance that may be necessary to protect the Concessionaire, its employees and its assets and the Concessioning Authority, its employees and agents engaged in or connected to the Project and the Project Site and Port Assets (against loss, damage or destruction at replacement value) including all Force Majeure Events that are insurable and not otherwise covered in items (1) to (10).
247.	**Article 12.1(d)(ii)**	**Item Description**: General Indemnity	DCA condition prevails.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		Query: We request that Article 12.1(d)(ii) be modified to include the directors, shareholders, and employees of the Concessionaire also as an indemnified party. Additionally, we request deletion of the term 'servants or agents' from Article 12.1(d)(i) of the DCA.	
248.	**rticle 12.2 and Appendix 8**	**Item Description**: Applicable Permits **uery:** accordance with Articles 7.1(a)i.i) and 12.2 of the DCA, the Concessionaire is responsible to obtain and maintain the Applicable Permits. However, as per Article 12.2, the Concessioning Authority shall "*issue recommendatory letters and make best efforts to assist the Concessionaire in obtaining all the Applicable Permits including renewals thereof*." In this regard, request the Authority to clarify the following: (i) the Party responsible to bear the costs for such Applicable Permits, including for the Environmental Clearance and CRZ Clearance which are to be obtained by the Concessioning Authority as per Appendix 8; (ii) the extent of support that the Concessioning Authority shall provide for obtaining such Applicable Permits; if an extension shall be granted to the Concessionaire from the 180 days timeline provided to the Concessionaire as per Article 3.2 of the DCA.	i) Concessioning Authority will obtain Environmental Clearance and CRZ Clearance and consent to establish at its own cost. Rest all clearance are to be obtained by the Concessionaire at its own cost. ii)DCA condition prevails.
249.	**Article 12.3(c) (iii)**	**Item Description:** Confidentiality	

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		Query: Kindly clarify that confidentiality obligations should not be applicable to information which was (a) available in public domain prior to the disclosure by a Party to another; or (b) already in the knowledge of the receiving party; or (c) obtained from a third party who had no binder of secrecy in relation to such information; or (d) independently developed by a Party. The said Article entitles a Party to disclose such confidential i nformation to its legal advisors or auditors on a need-to-know basis. We suggest that such disclosure should be allowed subject to such persons agreeing to be bound by the same confidentiality obligations applicable to the Parties under the DCA.	DCA condition prevails. However, the Auditor or Legal Advisor appointed by Concessioning Authority shall be bound by similar confidentiality obligations.
250.	**Article 13.1.1**	**Item Description:** Change in Law **Query:** The term 'Bid Date' has not been defined. Authority to define the same and clarify whether it means the Bid Due Date as defined under the RFP.	"Bid Date" is same as "Bid Due Date".
251.	**Article 13.1.2**	**Item Description:** The Remedy **Query:** The term '*EBITDA*' has not been defined. Authority to provide a clear definition of "*EBITDA*" as used in Article 13 and elsewhere in the Agreement, including specific guidance on what items should be included or excluded in its calculation, and which accounting standards should be applied for the purposes of this Concession Agreement	EBITDA (Earnings Before Interest, Taxes, Depreciation, and Amortization) = Net Income + Interest + Tax + Depreciation + Amortization For the purpose of the Concession Agreement, the relevant provisions of IND AS would be applicable. The definition of Indian Accounting Standard may be referred.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
252.	**Article 13.1.2**	**Item Description**: The Remedy **Query:** As per Article 13.1.2, we understand that, if as a result of Change in Law, the Concessionaire suffers decrease in cargo traffic and reduction in revenue or an increase in costs or reduction in EBITDA or other financial burden, the aggregate financial effect of which results in either (a) reduction by more than 25% (twenty five percent) of EBITDA in the affected financial year as compared to the average EBITDA of the previous three financial years or from COD Phase I till occurrence of Change in Law in case the Project is operational for less than three years from COD and this is enduring in nature due to the effect of Change in Law or (b) an increase in the capital expenditure by more than 20% (twenty percent), of the estimations before the occurrence of such Change in Law. With regard to Article 13.1.2 (i) (a) of the DCA, it is suggested that the Authority should modify the threshold limit of EBITDA from 25% (twenty five percent) to 10% (ten percent) in the said Clause. Further with regard to Article 13.1.2 (i) (b) of the DCA, it is suggested that the Authority should modify the threshold limit of the capital expenditure from 20% (twenty percent) to 10% (ten percent) in the said Article.	DCA condition prevails.
253.	**Article 14.9.2**	**Item Description:** Extension of time/ period **Query:** We note that, under Article 14.9.2 of the DCA, in case of	DCA condition prevails.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		occurrence of a Force Majeure Event after the Date of Award of the Concession or prior to achievement of COD Phase I, the Concessionaire is eligible for an extension in the completion schedule, which is equal in length to the duration of the Force Majeure Event. In our view, an 'equitable' extension of timelines be sought from the Authority after appropriately evaluating the Force Majeure Event and its impact on the schedule of the Project (and not just 'equal' extension, i.e. on a day to day basis).	
254.	**Article 14.10 and Article 16.5**	**Item Description:** Release of Performance Guarantee **Query:** The DCA does not provide for release of the Performance Guarantee on early termination of the DCA due to Authority's event of default or due to Force Majeure event during the period wherein the Performance Guarantee is valid and subsisting. Kindly clarify the period for release of the Performance Guarantee by the Authority upon early termination of the DCA.	Upon early termination of DCA due to Authority Event of Default or due to Force Majeure event, the Performance Guarantee shall be released within 90 days after adjustment/recovery of any outstanding dues from Concessionaire.
255.	**Article 15.1) and 15.1(b)**	**Item Description:** Extensive Default Events **Query:** This Article provides for numerous Concessionaire default events with varying cure periods compared to limited Authority default events. We note that the imbalanced approach to default events creates asymmetric risk allocation between the parties. We request that the Authority consider providing similar default events for the Authority or reducing the scope of Concessionaire default events to create a more	DCA condition prevails.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		balanced risk allocation framework.	
256.	**Article 15.1 (a) (xiv)**	**Item Description:** The Concessionaire Event of Default **Query:** We note that as per Article 15.1 (a) (xiv) of the DCA, in the event that "*the Concessionaire abandons or expresses its intention to revoke/terminate this Agreement without being entitled to do so as is expressly provided in the Agreement;*", it constitutes as an event of default of Concessionaire. We suggest deletion of the underlined language	DCA condition prevails.
257.	**rticles 15.3 nd 15.4**	**Item Description:** Consultation Notice on occurrence of Event of Default **Query:** As per Article 15.3 of the DCA, in case of occurrence of an Event of Default, the non- defaulting party is required to issue a notice to the other party proposing consultation amongst the Parties and the Senior Lenders for exploring possible measures of curing such default. As per Article 15.4, the consultation process is required to be carried on for a period not exceeding 90 days. However, in case of Concessionaire Event of Default, the Authority shall in consultation with the Senior Lenders endeavour to arrive at an agreement on appropriate measures to cure the defect, including, change in management or control/ownership of the Concessionaire or replacement of the Concessionaire by a new operator. rticle 15.4 does not allow any cure period to the Concessionaire for remedying the default and directly provides for a consultation process among the Parties and	DCA condition prevails.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		the Senior Lenders which may even lead to change in management/control/ ownership/substitution of the Concessionaire. Given the substantial investment by the Concessionaire in the Project, such a provision is not desirable. We suggest that prior to the initiation of the Remedial Period and consultation with the Senior Lenders pursuant to the provisions of Article 15.4, the Concessionaire should be allowed a period of at least 60 (sixty) days to cure the default. Ideally, in this case, the Remedial Period should commence only if the Concessionaire fails to remedy the default within such agreed cure period.	
258.	**rticles 15.8 (c)**	**Item Description:** Authority's right to step in due to Concessionaire Event of Default **Query:** Article 12.1(e)(iii) provides that the Concessionaire is required to procure that the Project Contracts provide the Authority with the right to step into such contract, in its sole discretion, in substitution of the Concessionaire, in the event of termination or suspension of the concession agreement. Article 15.8(c) provides for the right of the Authority to, at its discretion, step in and succeed upon election to the interests of the Concessionaire under such of the Project Contracts as the Authority may deem appropriate, in case of issuance of a Termination Notice due to a Concessionaire Event of Default. Further, Article 15.4(b) provides that the Authority, in consultation with the Senior Lenders, may exercise the right to substitute the	DCA condition prevails.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		Concessionaire in the case of a Concessionaire Event of Default under the DCA. We suggest that the right of the Authority to step into Project Contracts to substitute the Concessionaire in the event of termination due to a Concessionaire Event of Default under Article 15.8(c) of the DCA should be subject to the right of the lender to substitute the Concessionaire in accordance with Article 15.1 (a) (xi) of the DCA.	
259.	**rticle 16.3 (b)**	**Item Description:** Requisition **Query:** We note that under Article 16.3 of the DCA, the Data or records is to be specified by Concessioning Authority, regarding the operation and maintenance of the Project Facilities and Services. Authority to kindly provide the data and records as required.	The data requirement cannot be pre-determined and all data records regarding O & M of Project Facilities, which is considered relevant by the Concession Authority, shall have to be provided.
260.	**rticle 16.4 (b)**	**Item Description:** Condition Survey **uery:** 'e note that, based on the condition survey, if the Authority determines that the Project Site, the Port's Assets, the Project Facilities and Services, or any part thereof has not been operated and maintained in accordance with the standards and requirements set forth in this Agreement (excluding normal wear and tear), the Concessionaire shall, at its own cost and expense, undertake all necessary measures to restore the same to good working condition	The Concessionaire shall not be held liable for any damage, deterioration or deficiency in the Project site, port assets or project facilities and service occurring after handover of assets by the Concessionaire as per provision of Concession Agreement.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		prior to the Transfer Date. It should be clarified that the Concessionaire shall not be held liable for any damage, deterioration, or deficiency in the Project Site, Port's Assets, or Project Facilities and Services that is attributable to actions, omissions, or negligence of the Authority or any third party.	
261.	**rticles 16.5**	**Item Description:** Consequences of Termination and Termination Payment **Query:** Under Article 16.5(b), the Authority is entitled to encash any subsisting bank guarantee(s) provided by the Concessionaire against any amounts owed to the Authority by the Concessionaire in the event of termination of the Agreement. The DCA does not provide for return/refund of guarantees by the Authority, in case the amount of such bank guarantee(s) is in excess of the amounts owed by the Concessionaire to the Authority on the date of such termination of the agreement. We suggest that in case such amounts are set-off against the Termination Payment payable by the Authority under Article 17.1 (b), then the Authority shall return/refund the entire bank guarantees submitted by the Concessionaire.	Not Agreed to. DCA condition prevails.
262.	**ticle 17.1**	**Item Description:** Termination Payment in case of Termination prior to Date of Award **Query:** In order to achieve the Date of Award of Concession, the Concessionaire shall incur significant expenses towards Bid Security / Performance Guarantee, studies and other project related administrative expense.	Not Agreed to. DCA condition prevails.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		Accordingly, it is requested that in case the Concession Agreement is terminated due to occurrence of Force Majeure prior to Date of Award of Concession/ Appointed Date, the Concessionaire should be reimbursed for the cost incurred thereto by the Concessionaire. Similarly, in case of Concessionaire Event of Default prior to Date of Award of Concession, Termination Payment should be payable to the Concessionaire by the Authority to the extent of expenses incurred by the Concessionaire for mobilisation of manpower and equipment, etc.	
263.	**rticle 17.2**	**Item Description:** No Compensation on Expiry of Concession Period **Query:** It is understood that upon Termination or expiry of the Concession Period by efflux of time, the Concessionaire is required to hand over/ transfer the Site and the Project Assets, free of cost and Encumbrance, to the Authority. The Authority is requested to include provision for Termination Payment Concessionaire upon Termination by efflux of time. Accordingly, the Authority is requested to include Additional Termination Payment for compensations to concessionaire for any additional specified assets, in the event of expiry of concession by efflux of time. This would enhance bankability for any additional investments related to Specified Assets.	Not Agreed to. DCA condition prevails.
264.	**rticle 17.8**	Item Description: Additional Termination Payment Query:	DCA condition prevails.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		We note that the term "Additional Termination Payment" has been limited to the lowest of following three factors: (i) Adjusted Depreciated Value thereof; (ii) the replacement value thereof, as assessed by an Approved Valuer, who shall be selected and appointed by the Concessioning Authority, within 15 (fifteen) days of termination, for submitting his assessment within 30 (thirty) days of his appointment hereunder; and (iii) 40% of Total Project Cost. We suggest that the said Additional Termination Payment should be limited to the highest of three factors stated above.	
265.	**rticle 18.2**	**Item Description:** Obligations of the Concessionaire in relation to Transfer of the Project **Query:** i)Article 18.2(b) provides that the Concessionaire shall transfer all its rights, titles and interests in the assets comprised in the Project Facilities and Services in favour of the Authority on the Transfer Date, and execute such deeds and documents as may be required for such transfer. In the event the concession agreement is terminated by the Concessionaire due to Concessioning Authority Event of Default, the cost and liability, if any, for such transfer and execution of documents therefor will be borne in entirety by the Authority. Kindly	i)Please refer Clause 17.3 of DCA. ii)DCA condition prevails. iii)DCA condition prevails.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		confirm. Article 18.2 (d) provides that on the Transfer Date, the Concessionaire shall transfer all the technology and up-to-date know-how relating to the operation and maintenance of the Port's Assets and/or Project Facilities and Services. this context, we suggest that any intellectual property right created and subsisting in the technology, know-how and documents prepared by the Concessionaire in relation to the Project should be jointly owned by the Concessionaire and the Authority and each of the Parties should have the right of unrestricted use of such intellectual property. iii)Article 18.2 (e) provides for transfer/ assignment of the Project Contracts by Concessionaire (at its cost) in favour of the Authority on the Transfer Date. It is recommended that in the event the concession agreement is terminated by the Concessionaire due to a Concessioning Authority Event of Default, the cost and liability, if any, associated with such transfer/assignment should be borne in entirety by the Authority.	
266.	**Article 18.5**	**Item Description:** Vesting Certificate **Query:** Article 18.5 of the DCA states that Authority shall issue a Vesting Certificate in the form set out in Appendix-23 to evidence divestment by Concessionaire of all its rights, title and interest in the Project and their vesting in the Authority.	DCA condition prevails.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		Clause 3 of the Vesting Certificate as provided in Appendix-23 implies that Concessionaire remains liable for rectifying and remedying any defects or deficiencies even after the issuance of the Vesting Certificate. We suggest limiting such obligation for a specified period. Kindly clarify.	
267.	**rticles 19**	**Item Description**: Dispute Resolution **Query:** **(i)** Kindly clarify the timelines within which the dispute is required to be resolved during each of the dispute resolution processes specified in Article 19.1 (*Amicable Settlement*), Article 19.2 (*Conciliation*), Article 19.3 (*Arbitration*) and Article 19.5 (*Adjudication by Adjudicatory Board*). **(ii)** We also suggest that the jurisdiction of High court of Kolkata having territorial jurisdiction over the Project to decide any dispute arising out of the Concession Agreement, as specified in Articles 21.12, should be subject to the dispute resolution mechanism specified in Article 19.	(i) Dispute resolution depends on the nature of dispute and no specific timelines can be given for resolution at this juncture. (ii) DCA condition prevails.
268.	**Article 21.2.1 (a)**	**Item Description:** Audited Accounts **Query:** Authority is requested to increase the time limit from 90 (ninety) days to 120 (one hundred and twenty) days after the close of the Accounting Year, for providing 2 copies of Concessionaire's Balance Sheet, Cash Flow Statement and Profit and Loss Account, along with a report thereon by its Statutory Auditors	Please see **Corrigendum-VI**

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
269.	**Article 21.3.1**	**Item Description:** Compensation for default by the Concessionaire **Query:** We request that the Concessionaire be liable to pay to the Authority the costs, by way of compensation under Article 21.3.1 of the DCA, "*any time after the Date of Award of Concession*" and not prior to it, similar to the Authority's obligation specified in Article 21.3.2 of the DCA.	Not Agreed to. DCA condition prevails.
270.	**ticle 21.3.2**	**Item Description:** Compensation for default by the Authority **Query:** This Article provides for extensive exclusions including loss of revenues from Tariff or debt repayment obligations or other consequential losses, when there is a material breach by the Authority. The broad exclusions significantly limit the Concessionaire's recovery rights. We request that the Authority reconsider these extensive exclusions, particularly the exclusion of debt repayment obligations and direct losses, as they may render the Project unfinanceable	Not Agreed to. DCA condition prevails.
271.	**ppendix 3**	**Item Description:** Financial Default under the Draft Substitution Agreement **Query:** We suggest that the definition of Financial Default should provide for a cure period that the Concessionaire may be entitled to under the Financing Documents for remedying such default in a way that Financial Default under the Substitution Agreement occurs only if the Lenders finally determine that the	DCA condition prevails. Refer article 3.2.1 of Substitution Agreement.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		default is such that requires the substitution of the Concessionaire.	
272.	**ppendix-7**	**Item Description**: Development Period and Construction Period **Query:** We note that the expression "Development Period" used in Appendix-7 referring to the Terms of Reference for the Independent Engineer in the DCA is not defined in the DCA. Kindly clarify the meaning in reference to "Development Period" in Appendix-7 of the DCA. Additionally, we note that the term "Construction Period" is also used in Appendix-7 (specifically in Paragraph 5 titled "Construction Period") but is not defined in Article 1.1 (Definitions) of the DCA. Authority to kindly clarify the same.	Development Period & Construction Period together constitutes the Construction Phase of the Project.
273.	**ppendix-7**	**Item Description**: Terms of Reference for Independent Engineer **Query:** The expression 'Project Milestones' used in paragraph 5.9 of Appendix 7 to the DCA is not defined. Kindly clarify if it refers to 'Milestone Dates' defined in Article 1.1 of the DCA.	Project Milestone is as per Appendix -5 Project Schedule
274.	**Appendix 9**	**Item Description**: Performance Guarantee **Query:** Paragraph 4 of Appendix 9 to the DCA provides that the Performance Guarantee shall remain in full force and effect until the Scheduled Project Completion Date and for a period of 12 months thereafter, unless discharged/released earlier by the Authority in accordance with the provisions of the concession	If the Bank Guarantee is submitted with a validity up to 12 months after Scheduled Project Completion Date, then there may not be any requirement of periodic renewal of Bank Guarantee. However, if the Concessionaire submit the Bank Guarantee with validity of one year, then the he would be required to renew the performance

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		agreement. Article 4.1 of the DCA provides that the Performance Guarantee shall need to be valid for an initial period of 1 year and be renewed 30 days prior to expiry of each year for an additional term of 1 year. Further, it states that the Performance Guarantee shall need to be valid until the expiry of 6 months from the COD Phase II. Article 4.1 and the format of the Performance Guarantee set out in Appendix 9 to the DCA are not in alignment. We suggest that Appendix 9 to be amended accordingly	bank guarantee, before 30 days' expiry of one year, till 12 months' post Schedule Project Completion date. Please see **Corrigendum-VI**
275.	**ppendix-14 to DCA**	**Item Description**: Liquidated Damages **Query:** Appendix 14 to the DCA does not provide for a maximum liability for cap on liquidated damages specified for shortfall in Performance Standards. Kindly provide a cap for LDs for shortfall in Performance Standards.	There is no cap on liability for liquidated damage for shortfall in Performance Standard.
276.	**eneral Remark**	**Item Description**: Extension of Timelines **Query:** Completion of the Scope of Work by the Concessionaire will need to be subject to any delay caused due to Force Majeure, acts or omission of Authority, change order, Change in Law, suspension or any other events for which extension of timelines is provided under the DCA. This should be universally clarified under the DCA.	DCA contains adequate provisions for extension of time under such circumstances.
277.	**eneral Remark**	**Item Description**: Charges/ Mortgage over the Project Site **Query:** Currently, we understand that based on Policy Guidelines	For the purpose of the project, land will be provided under license.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		for Land Management for Major Ports 2014, only licenses are permitted within the custom bonded areas for PPP projects. We understand that the proposed land policy, to be issued by the Ministry of Shipping, permits the Major Ports to enter into leases for PPP projects within the custom bonded areas. Kindly confirm whether the land required for this Project will be then given under lease. Additionally, kindly confirm whether the Concessionaire will be permitted to create charge/mortgage over the Project Site. Lease and mortgage will help in the bankability of this Project.	The Concessionaire is not permitted to create charge/ mortgage over the project site.
278.	**General remark**	**Item Description**: Requirement of information **Query:** Authority is requested to provide the relevant information of any underground pipelines / electrical cables / etc. in the project premises / boundary limits as the same will impact project implementation. Further, as matter of general practice, the cost of shifting of any such obstructing utilities including electric lines, water pipes and telephone cables, to an appropriate location or alignment within or outside the site is always borne by the Authority.	Refer reply to Sl. No. 102 above.
279.	**General remark**	**Item Description**: Indirect or consequential losses **Query:** A clause needs to be added that neither party will be liable for any indirect, special, remote or consequential losses under the DCA.	The liabilities of each party against any losses shall be as specified in DCA.
280.	**General remark**	**Item Description**: Limitation of Liability **Query:**	DCA condition prevails.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
		The DCA does not provide for any provision in relation to limitation of liability of the Parties. **Kindly clarify that the liability of the Parties is limited upto the Total Project Cost.**	
281.	**General Remark**	**Item Description**: Definitions **Query:** We note that certain undefined terms have been used in the DCA out of which some are utilized in provisions which are critical in nature. To avoid misinterpretation of such terms and facilitate the Parties to have the same understanding in respect of such terms, kindly clarify the meaning/definition of the following terms: (a) Accounting Year (Article 21.2.1 of the DCA); (b) Fee Tariff (Article 14.4 of the DCA); (c) Stressed project (Article 7.1 (c) (iv) of the DCA); (d) Shareholders (definition of "Equity" under Article 1.1 of the DCA); (e) Right of Way (definition of "Project Assets" under Article 1.1 and 7.2 of the DCA); (f) Government Instrumentality (definition of "Taxes" and Article 12.1 (d) of the DCA); (g) Concessioning Authority Default (definition of "Debt Due" under Article 1.1 of the DCA); and (h) Minimum Guaranteed Traffic (Article 13.2.2 (v) (c) of the DCA).	a) Accounting Year means Financial year as per Companies Act 2013 i.e from 1st April of a year to 31st March of the next year. b) Please see **Corrigendum-VI** c) Stressed Project shall have the same meaning as prescribed in the Government Guideline vide PD-13/1/2018-PPP cell/e-330932 dt 10 May,2022 amended from time to time. And attached **Annexure-IX** d) Shareholders is a commonly used term which doesn't require specific definition. e) Right of Way is the permission given by Authority for laying pipeline, roads and other utilities for temporary possession without allotment of land to the Party.

Sl. No.	Clause/Article No. /Page No./ Query Ref.	Pre-Bid Query	Response of HDC, SMPA
			f) Government Instrumentality means government authority having jurisdiction. g) Concessioning Authority Default is same as Concessioning Authority Event of Default as defined in Article 15. h) Minimum Guaranteed Traffic will have the same meaning as 'Minimum Guaranteed Cargo' defined in DCA.

Annexure-I

Government of India
Ministry of Surface Transport
(Ports Wing)

No.:PR-24021/28/98-PG

dated the 19/28.08.1998.

The Chairman, Calcutta Port Trust, 15, Strand Road, Calcutta
All Major Port Trusts.

Subject: Life norms of the plant and machinery and norms for availability and utilisation of Cargo Handling Equipment - Reg.

Sir,

I am directed to say that it has come to notice that outdated norms for life of various equipments fixed by various committees are being followed by the ports and are considered as impediments to quicker implementation of plan schemes drawn up by the Ports. In this direction, a committee was constitued to examine the life norms and disposal procedures for plants and equipment and make its recommendations. The Committee has submitted its recommendations to the Government. After careful examination of the report of the Committee and in supersession of any order issued earlier on the subject, the Central Government has determined the economic life norms for plants and equipments as indicated in the enclosed Annexure I. The economic life of the plants/equipment have been considered after taking into account the normal wear & tear and without any revamping etc. These life norms may be made applicable to the existing plant & equipment as well as new additions. In case of existing plant & equipment, the accounting adjustment with respect to depreciation may be made.

2. The norms for availability and utilisation of Cargo Handling Equipment as well as the calculation for determining the availability & utilisation have been laid down in Annexure II.

3. It is requested that the afor said procedure may kindly be followed with immediate effect.

4. This issues with the approval of Finance Wing vide their Dy. No. 200/TF-I/98 dated 14.5.98.

Yours faithfully,

(V. K. Dang)
Under Secretary to the Government of India

Copy to:-

1.
2. DA(Ports)/Dir(PD)/Dir(PT)/Dir(L)/US(PE)
3. Finance Wing.
Guard File.

ANNUAL LIFE NORMS OF [illegible] MACHINERY USED AT [illegible] PORTS.

		Years
I.	CRANES	
1)	Electric Wharf Crane	20
2)	Rail Mounted Quay Crane (RMQC)	20
3)	Rubber Tyred Gantry Crane (RTGC)	20
4)	Rail Mounted Gantry Crane (RMGC)	20
5)	Grab Crane	20
6)	mobile Crane	10
7)	Harbour Mobile Crane	10
8)	Overhead Travelling Crane	15
9)	Floating Crane	25
10)	Crawler Mounted crane	10
II.	LIFT TRUCKS	
1)	Diesel Fork Lift Truck	8
2)	Electric Fork Lift Truck	8
3)	Top Lift Truck	8
4)	Fork Lift Truck	8
5)	Reach Stacker	8
III.	LOADERS/SHUNTERS	
1)	Payloader	8
2)	Power Shovel	10
3)	Mini dozer	8
4)	Road Roller	12
5)	Tractor	10
6)	Trailer	10
7)	Skid shovel	10
8)	Rear dumper/tipper	8
9)	Excavator with back hoe	8
10)	Road Sweeper	8
11)	Trucks shovel	8

...2/-

IV)	LOCOS	
1)	Diesel Locos	20
2)	Loco Traversers	15
V)	BRIDGES	
1)	Bascule	40
2)	Swing Bridge	40
3)	Capstans and Winches	20
4)	Weigh Bridge	10
VI.	FLOTILLA	
1)	Dredgers	20
2)	Tugs - Conventional	20
3)	Tugs - Others	20
4)	Launches (all types)	20
5)	Barges (all types)	20
6)	Buoy laying vessels	20
VII.	AUTOMOBILES	
1)	Cars/Vans/Jeeps	6 years or 1.2 lakhs Kms. whichever is earlier.
2)	Trucks/Lorries/Water Tankers	8 years or 2 lakhs Kms. whichever is earlier.
VIII.	PIPELINES	
1)	Oil Pipelines	15
2)	Sea Waterflushing Pipeline	10
3)	G.I. and RCC Water pipeline	30
4)	Steel & G I Water Pipeline	20
5)	Pumping Plants	20
6)	Shore pipeline for dredging	10
7)	HDPE Pipeline	10
8)	Marine Unloading arms	20

(X)	WORKSHOP MACHINERIES	
1)	Machine Tools	20
2)	Welding Plants	15
3)	Diesel Welding Plants	10
4)	Compressors	10
X.	BULK HANDLING EQUIPMENT	
1.	Wagon Tipplers	
2.	Stackers	
3.	Reclaimers	
4.	Shiploaders	
5.	Bucket Unloaders	20
6.	Barge Unloaders	
7.	Conveyors	
XI.	ELECTRICAL EQUIPMENT	
1.	Transformers (Outdoor)	20
2.	Transformers (Indoor)	35
3.	Switchgears	25
4.	Lift	15
XII.	FIRE FIGHTING EQUIPMENT	10
XIII.	TELEPHONE EXCHANGE	10
XIV.	ELECTRONIC EQUIPMENT	10
	Such as - Medical, Audio Visual & Communication	
XV.	NAVIGATIONAL EQUIPMENT	
1.	All Radio Communication equipment & VHF equipment	7
2.	Grabs	5
3.	Channel Buoys	15
4.	All navigational aids	10

ANNEXURE - II

Norms for availability and utilisation of Cargo Handling Equipment.

S.No.	Equipment	Norms for Availability	Utilization
1.	Wharf Crane	85-90%	35%
2.	Mobile Crane	82-85%	30%
3.	Fork Lift Truck	75-80%	35%
4.	Locomotive	80%	30%
5.	Payloader	90-95%	25%
6.	Tractor	90%	60%
7.	Rail Mounted Quay Crane (RMQC)	85-90%	50%
8.	Rail Mounted Gantry Cranes (RMGC)	96%	55-60%
9.	Rubber Tyred Gantry Crane (RTGC)	90-95%	40%
10.	Straddle Carrier	85%	50%
11.	Top lift Trucks/Reach Stacker	90-95%	35%
12.	Tractor /Trailer	90%	60%

Note :- For ascertaining the percentage of availability & utilisation, the following formula may be adopted uniformly by all the ports.

Availability

Let A = Number of possible equipment hours in a month (24 Hours may be taken if the port operate in three shifts. If the port is operating only in two shifts, 16 hours may be considered)

= Number of equipment in the fleet x Number of days in the month x24.

B = Number of hours the equipment are available for work

(22)

C = Number of hours the equipment are under major over haul or under Scheduled (or periodic) maintenance or under preventive maintenance in a month.

D = Number of hours the equipmont are under breakdown maintenance in a month

Then B = A - (C + D)

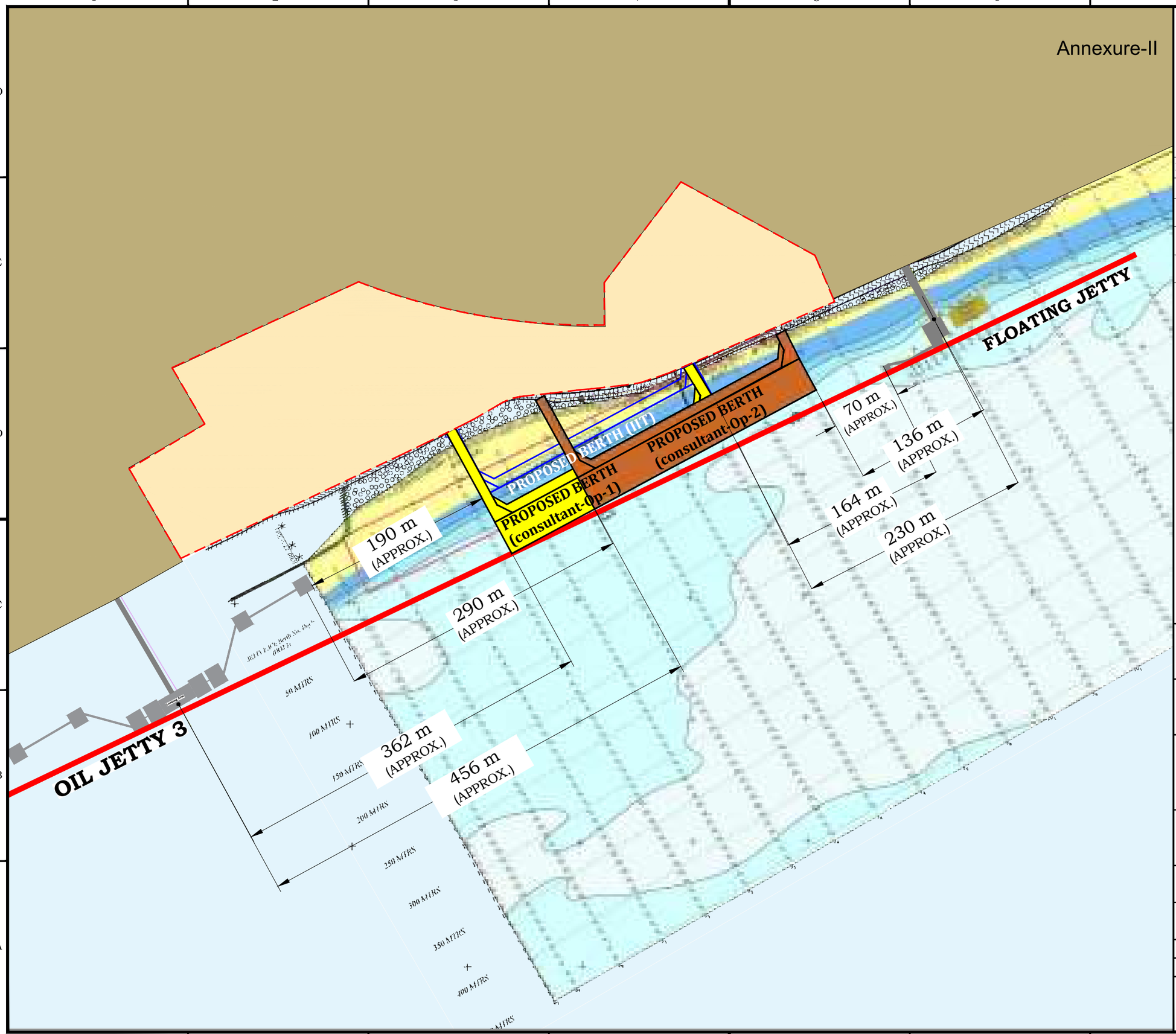
Availability = B/A

Utilization

Let E = Actual hours the equipment is engaged for work in a month (For calculation of actual hours of work, the number of shift hours may be taken. However in the total shift hours, necessary adjustment may be made. For example, if the equipment is engaged for work say 50 chifts in amonth and the meal break in each shift is say 0.5 hours, then the number of hours the equipment was used = 50 x (8 - 0.5) = 375 hours

Utilization = E/A.

Annexure-II



NOTES:

1. All dimensions in Meters,unless otherwise specified.
2. Dimension shall not be scaled only written dimensions shall be followed.
3. This drawing shall not be used other than purpose marked issued.

Legend

S.No	Description	Unit
1		Proposed Berth (IIT)
2		Proposed Berth (Consultant-Op-1)
3		Proposed Berth (Consultant-Op-2)

Client: **Syama Prasad Mookerjee Port, Kolkata**

Consultant: **Voyants Solutions Private Limited**

Project Title:

DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

Drawing Title:

OPTIONS OF PROPOSED OCT BERTHS

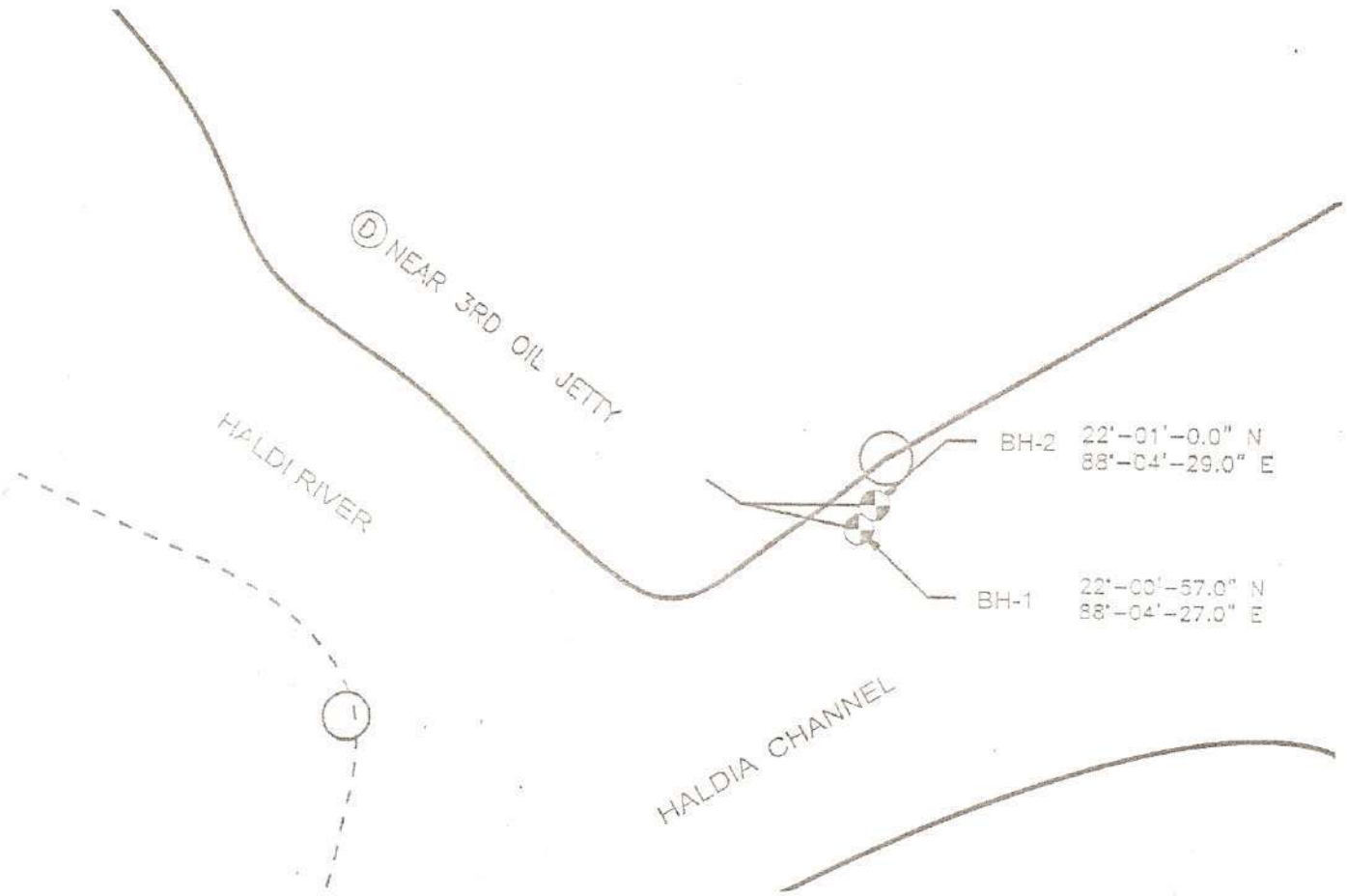
Drawing No.	Report No
SMPK/PMS/2425-052/HDC/TEFR	RP001

Project No. SMPK-GUR/2425-052/PORTS

Rev No. : R0	Sheet size : A3	N / W E / S
Date 07-05-2025	Scale : NTS	
Drawn by: ABR	Checked by: NBL	Approved by: SDC

Results Of Geo-Technical Investigation At The Proposed Location Of The Multipurpose Riverine Jetty At Upstream Of 3rd Oil Jetty At Haldia, Haldia Dock Complex

Issued With Bid No M(I&CF)/T/1783



Borehole Location Plan for RRM Scheme for improvement of Draught in Hoogly River – 3rd Oil Jetty

Constell Consultants Pvt. Ltd. Kolkata	Job No. :CCPL/0605582	Not to scale	Figure No. : C-1

Sheet No. : C-1

Constell Consultants Pvt. Ltd.

BORE / DRILL LOG

Project: Soil investigation for RRM scheme for improvement of draught in Hooghly River.

Bore Hole No. : BH-I

Location : 3rd Oil Jetty
(N 22°-01'-00"; E 88°-04'-29.0")

Ground Elevation : (-)5.50m I.C.D.

Method of Boring / Drilling : Shell / Rotary

Water Level : 6.75m (min.) abl. at 12.00 hrs on 19.07
10.85m (max.) abl. at 15.40 hrs on 18.07

Boring / Drilling Equipment : Mechanical Winch

Dia of Boring / Drilling : 200mm / 150mm

Casing Lowered : 200mm = 19.00m ; 150mm = 27.00m below deck level

Date : From 18.07.06 To 19.07.06

Date (dd / mm)	Elevation (m)	Depth / RUN (m) From	Depth / RUN (m) To	Length (m)	Nature of Sampling	SPT : No. of blows 0-15 cm	15-30 cm	30-45 cm	45-60 cm	'N' Value	Time Taken (min.)	Total Length of Core Pieces (m)	Core Recovery (%)	R.Q.D. (%)	Description
18/07		1.00	1.45	0.45	P/D	1	2	2	-	4	-	-	-	-	Soft / firm grey / bluish grey silty clay with traces of decomposed wood
		2.00	2.50	0.50	U	-	-	-	-	-	-	-	-	-	
		2.50	2.95	0.45	P/D	1	1	1	-	2	-	-	-	-	
		4.00	4.45	0.45	P/D	1	1	2	-	3	-	-	-	-	
		5.00	5.50	0.50	U	-	-	-	-	-	-	-	-	-	
		5.50	5.95	0.45	P/D	1	2	2	-	4	-	-	-	-	
		7.00	7.45	0.45	P/D	1	2	2	-	4	-	-	-	-	
		8.00	8.50	0.50	U	-	-	-	-	-	-	-	-	-	
		8.50	8.95	0.45	P/D	1	2	2	-	4	-	-	-	-	
		10.00	10.45	0.45	P/D	1	2	3	-	5	-	-	-	-	
		11.00	11.50	0.50	U	-	-	-	-	-	-	-	-	-	11.0m Grey to bluish grey silty sandy clay / silty clayey sand
		11.50	11.95	0.45	P/D	1	2	3	-	5	-	-	-	-	
		13.00	13.45	0.45	P/D	2	6	9	-	15	-	-	-	-	

NOTES
1. Abbreviation Used : U-Undisturbed Sample C-Core Sample D-Disturbed Sample P-Standard Penetration Test
2. Level at which Artesian Condition experienced and its pressure, if any :
3. Water Loss with depth, if any :
4. Colour of water during drilling :

Site Engineer : S. Nayak | Driller : J. Manna | Job No. : CCPL/0605582

Constell Consultants Pvt. Ltd.

BORE / DRILL LOG

Project: Soil investigation for RRM scheme for improvement of draught in Hooghly River

Bore Hole No. : BH-1

Location : 3rd Oil Jetty
(N 22°-01'-00", E 88°-04'-29.0")

Ground Elevation : (-)5.50m B.C.D.

Method of Boring / Drilling : Shell / Rotary

Water Level : 6.75m (min.) abl. at 12.00 hrs on 19/07
10.85m (max.)abl at 15:40 hrs on 18/07

Boring / Drilling Equipment : Mechanical Winch

Dia of Boring / Drilling : 200mm / 150mm

Casing Lowered : 200mm = 19.00m ; 150mm = 27.00m below deck level

Date : From 18.07.06 To 19.07.06

Date (dd / mm)	Elevation (m)	Depth / RUN (m) From	Depth / RUN (m) To	Length (m)	Nature of Sampling	SPT : No. of blows 0-15 cm	15-30 cm	30-45 cm	45-60 cm	N' Value	Time Taken (min)	Total length of Core Pieces (m)	Core Recovery (%)	R.Q.D. (%)	Description
		14.00	14.50	0.50	U	-	-	-	-	-	-	-	-	-	Grey to bluish grey silty sandy clay / silty clayey sand
		14.50	14.95	0.45	P/D	4	4	7	-	11	-	-	-	-	
		16.00	16.45	0.45	P/D	4	5	8	-	13	-	-	-	-	
		17.00	17.50	0.50	U	Slipped					-	-	-	-	
		17.50	17.95	0.45	P/D	5	5	9	-	14	-	-	-	-	17.5m
		19.00	19.45	0.45	P/D	4	6	10	-	16	-	-	-	-	Medium dense yellowish grey / brownish yellow silty fine sand with traces of mica
19/07		20.50	20.95	0.45	P/D	6	7	11	-	18	-	-	-	-	
		22.00	22.45	0.45	P/D	7	9	13	-	22	-	-	-	-	
		23.50	23.95	0.45	P/D	8	11	16	-	27	-	-	-	-	
		25.00	25.45	0.45	P/D	9	15	17	-	32	-	-	-	-	
		26.50	26.95	0.45	P/D	10	18	22	-	40	-	-	-	-	
		28.00	28.45	0.45	P/D	9	17	24	-	41	-	-	-	-	
		29.50	29.95	0.45	P/D	11	19	27	-	46	-	-	-	-	
		31.00	31.45	0.45	P/D	10	20	23	-	43	-	-	-	-	

NOTES
1. Abbreviation Used : U-Undisturbed Sample C-Core Sample D-Disturbed Sample P-Standard Penetration Test
2. Level at which Artesian Condition experienced and its pressure if any
3. Water Loss with depth, if any
4. Colour of water during drilling

Site Engineer : S. Nayak | Driller : J. Manna | Job No.: CCPL/0605582

Constell Consultants Pvt. Ltd.

BORE / DRILL LOG

Project: Soil investigation for RRM scheme for improvement of draught in Hooghly River.

Bore Hole No. : BH-I

Location : 3rd Oil Jetty
(L 22°-01'-00", L 88°-04'-29.0")

Ground Elevation : (-)5.50m B.C.D

Method of Boring / Drilling : Shell / Rotary

Water Level : 6.75m (min.) abl. at 12:00 hrs on 19.07
10.85m (max.)abl.at 15:40 hrs on 18.07

Boring / Drilling Equipment : Mechanical Winch

Dia of Boring / Drilling : 200mm / 150mm

Casing Lowered : 200mm = 19.00m ; 150mm = 27.00m below deck level

Date : From 18.07.06 To 19.07.06

Date (dd/mm)	Elevation (m)	Depth / RUN (m) From	Depth / RUN (m) To	Length (m)	Nature of Sampling	SPT : No. of blows 0-15 cm	15-30 cm	30-45 cm	45-60 cm	N Value	Time Taken (min)	Total Length of Core Recovered (m)	Core Recovery (%)	R.Q.D. (%)	Description
		32.50	32.95	0.45	P/D	11	22	26	-	48	-	-	-	-	Medium dense yellowish grey / brownish yellow silty fine sand with traces of mica
		34.00	34.45	0.45	P/D	12	20	29	-	49	-	-	-	-	
		35.50	35.95	0.45	P/D	10	21	27	-	48	-	-	-	-	
		37.00	37.45	0.45	P/D	9	20	26	-	46	-	-	-	-	
		38.50	38.95	0.45	P/D	10	21	28	-	49	-	-	-	-	
		40.00	40.45	0.45	P/D	9	23	29	-	52	-	-	-	-	
		41.50	41.95	0.45	P/D	11	18	25	-	43	-	-	-	-	
		43.00	43.45	0.45	P/D	10	19	27	-	46	-	-	-	-	
		45.00	45.45	0.45	P/D	13	21	29	-	50	-	-	-	-	
		47.00	47.45	0.45	P/D	12	20	27	-	47	-	-	-	-	
		48.50	48.95	0.45	P/D	10	22	30	-	52	-	-	-	-	
		50.00	50.45	0.45	P/D	12	26	33	-	59	-	-	-	-	
			50.00	(Termination Depth)											

NOTES

1. Abbreviation Used : U-Undisturbed Sample C-Core Sample D-Disturbed Sample P-Standard Penetration Test
2. Level at which Artesian Condition experienced and its pressure, if any :
3. Water Loss with depth, if any :
4. Colour of water during drilling :

Site Engineer : S. Nayak | Driller : J. Manna | Job No.: CCPL/0605582

Constell Consultants Pvt. Ltd.

BORE / DRILL LOG

Project: Soil investigation for RRM scheme for improvement of draught in Hooghly River.

Bore Hole No. : BH-2

Location : 3rd Oil Jetty
(N 22°-00'-57.00", E 88°-04'-27.0")

Ground Elevation : (-)3.90m (C.D.)

Method of Boring / Drilling : Shell / Rotary

Water Level : 8.15m (min.) abl. at 12.30 hrs on 20.07
12.85m (max.)abl.at 20.00 hrs on 21.07

Boring / Drilling Equipment : Mechanical Winch

Dia.of Boring / Drilling : 200mm / 150mm

Casing Lowered : 200mm = 17.00m ; 150mm = 26.00m below deck level

Date : From 20.07.06 To 21.07.06

Date (dd / mm)	Elevation (m)	Depth / RUN (m) From	Depth / RUN (m) To	Length (m)	Nature of Sampling	SPT No. of blows 0-15 cm	15-30 cm	30-45 cm	45-60 cm	N Value	Time Taken (min)	Total length of Core Recovered	Core Recovery (%)	R.Q.D. (%)	Description
20/07		1.00	1.45	0.45	P/D	1	1	1	-	2	-	-	-	-	Soft / firm grey to dark grey silty clay with traces of semi-decomposed / decomposed wood
		2.50	2.95	0.45	P/D	1	2	2	-	4	-	-	-	-	
		3.00	3.50	0.50	U	-	-	-	-	-	-	-	-	-	
		3.50	3.95	0.45	P/D	1	1	2	-	3	-	-	-	-	
		5.00	5.45	0.45	P/D	1	2	2	-	4	-	-	-	-	
		6.00	6.50	0.50	U	-	-	-	-	-	-	-	-	-	
		6.50	6.95	0.45	P/D	1	2	2	-	4	-	-	-	-	
		8.00	8.45	0.45	P/D	1	2	2	-	4	-	-	-	-	
		9.00	9.50	0.50	U	-	-	-	-	-	-	-	-	-	
		9.50	9.95	0.45	P/D	1	2	3	-	5	-	-	-	-	
		11.00	11.45	0.45	P/D	2	2	3	-	5	-	-	-	-	
		12.00	12.50	0.50	U	-	-	-	-	-	-	-	-	-	
		12.50	12.95	0.45	P/D	2	3	3	-	6	-	-	-	-	
		14.00	14.45	0.45	P/D	2	3	4	-	7	-	-	-	-	

NOTES:
1. Abbreviation Used : U-Undisturbed Sample C-Core Sample D-Disturbed Sample P-Standard Penetration Test
2. Level at which Artesian Condition experienced and its pressure, if any :
3. Water Loss with depth, if any :
4. Colour of water during drilling :

Site Engineer : S. Nayak | Driller : J. Manna | Job No.: CCPL/0605582

Constell Consultants Pvt. Ltd.

BORE / DRILL LOG

Project: Soil investigation for RRM scheme for improvement of draught in Hooghly River

Bore Hole No. : BH-2

Location : 3rd Oil Jetty
(N 22°-00'-57.00", E 88°-04'-27.0")

Ground Elevation : (-)3.90m I.C.D

Method of Boring / Drilling : Shell / Rotary

Water Level : 8.15m (min.) abl. at 12.30 hrs on 20.07
12.85m (max.)abl.at 20.00 hrs on 21.07

Boring / Drilling Equipment : Mechanical Winch

Dia of Boring / Drilling : 200mm / 150mm

Casing Lowered : 200mm = 17.00m ; 150mm = 26.00m below deck level

Date : From 20.07.06 To 21.07.06 .

Date (dd / mm)	Elevation (m)	Depth / RUN (m) From	Depth / RUN (m) To	Length (m)	Nature of Sampling	SPT : No. of blows 0-15 cm	15-30 cm	30-45 cm	45-60 cm	N Value	Time Taken (min)	Total length of Core Pieces (m)	Core Recovery (%)	R.Q.D. (%)	Description
		15.00	15.50	0.50	U	-	-	-	-	-	-	-	-	-	Soft / firm grey to dark grey silty clay with traces of semi-decomposed / decomposed wood
21.07		15.50	15.95	0.45	P/D	2	3	4	-	7	-	-	-	-	
		17.00	17.45	0.45	P/D	2	2	3	-	5	-	-	-	-	
		18.00	18.50	0.50	U	-	-	-	-	-	-	-	-	-	
		18.50	18.95	0.45	P/D	3	4	7	-	11	-	-	-	-	
		20.00	20.45	0.45	P/D	4	6	8	-	14	-	-	-	-	
		21.00	21.50	0.50	U	-	-	-	-	-	-	-	-	-	
		21.50	21.95	0.45	P/D	5	6	9	-	15	-	-	-	-	21.5m
		23.00	23.45	0.45	P/D	4	5	9	-	14	-	-	-	-	Medium dense yellowish grey / yellowish brown silty fine sand with traces of mica
		25.00	25.50	0.50	U	-	-	-	-	-	-	-	-	-	
		25.50	25.95	0.45	P/D	4	6	10	-	16	-	-	-	-	
		27.00	27.45	0.45	P/D	5	6	9	-	15	-	-	-	-	
		28.50	28.95	0.45	P/D	6	7	11	-	18	-	-	-	-	
		30.00	30.45	0.45	P/D	7	9	13	-	22	-	-	-	-	

NOTES
1. Abbreviation Used : U-Undisturbed Sample C-Core Sample D-Disturbed Sample P-Standard Penetration Test
2. Level at which Artesian Condition experienced and it's pressure, if any :
3. Water Loss with depth, if any :
4. Colour of water during drilling :

Site Engineer : S. Nayak | Driller : J. Mouni | Job No. : CCPL/0605582

Constell Consultants Pvt. Ltd.

BORE / DRILL LOG

Project: Soil investigation for RRM scheme for improvement of draught in Hooghly River

Bore Hole No. : BH-2

Location : 3rd Oil Jetty
(N 22°-00'-57.00", E 88°-01'-27.0")

Ground Elevation : (-)3.90m I.C.D.

Method of Boring / Drilling : Shell / Rotary

Water Level : 8.15m (min.) abl. at 12:30 hrs on 20/07
12.85m (max.)abl at 20:00 hrs on 21/07

Boring / Drilling Equipment : Mechanical Winch

Dia.of Boring / Drilling : 200mm / 150mm

Casing Lowered : 200mm = 17.00m ; 150mm = 26.00m below deck level

Date : From 20.07.06 To 21.07.06

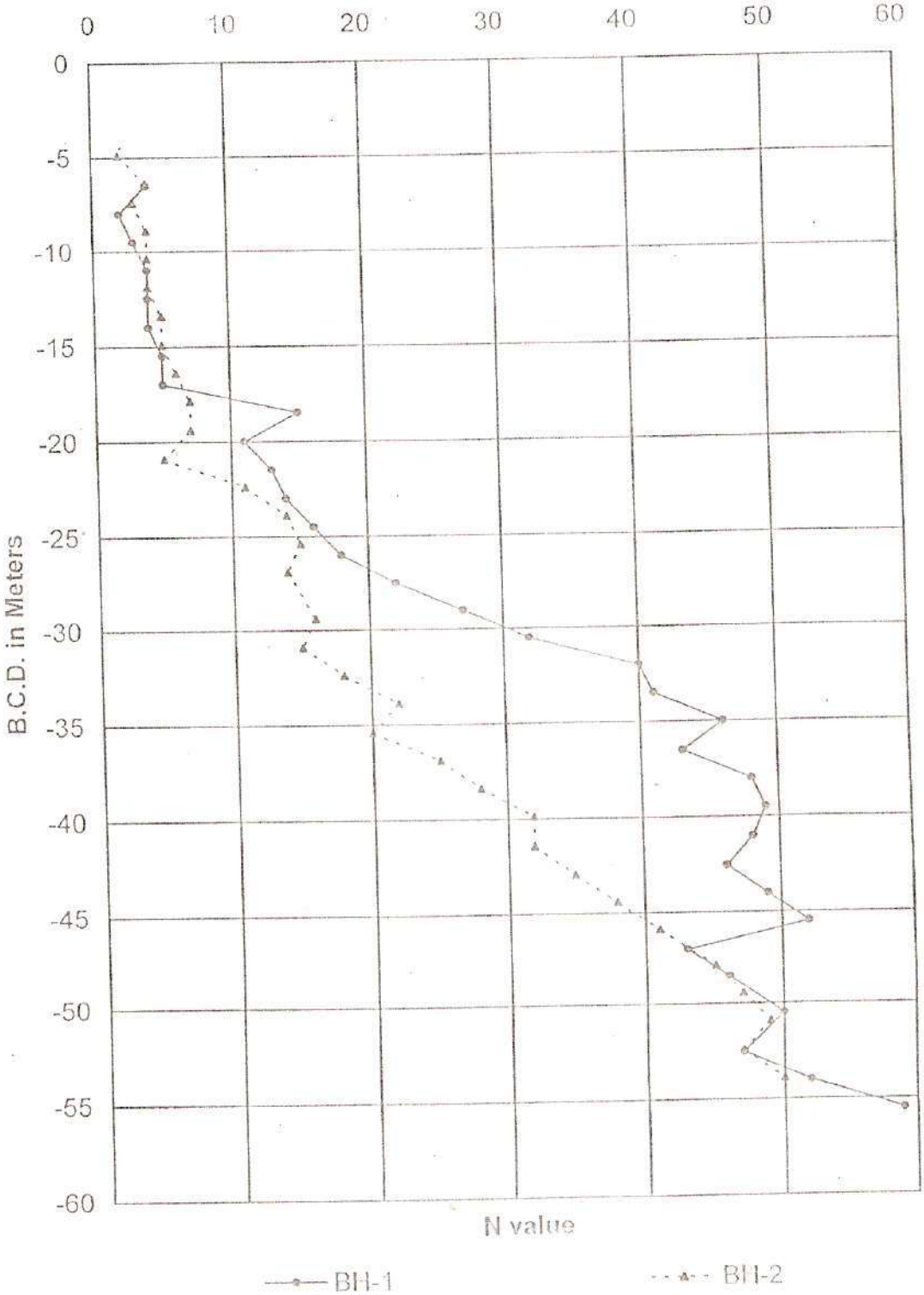
Date (dd / mm)	Elevation (m)	Depth / RUN (m) From	Depth / RUN (m) To	Length (m)	Nature of Sampling	SPT : No. of blows 0-15 cm	15-30 cm	30-45 cm	45-60 cm	N Value	Time Taken (min)	Total Length of Core Pieces (m)	Core Recovery (%)	R.Q.D. (%)	Description
		31.50	31.95	0.45	P/D	5	8	12	-	20	-	-	-	-	Medium dense yellowish grey / yellowish brown silty fine sand with traces of mica
		33.00	33.45	0.45	P/D	8	10	15	-	25	-	-	-	-	
		34.50	34.95	0.45	P/D	8	12	16	-	28	-	-	-	-	
		36.00	36.45	0.45	P/D	10	14	18	-	32	-	-	-	-	
		37.50	37.95	0.45	P/D	9	13	19	-	32	-	-	-	-	
		39.00	39.45	0.45	P/D	11	15	20	-	35	-	-	-	-	
		40.50	40.95	0.45	P/D	10	16	22	-	38	-	-	-	-	
		42.00	42.45	0.45	P/D	12	17	24	-	41	-	-	-	-	
		44.00	44.45	0.45	P/D	13	18	27	-	45	-	-	-	-	
		45.50	45.95	0.45	P/D	14	19	28	-	47	-	-	-	-	
		47.00	47.45	0.45	P/D	12	20	29	-	49	-	-	-	-	
		48.50	48.95	0.45	P/D	11	19	28	-	47	-	-	-	-	
		50.00	50.45	0.45	P/D	13	21	29	-	50	-	-	-	-	
			50.00	(Termination Depth)											

NOTES

1. Abbreviation Used : U-Undisturbed Sample C-Core Sample D-Disturbed Sample P-Standard Penetration Test
2. Level at which Artesian Condition experienced and its pressure, if any :
3. Water Loss with depth, if any :
4. Colour of water during drilling :

Site Engineer : S. Bisoi | Driller : I. Ansari | Job No. : CCPL/0605582

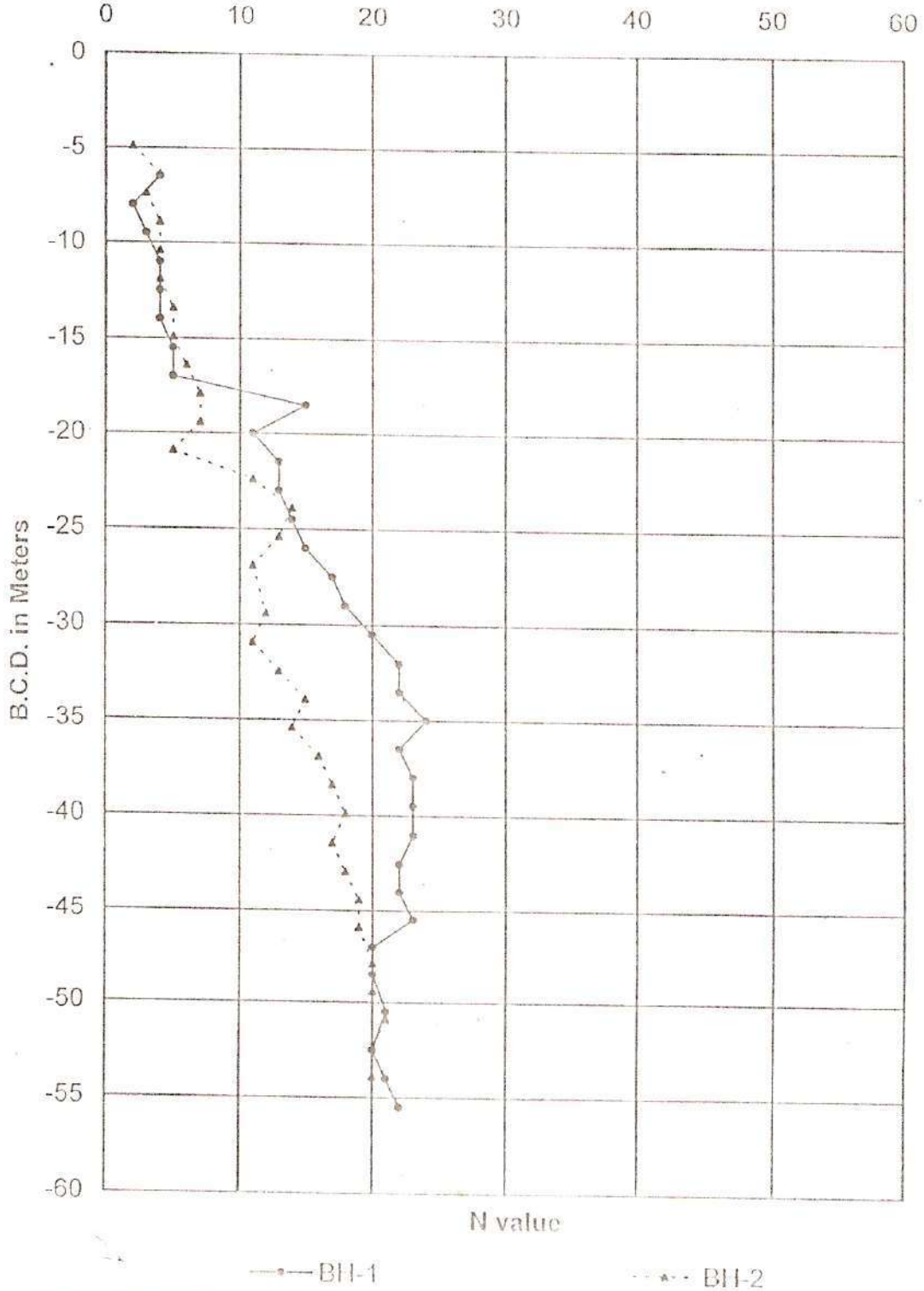
GRAPHICAL REPRESENTATION OF FIELD N-VALUE WITH B.C.D.



Project : Soil investigation fpr RRM Scheme for Improvement of Draught in Hooghly River - 3rd Oil Jetty.	Job No.: CCPL/0605582
	Fig No.: C - 2/1

Constell Consultants Private Limited

GRAPHICAL REPRESENTATION OF CORRECTED N-VALUE WITH B.C.D.



Project : Soil investigation for RRM Scheme for Improvement of Draught in Hooghly River - 3rd Oil Jetty.	Job No.: CCPL/0605582
	Fig No.: C - 2/2

Constell Consultants Private Limited

Bore Hole Number	Depth below G.L. m	Description	Field 'N' Value	Corrected 'N' Value	Grain Size Analysis				Density and Moisture Test			Atterberg Limits				Shear Strength Parameters			Specific Gravity, G_s	Consolidation Characteristics		Void Ratio, e_0	Silt Factor
					Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gms/cc)	Dry Density (gms/cc)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	Type of Test	C (kg/cm^2)	ϕ (degrees)		C_c	$\frac{C_c}{1+e_0}$		
BH1	1.0	Soft / firm grey / bluish grey silty clay with traces of decomposed wood	4	4	-	1.3	56.8	41.9	-	-	-	65.2	25.0	40.2	15.0	-	-	-	-	-	-	-	-
	2.0		-	-	-	0.5	57.0	42.5	41.3	1.737	1.229	68.2	26.5	41.7	15.1	UU	0.17	3.0	-	-	-	-	2.82
	2.5		2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4.0		3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5.0		-	-	-	1.4	58.1	40.5	42.1	1.749	1.231	68.9	25.6	43.3	14.9	UU	0.21	2.0	2.63	0.4674	0.2167	1.1367	2.92
	5.5		4	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	7.0		4	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8.0		-	-	-	-	-	-	44.1	1.714	1.189	71.6	27.8	43.8	15.2	UU	0.23	3.5	-	-	-	-	2.96
	8.5		4	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10.0		5	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11.0	11.00m	-	-	-	49.0	33.8	17.2	25.7	1.930	1.535	34.7	20.0	14.7	15.9	UU	0.58	6.0	-	-	-	-	3.06
	11.5	Grey to bluish grey silty sandy clay / silty clayey sand	5	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13.0		15	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	14.0		-	-	-	51.5	33.5	15.0	24.7	1.970	1.580	33.8	22.4	11.4	-	UU	0.71	6.0	2.67	0.1633	0.0966	0.6901	3.22
	14.5		11	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16.0		13	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17.5	17.50m	14	13	-	79.9	*20.1		-	-	-	Non-plastic			-	-	-	-	-	-	-	-	0.71
	19.0	Medium dense yellowish grey / brownish yellow silty fine sand with traces of mica	16	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Combined percentage of silt & clay

CONSTELL CONSULTANTS PVT. LTD. KOLKATA	Bore hole data and Laboratory test results for RRM scheme for improvement of draught in Hooghly River - 3rd Oil Jetty	JOB NUMBER CCPL/0605582	TABLE NUMBER C-1/1

Sheet No. C-10

Bore Hole Number	Depth below G.L. m	Description	Field 'N' Value	Corrected 'N' Value	Grain Size Analysis				Density and Moisture Test			Atterberg Limits				Shear Strength Parameters			Specific Gravity G_s	Consolidation Characteristics		Void Ratio e_0	Silt Factor
					Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gms/cc)	Dry Density (gms/cc)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	Type of Test	C (kg/cm^2)	ϕ (degrees)		C_c	$\frac{C_c}{1+e_0}$		
BH 1	20.5	Medium dense yellowish grey / brownish yellow silty fine sand with traces of mica	18	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22.0		22	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23.5		27	18	-	74.8	*25.2		-	-	-	Non-plastic			-	-	-	-	-	-	-	-	0.66
	25.0		32	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	26.5		40	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	28.0		41	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	29.5		46	24	-	70.9	*29.1		-	-	-	Non-plastic			-	-	-	-	-	-	-	-	0.65
	31.0		43	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	32.5		48	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	34.0		49	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	35.5		48	23	-	80.0	*20.0		-	-	-	Non-plastic			-	-	-	-	-	-	-	-	-
	37.0		46	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	38.5		49	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	40.0		52	23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	41.5		43	20	-	79.9	*20.1		-	-	-	Non-plastic			-	-	-	-	-	-	-	-	-
	43.0		46	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	44.5		50	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	47.0		47	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	48.5		52	21	-	82.0	*18.0		-	-	-	Non-plastic			-	-	-	-	-	-	-	-	-
	50.0		59	22	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Combined percentage of silt & clay

CONSTELL CONSULTANTS PVT. LTD. KOLKATA

Bore hole data and Laboratory test results for RRM scheme for improvement of draught in Hooghly River - 3rd Oil Jetty

JOB NUMBER CCPL/0605582

TABLE NUMBER C-1/2

Sheet No. C-11

Bore Hole Number	Depth below G.L. in M	Description	Field 'N' Value	Corrected 'N' Value	Grain Size Analysis				Density and Moisture Test			Atterberg Limits				Shear Strength Parameters			Specific Gravity, G_s	Consolidation Characteristics		Void Ratio, e_o	Silt Factor
					Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gms/cc)	Dry Density (gms/cc)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	Type of Test	C (kg/cm^2)	ϕ (degrees)		C_c	$\frac{C_c}{1+e_o}$		
BH-2	1.0	Soft / firm to stiff grey to dark grey silty clay with traces of semi-decomposed / decomposed wood	2	2	-	0.9	54.9	44.2	-	-	-	65.6	28.0	37.6	-	-	-	-	-	-	-	-	-
	2.5		4	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3.0		-	-	-	1.7	53.5	44.8	45.8	1.700	1.166	63.3	27.8	35.5	17.3	UU	0.19	2.5	-	-	-	-	2.87
	3.5		3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5.0		4	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6.0		-	-	-	0.3	57.3	42.4	45.4	1.734	1.193	71.3	26.2	45.1	14.3	UU	0.23	3.5	-	-	-	-	2.98
	6.5		4	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8.0		4	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9.0		-	-	-	-	-	-	44.3	1.705	1.179	71.6	27.2	44.4	16.0	UU	0.28	3.0	2.66	0.4414	0.1857	1.2558	3.06
	9.5		5	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11.0		5	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	12.0		-	-	-	0.9	58.5	40.6	42.4	1.729	1.214	69.5	25.4	44.1	14.2	UU	0.29	2.5	-	-	-	-	3.06
	12.5		6	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	14.0		7	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	15.0		-	-	-	-	-	-	42.0	1.732	1.220	72.6	28.7	45.9	15.0	UU	0.32	3.5	2.67	0.4569	0.2087	1.1891	3.13
	15.5		7	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	17.0		5	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	18.0		-	-	-	1.7	50.5	47.8	41.5	1.747	1.235	79.2	28.3	50.9	15.1	UU	0.34	4.0	-	-	-	-	3.17

*Combined percentage of silt & clay

CONSTELL CONSULTANTS PVT. LTD. KOLKATA	Bore hole data and Laboratory test results for RRM scheme for improvement of draught in Hooghly River - 3rd Oil Jetty	JOB NUMBER CCPL/0605582	TABLE NUMBER C-2/1

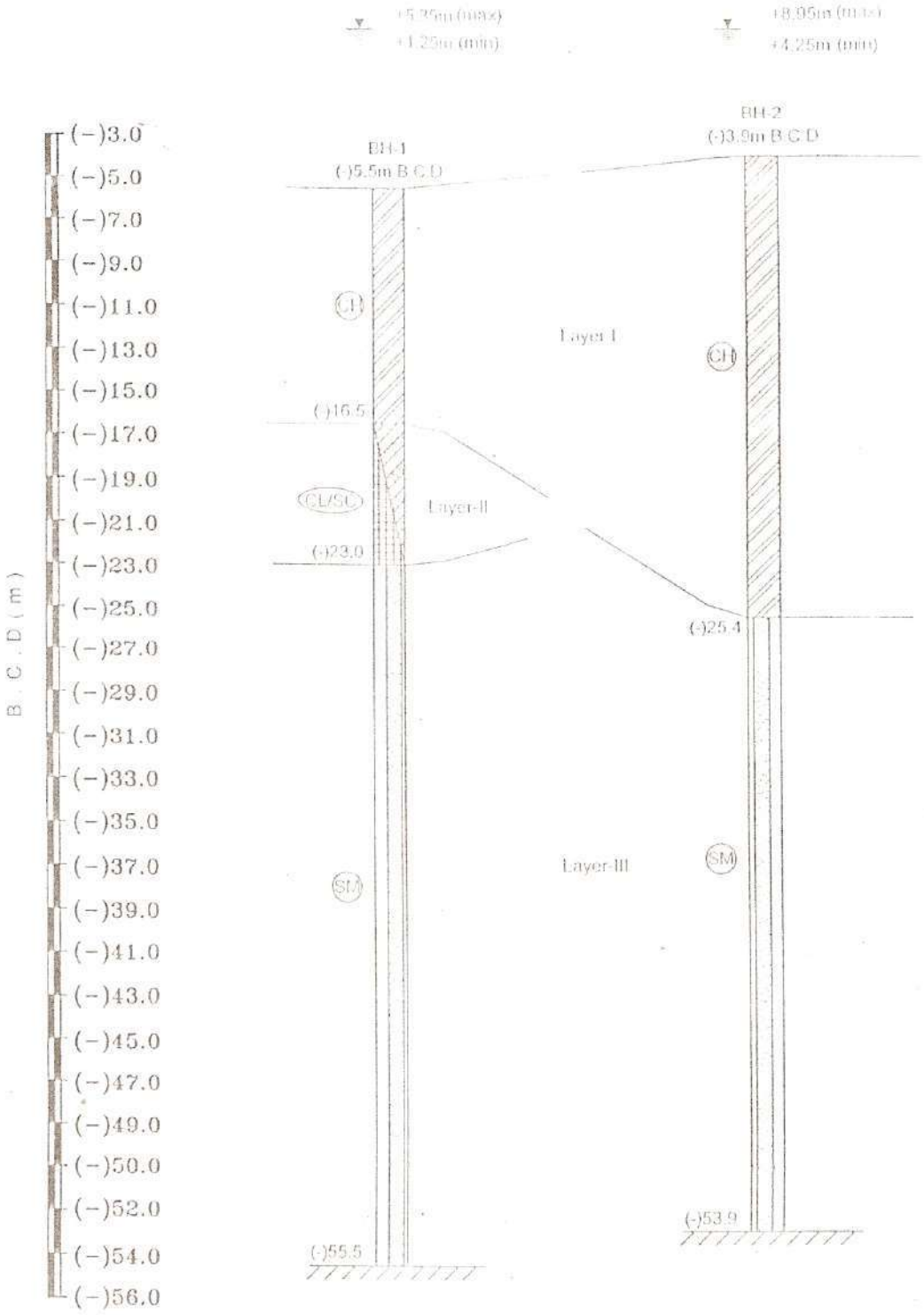
Sheet No. C-2/1

Bore Hole Number	Depth below G.L. in M	Description	Field N Value	Corrected N Value	Grain Size Analysis				Density and Moisture Test			Atterberg Limits				Shear Strength Parameters			Specific Gravity G_s	Consolidation Characteristics		Void Ratio, e_0	Silt Factor
					Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Natural Moisture Content (%)	Bulk Density (gms/cc)	Dry Density (gms/cc)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Shrinkage Limit (%)	Type of Test	C (kg/cm²)	ϕ (degrees)		C_c	$\frac{C_c}{1+e_0}$		
BH2	18.5	Soft / firm to stiff grey to dark grey silty clay with traces of semi-decomposed / decomposed wood	11	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20.0		14	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21.5		-	-	-	4.7	47.0	48.3	39.5	1.775	1.272	77.7	27.6	50.1	15.0	UU	0.39	2.5	-	-	-	-	3.25
	21.5	21.50m	15	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	23.0	Medium dense yellowish grey / yellowish brown silty fine sand with traces of mica	14	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	24.5		-	-	-	68.0	*32.0		31.5	1.815	1.380	Non-plastic			-	DS	0.00	30.5	-	-	-	-	0.63
	26.5		16	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	28.0		15	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	29.5		18	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	31.0		22	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	32.5		20	14	-	69.7	*30.3		-	-	-	Non-plastic			-	-	-	-	-	-	-	-	0.63
	34.0		25	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	35.5		23	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	37.0		32	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	38.5		32	17	-	71.3	*28.7		-	-	-	Non-plastic			-	-	-	-	-	-	-	-	-
	40.0		35	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	41.5		38	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	43.0		41	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	44.5		45	20	-	75.1	*24.9		-	-	-	Non-plastic			-	-	-	-	-	-	-	-	-
	46.0		47	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	47.5		49	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	48.5		47	20	-	76.6	*23.4		-	-	-	Non-plastic			-	-	-	-	-	-	-	-	-
	50.0		50	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Combined percentage of silt & clay

CONSTELL CONSULTANTS PVT. LTD. KOLKATA	Bore hole data and Laboratory test results for RRM scheme for improvement of draught in Hooghly River - 3rd Oil Jetty	JOB NUMBER CCPL/0605582	TABLE NUMBER C-2/2

Sheet No. C-13



Layer-I:- Soft / firm grey to dark grey / bluish grey silty clay with traces of semi-decomposed / decomposed wood.

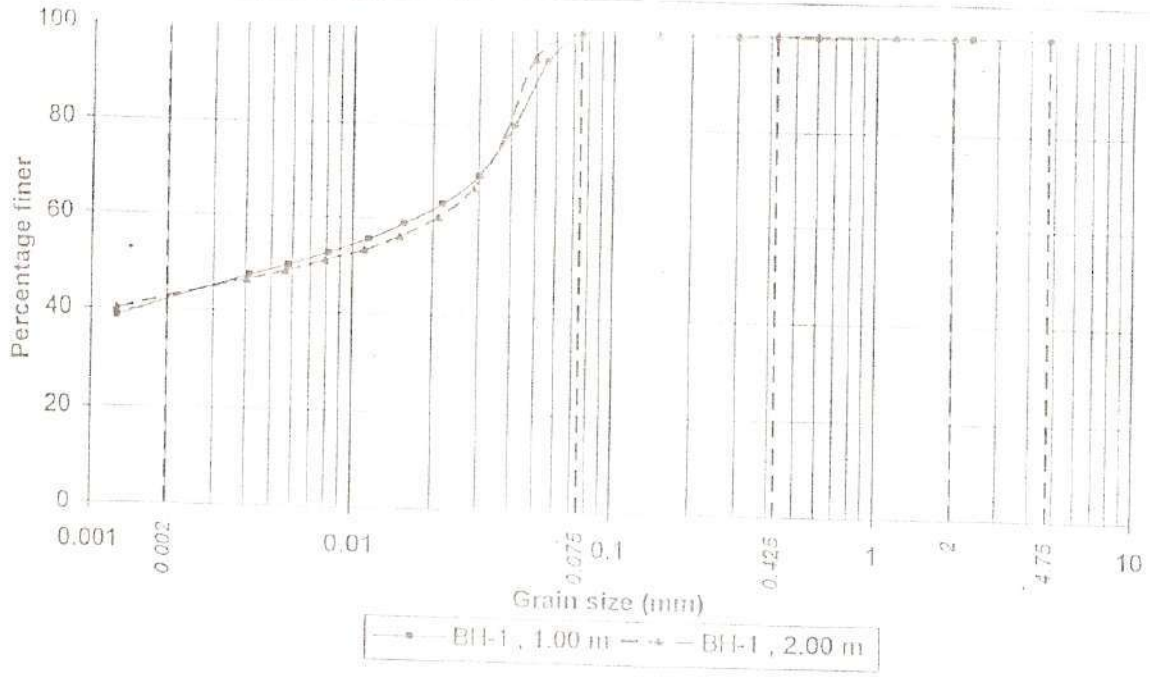
Layer-II:- Grey to bluish grey silty sandy clay / silty clayey sand.

Layer-III:-Medium dense yellowish grey / yellowish brown / brownish yellow silty fine sand with traces of mica.

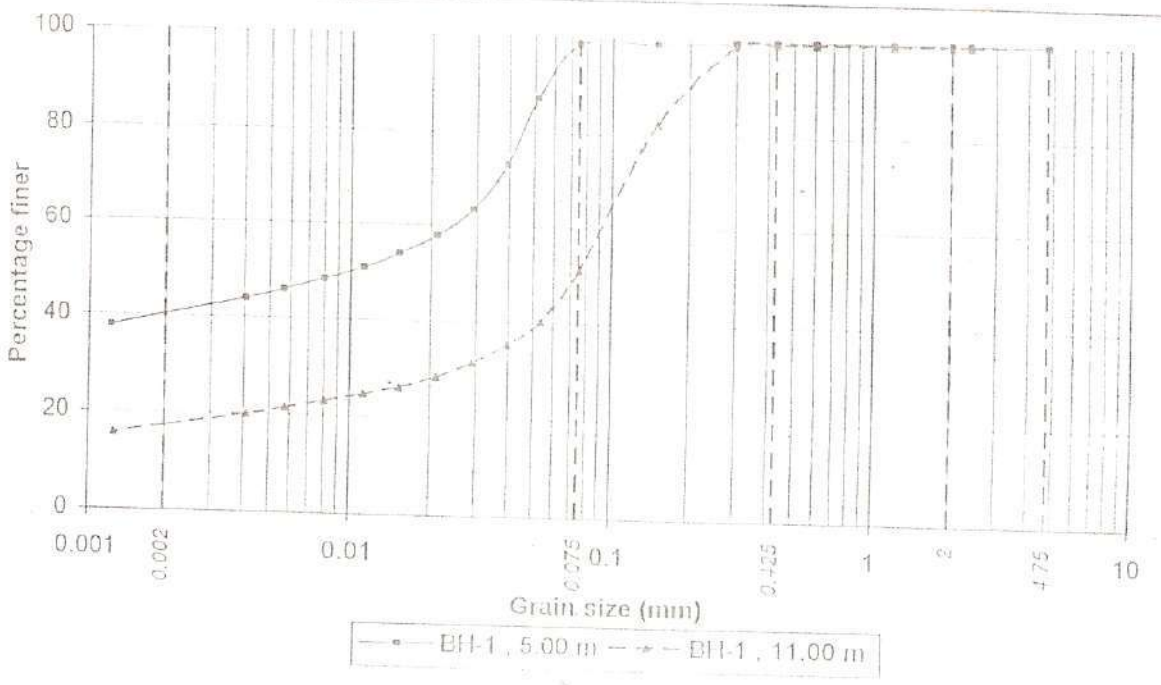
Generalised Soil Profile for RRM Scheme for Improvement of Draught in Hooghly River - 3rd Oil Jetty

CONSTELL CONSULTANTS PVT. LTD. KOLKATA	Job No.: CCPL/0605502	Scale.: 1:300	Figure No: C-3

GRAIN SIZE DISTRIBUTION CURVES



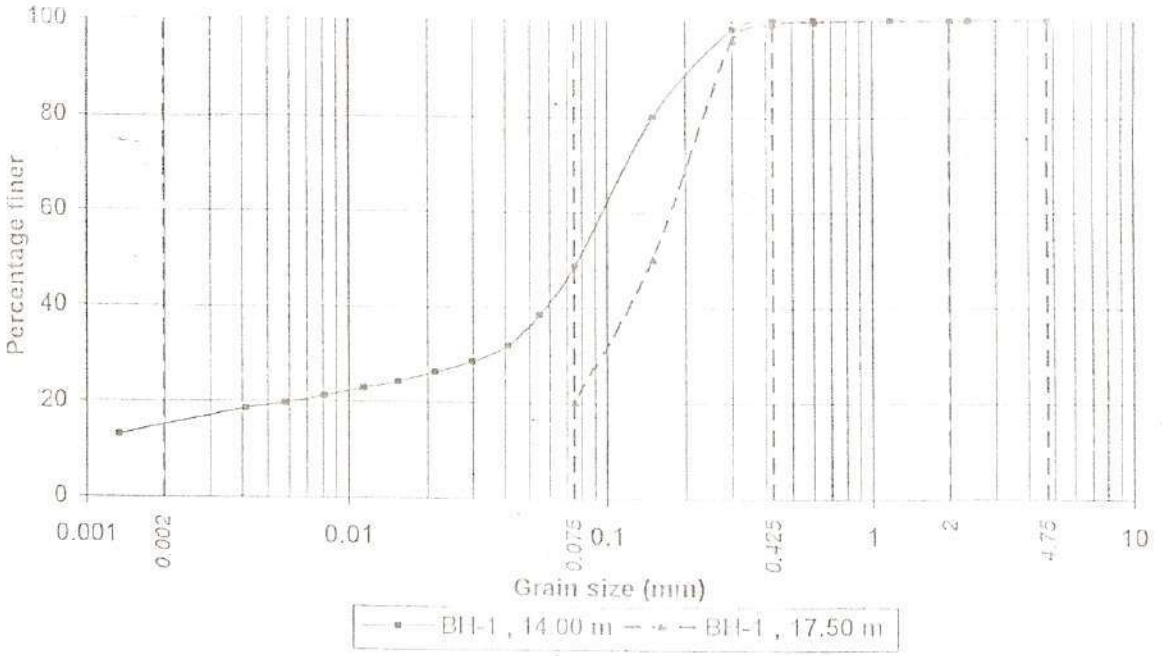
Grain size (mm) / Sample No.	<0.002 Clay (%)	0.002-0.075 Silt (%)	0.075-0.425 Fine sand (%)	0.425-2.0 Medium sand (%)	2.0-4.75 Coarse sand (%)	>4.75 Gravel (%)
BH-1 , 1.00 m	41.9	56.8	0.8	0.2	0.3	0.0
BH-1 , 2.00 m	42.5	57.0	0.5	0.0	0.0	0.0



Grain size (mm) / Sample No.	<0.002 Clay (%)	0.002-0.075 Silt (%)	0.075-0.425 Fine sand (%)	0.425-2.0 Medium sand (%)	2.0-4.75 Coarse sand (%)	>4.75 Gravel (%)
BH-1 , 5.00 m	49.5	50.1	1.1	0.3	0.0	0.0
BH-1 , 11.00 m	17.2	33.8	48.2	0.3	0.5	0.0

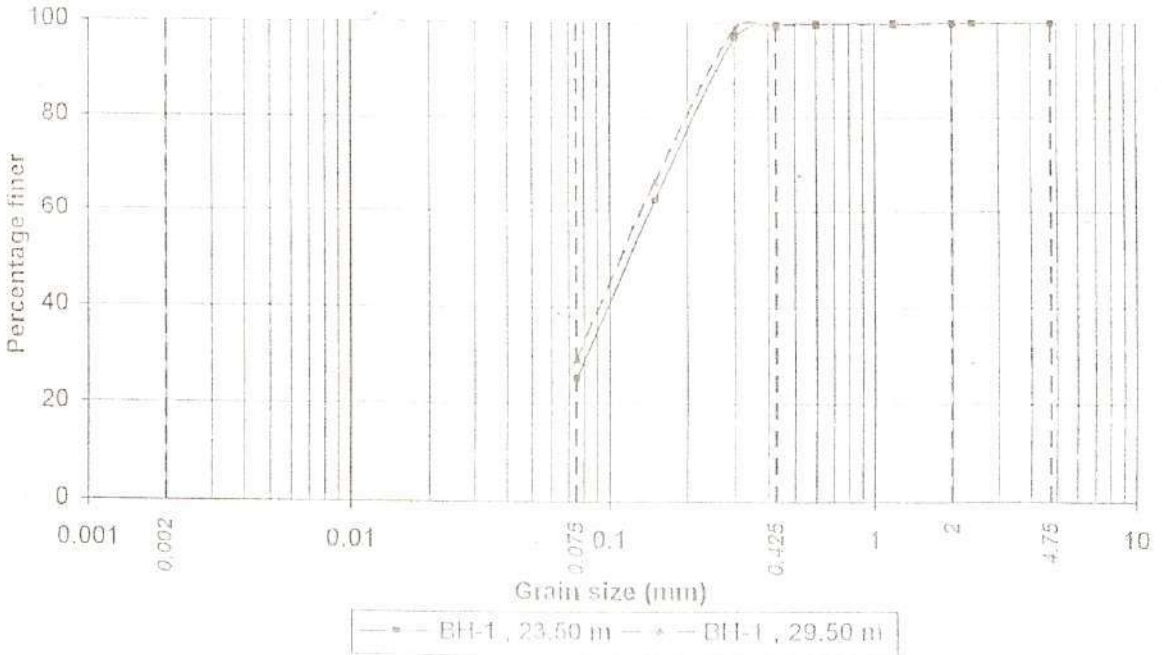
Project: Soil investigation for EPRM Scheme for Improvement of Draught in Hooghly River - 3rd Oil Jetty.	Job No. CCPL/0605582	Fig. No. C - 4

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm) / Sample No.	<0.002 Clay (%)	0.002-0.075 Silt (%)	0.075-0.425 Fine sand (%)	0.425-2.0 Medium sand (%)	2.0-4.75 Coarse sand (%)	>4.75 Gravel (%)
BH-1 , 14.00 m	15.0	33.5	51.4	0.1	0.0	0.0
BH-1 , 17.50 m	*20.1		79.2	0.7	0.0	0.0

*Silt & Clay

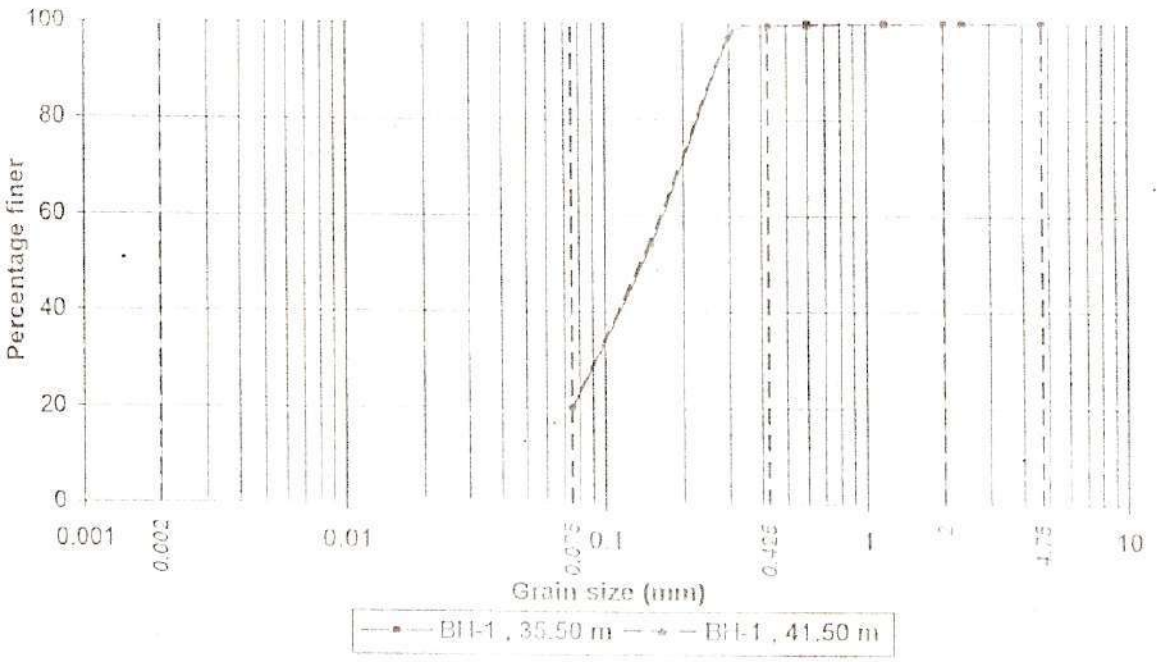


Grain size (mm) / Sample No.	<0.002 Clay (%)	0.002-0.075 Silt (%)	0.075-0.425 Fine sand (%)	0.425-2.0 Medium sand (%)	2.0-4.75 Coarse sand (%)	>4.75 Gravel (%)
BH-1 , 23.50 m	*25.2		74.5	0.3	0.0	0.0
BH-1 , 29.50 m	*29.1		70.3	0.6	0.0	0.0

*Silt & Clay

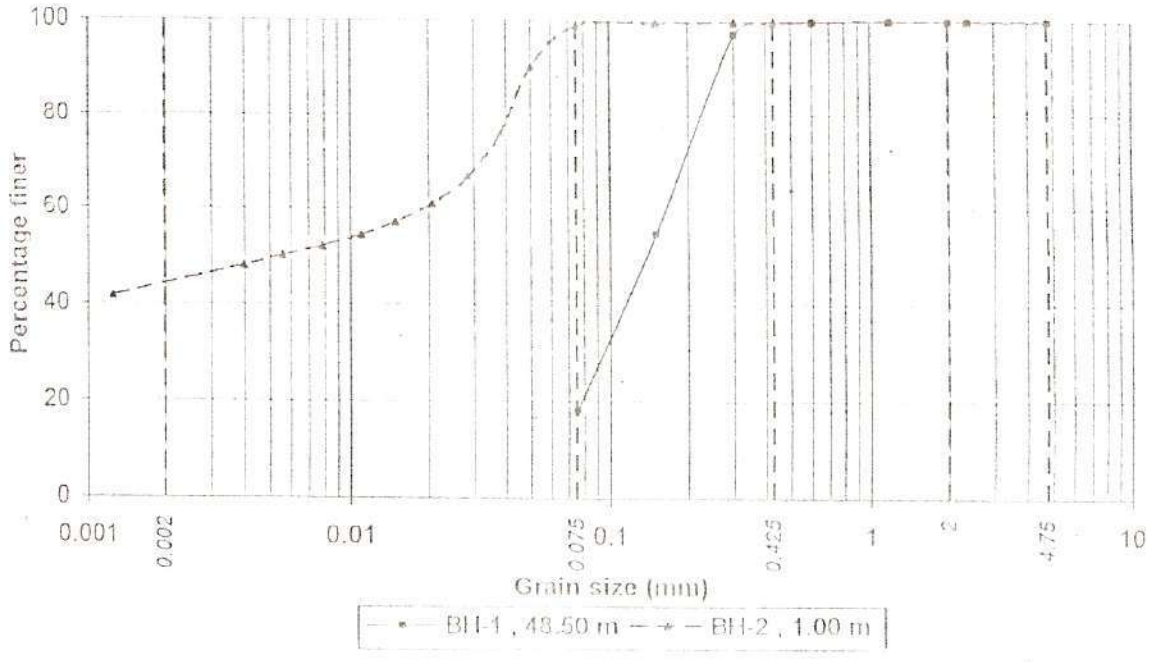
Project: Soil investigation for RRM Scheme for Improvement of Draught in Hooghly River - 3rd Oil Jetty.	Job No. CCPL/0605582	Fig. No. C - 5

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm) / Sample No.	<0.002 Clay (%)	0.002-0.075 Silt (%)	0.075-0.425 Fine sand (%)	0.425-2.0 Medium sand (%)	2.0-4.75 Coarse sand (%)	>4.75 Gravel (%)
BH-1 , 35.50 m	*20.0		79.3	0.7	0.0	0.0
BH-1 , 41.50 m	*20.1		79.3	0.6	0.0	0.0

*Silt & Clay

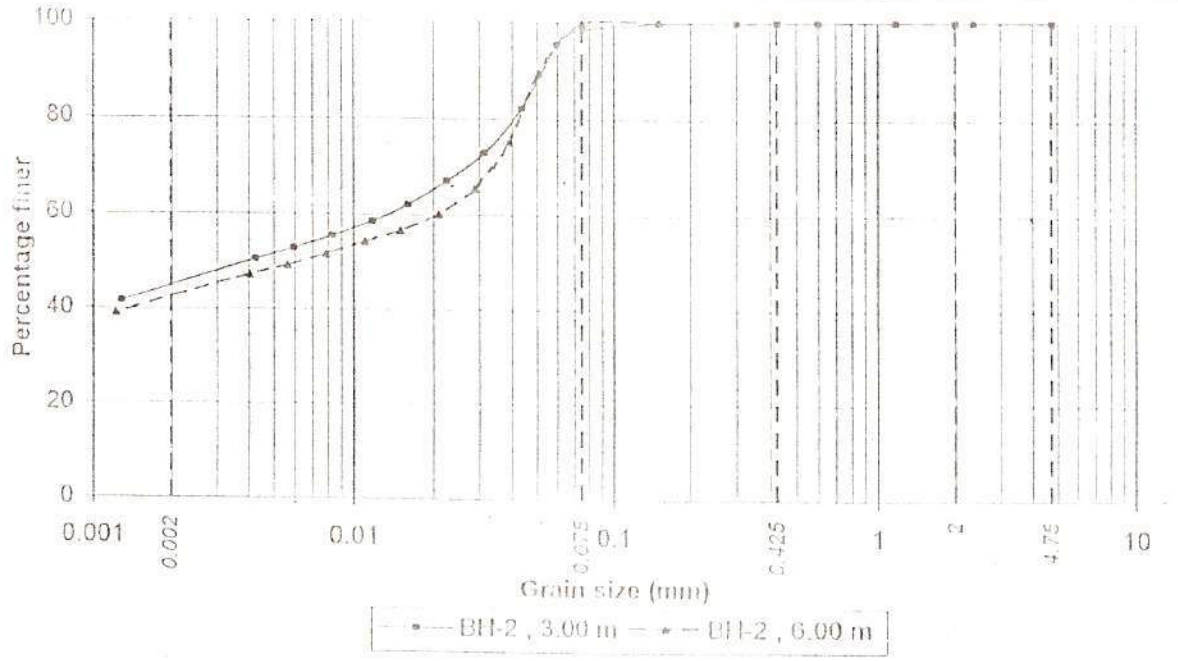


Grain size (mm) / Sample No.	<0.002 Clay (%)	0.002-0.075 Silt (%)	0.075-0.425 Fine sand (%)	0.425-2.0 Medium sand (%)	2.0-4.75 Coarse sand (%)	>4.75 Gravel (%)
BH-1 , 48.50 m	*18.0		81.4	0.6	0.0	0.0
BH-2 , 1.00 m	44.2	54.9	0.8	0.1	0.0	0.0

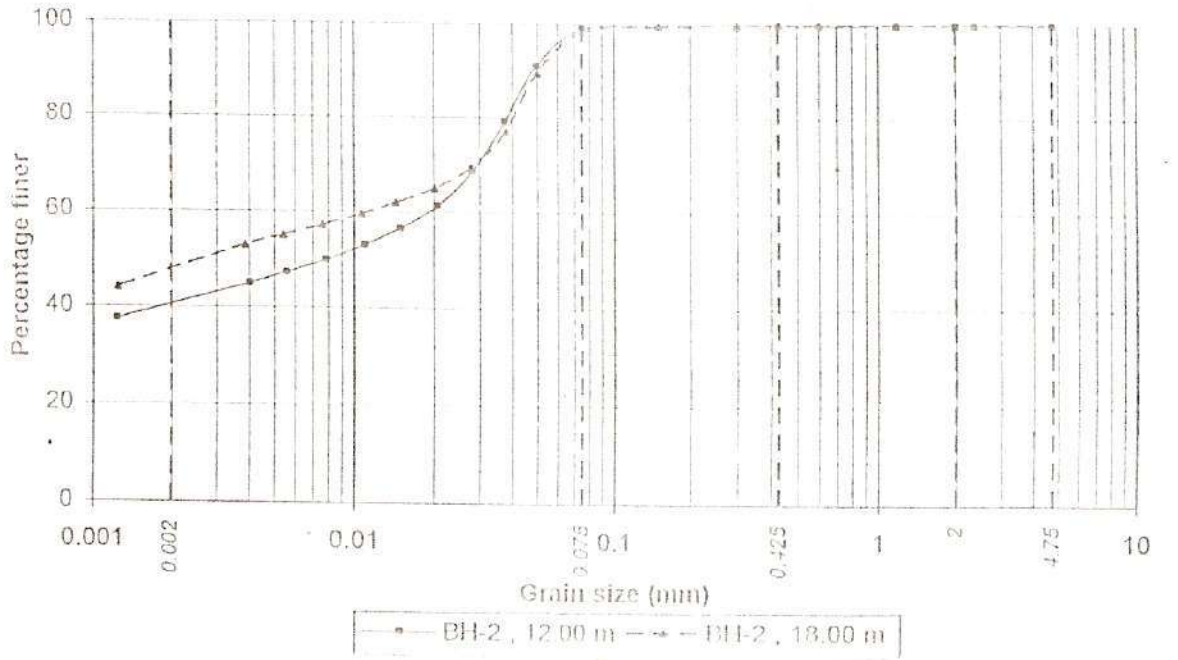
*Silt & Clay

Project: Soil investigation for RRM Scheme for Improvement of Draught in Hooghly River - 3rd Oil Jetty.	Job No. CCPL/0605582	Fig. No. C - 6

GRAIN SIZE DISTRIBUTION CURVES



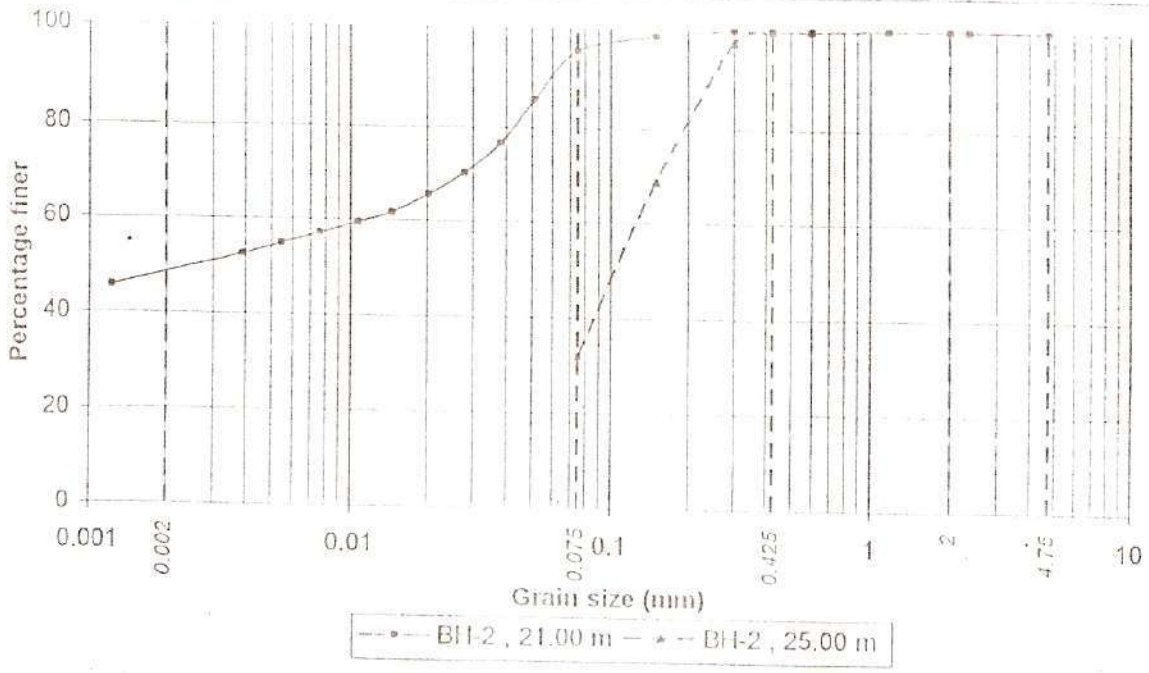
Grain size (mm) / Sample No.	<0.002 Clay (%)	0.002-0.075 Silt (%)	0.075-0.425 Fine sand (%)	0.425-2.0 Medium sand (%)	2.0-4.75 Coarse sand (%)	>4.75 Gravel (%)
BH-2 , 3.00 m	44.8	53.5	1.7	0.0	0.0	0.0
BH-2 , 6.00 m	42.4	57.3	0.3	0.0	0.0	0.0



Grain size (mm) / Sample No.	<0.002 Clay (%)	0.002-0.075 Silt (%)	0.075-0.425 Fine sand (%)	0.425-2.0 Medium sand (%)	2.0-4.75 Coarse sand (%)	>4.75 Gravel (%)
BH-2 , 12.00 m	40.6	58.5	0.5	0.4	0.0	0.0
BH-2 , 18.00 m	47.8	50.5	1.7	0.0	0.0	0.0

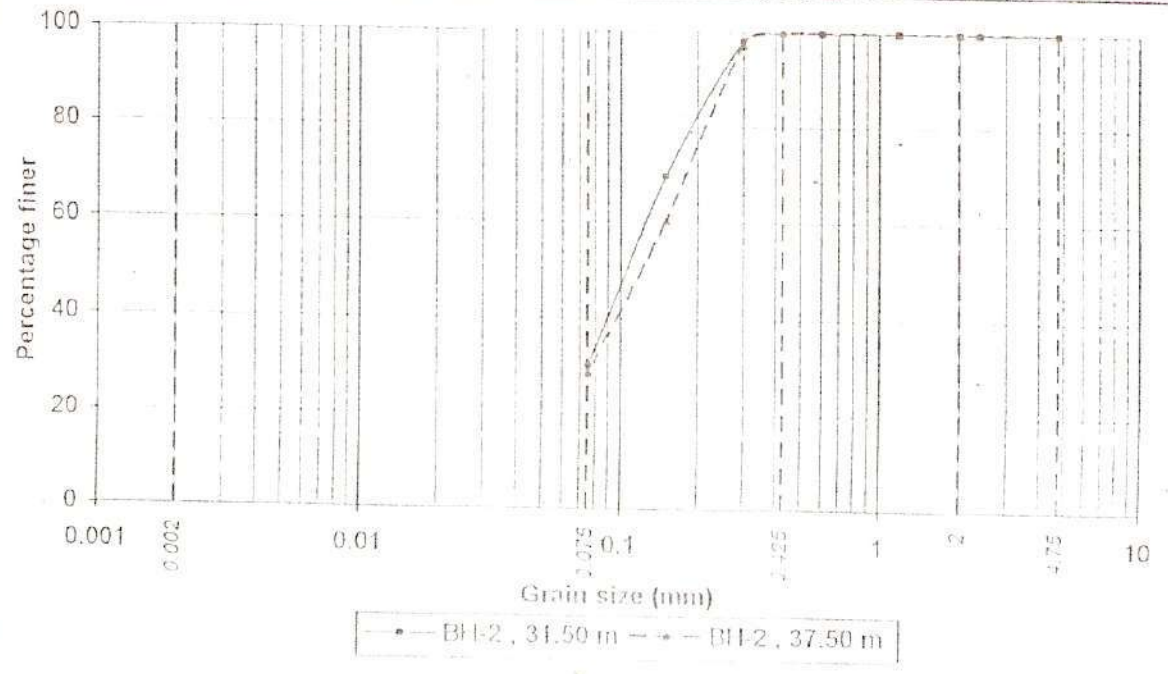
Project: Soil investigation for RRM Scheme for Improvement of Draught in Hooghly River - 3rd Oil Jetty.	Job No. CCPL/0605582	Fig. No. C - 7

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm) / Sample No.	<0.002 Clay (%)	0.002-0.075 Silt (%)	0.075-0.425 Fine sand (%)	0.425-2.0 Medium sand (%)	2.0-4.75 Coarse sand (%)	>4.75 Gravel (%)
BH-2 , 21.00 m	48.3	47.0	4.6	0.1	0.0	0.0
BH-2 , 25.00 m	*32.0		67.5	0.5	0.0	0.0

*Silt & Clay

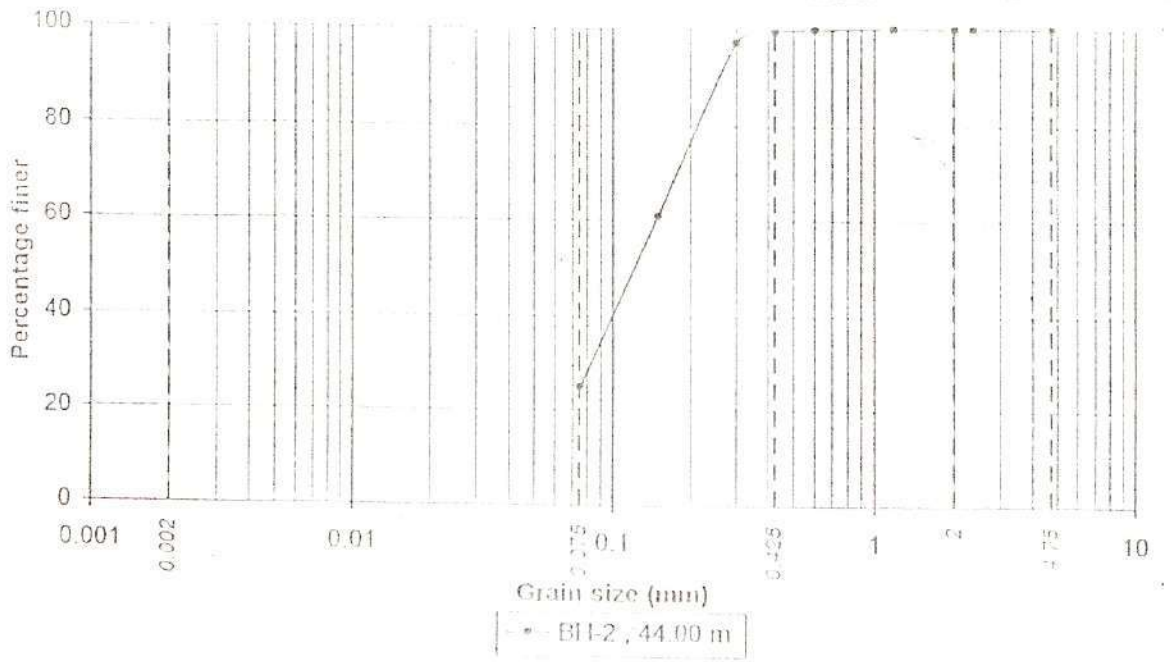


Grain size (mm) / Sample No.	<0.002 Clay (%)	0.002-0.075 Silt (%)	0.075-0.425 Fine sand (%)	0.425-2.0 Medium sand (%)	2.0-4.75 Coarse sand (%)	>4.75 Gravel (%)
BH-2 , 31.50 m	*30.3		69.4	0.3	0.0	0.0
BH-2 , 37.50 m	*28.7		71.1	0.2	0.0	0.0

*Silt & Clay

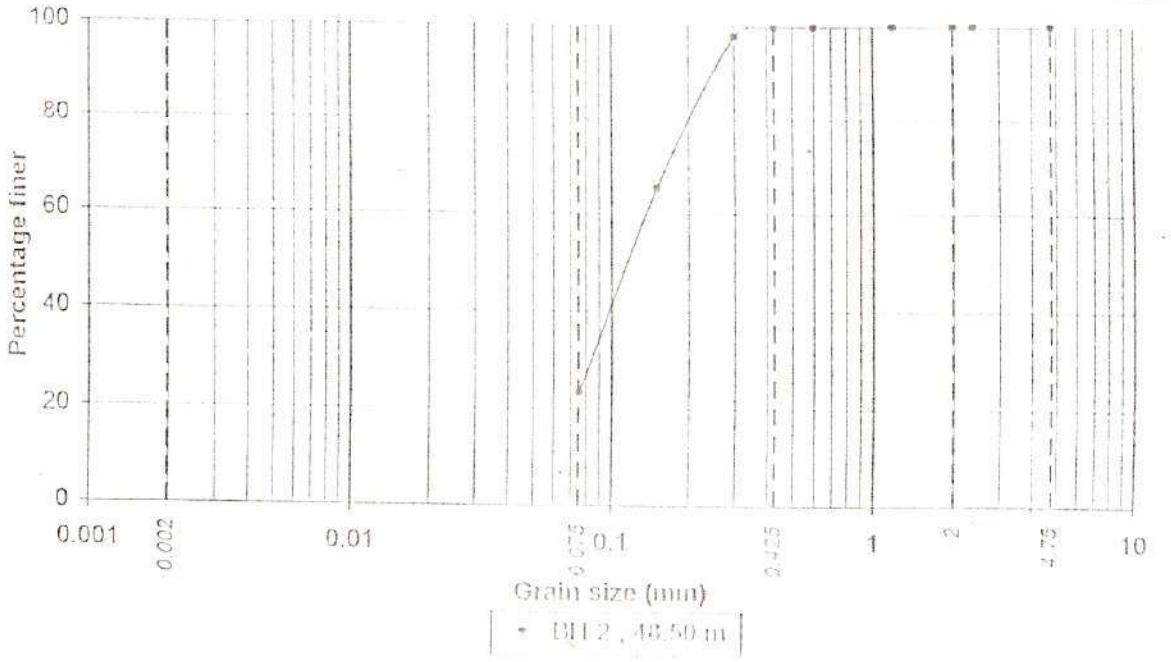
Project: Soil investigation for FRM Scheme for Improvement of Draught in Hooghly River - 3rd Oil Jetty.	Job No. CCPL/0605582	Fig. No. C - 8

GRAIN SIZE DISTRIBUTION CURVES



Grain size (mm) / Sample No.	<0.002 Clay (%)	0.002-0.075 Silt (%)	0.075-0.425 Fine sand (%)	0.425-2.0 Medium sand (%)	2.0-4.75 Coarse sand (%)	>4.75 Gravel (%)
BH-2 , 44.00 m	*24.9		74.5	0.6	0.0	0.0

*Silt & Clay

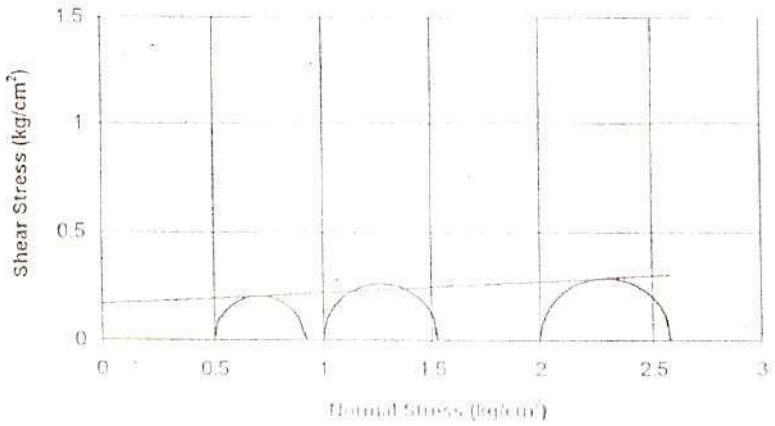


Grain size (mm) / Sample No.	<0.002 Clay (%)	0.002-0.075 Silt (%)	0.075-0.425 Fine sand (%)	0.425-2.0 Medium sand (%)	2.0-4.75 Coarse sand (%)	>4.75 Gravel (%)
BH-2 , 48.50 m	*23.4		76.2	0.4	0.0	0.0

*Silt & Clay

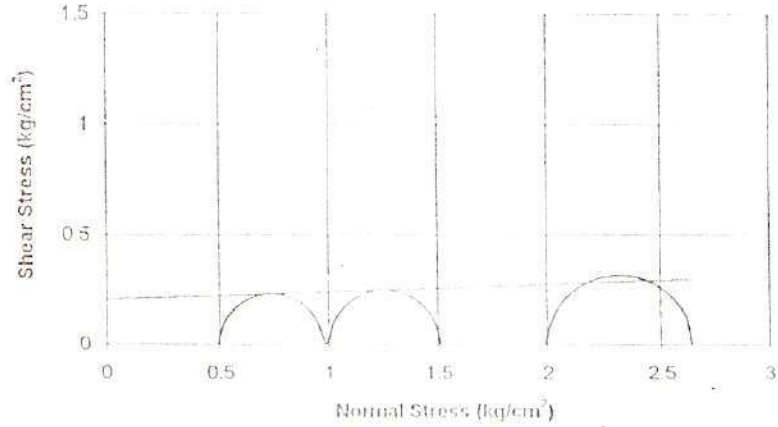
Project: Soil investigation for DRM Scheme for Improvement of Draught in Hooghly River - 3rd Oil Jetty.	Job No. CCPL/0605582	Fig. No. C - 9

Mohr-Diagram



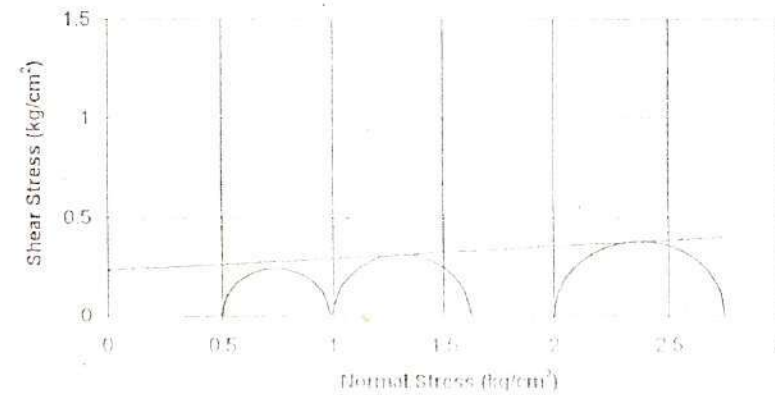
BH No.: BH-1 Depth: 2.00 m	Test Type: UU	c : 0.17 kg/sq. cm ϕ : 3 degree

Mohr-Diagram



BH No.: BH-1 Depth: 5.00 m	Test Type: UU	c : 0.21 kg/sq. cm ϕ : 2 degree

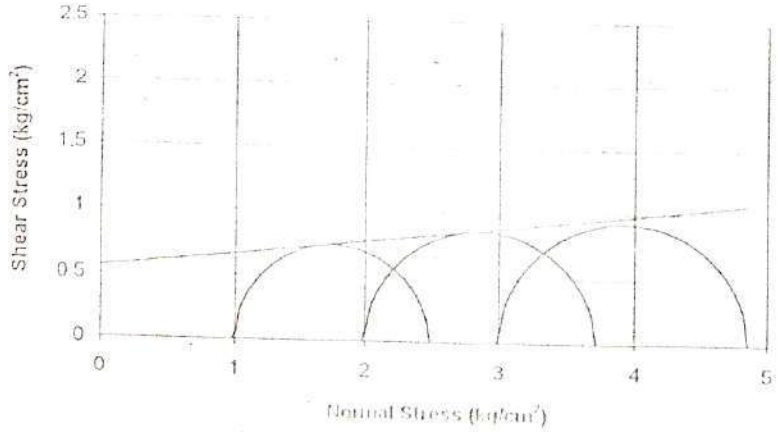
Direct Shear Test



BH No.: BH-1 Depth: 8.00 m	Test Type: UU	c : 0.23 kg/sq. cm ϕ : 3.5 degree

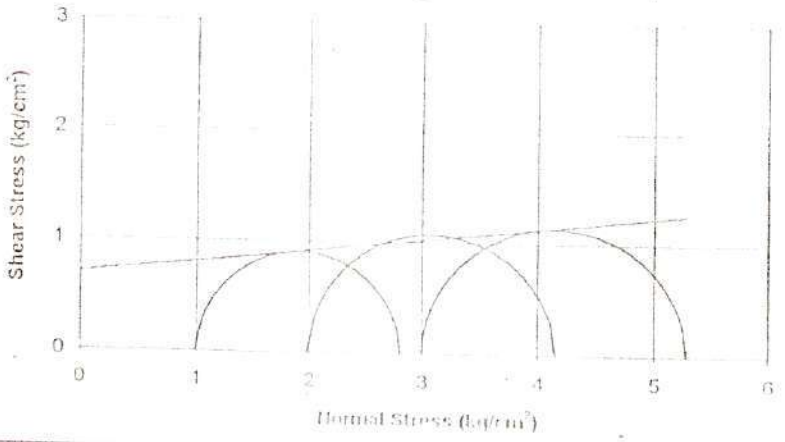
Project: Soil investigation for RRM Scheme for Improvement of Draught in Hooghly River - 3rd Oil Jetty.	Job No.	Fig. No.
	CCPL/0605582	C - 10

Mohr-Diagram



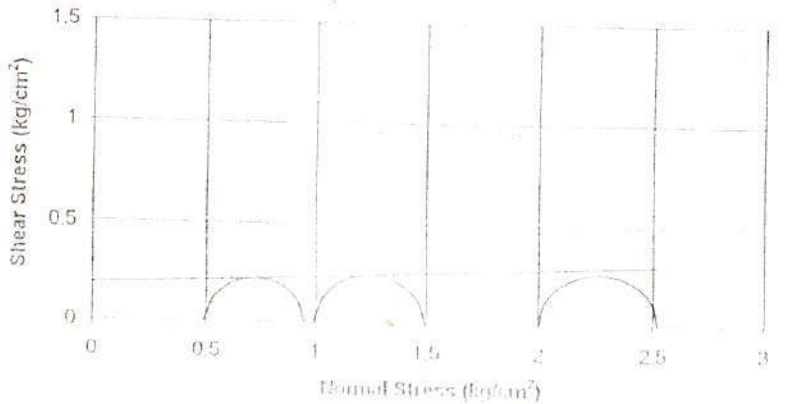
BH No.:	BH-1	Test Type: UU	c : 0.56 kg/sq. cm
Depth:	11.00 m		ϕ : 6 degree

Mohr-Diagram



BH No.:	BH-1	Test Type: UU	c : 0.71 kg/sq. cm
Depth:	14.00 m		ϕ : 6 degree

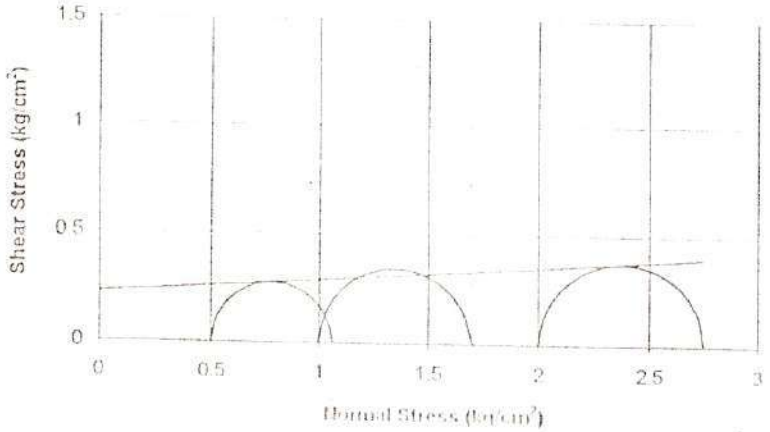
Direct Shear Test



BH No.:	BH-2	Test Type: UU	c : 0.19 kg/sq. cm
Depth:	3.00 m		ϕ : 2.5 degree

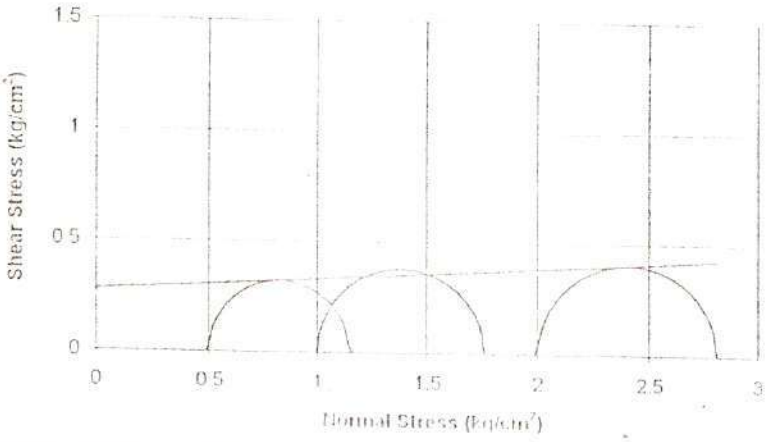
Project: Soil investigation for RRM Scheme for Improvement of Draught in Hooghly River - 3rd Oil Jetty.	Job No.	Fig. No.
	CCPL/0605502	C - 11

Mohr-Diagram



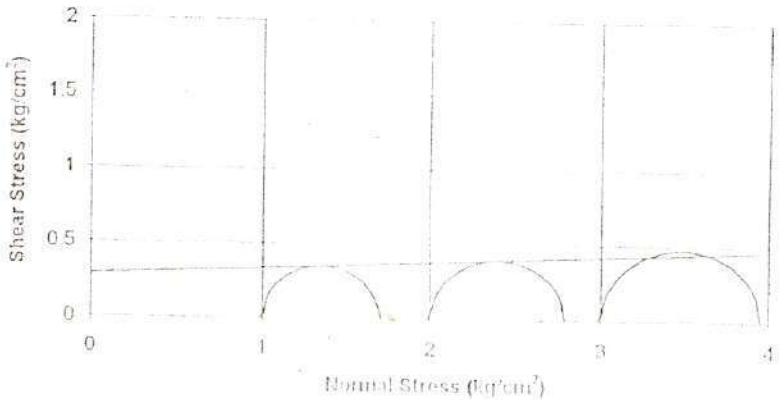
BH No.: BH-2	Test Type: UU	c : 0.23 kg/sq. cm
Depth: 6.00 m		ϕ : 3.5 degree

Mohr-Diagram



BH No.: BH-2	Test Type: UU	c : 0.28 kg/sq. cm
Depth: 9.00 m		ϕ : 3 degree

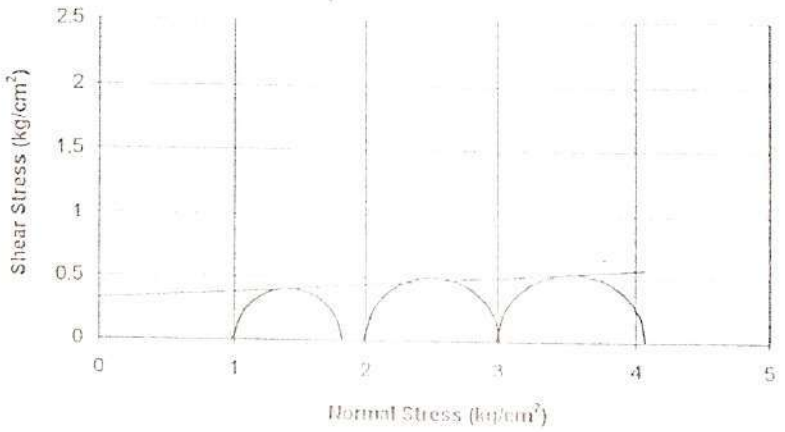
Direct Shear Test



BH No.: BH-2	Test Type: UU	c : 0.29 kg/sq. cm
Depth: 12.00 m		ϕ : 2.5 degree

Project: Soil investigation for RRM Scheme for Improvement of Draught in Hooghly River - 3rd Oil Jetty.	Job No.	Fig. No.
	CGPL/030559/2	C - 12

Mohr-Diagram



BH No.: BH-2
Depth: 15.00 m

Test Type: UU

c : 0.32 kg/sq. cm
ϕ : 3.5 degree

Mohr-Diagram



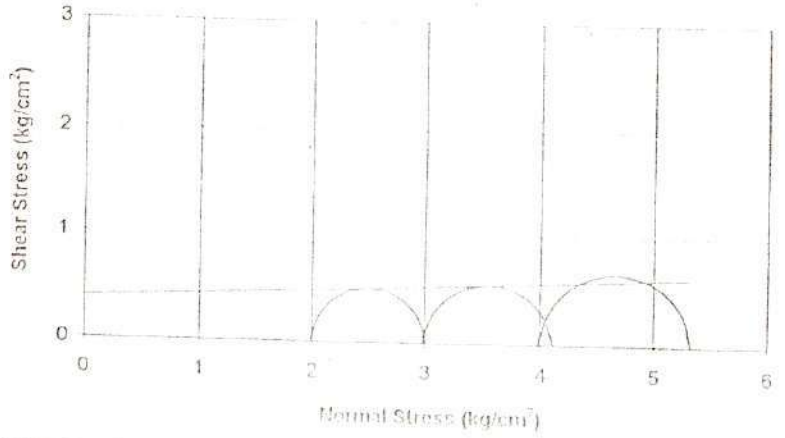
BH No.: BH-2
Depth: 18.00 m

Test Type: UU

c : 0.34 kg/sq. cm
ϕ : 4 degree

Project: Soil investigation for RRM Scheme for Improvement of Draught in Hooghly River - 3rd Oil Jetty.	Job No.	Fig. No.
	CCPL/0605582	C - 13

Mohr-Diagram

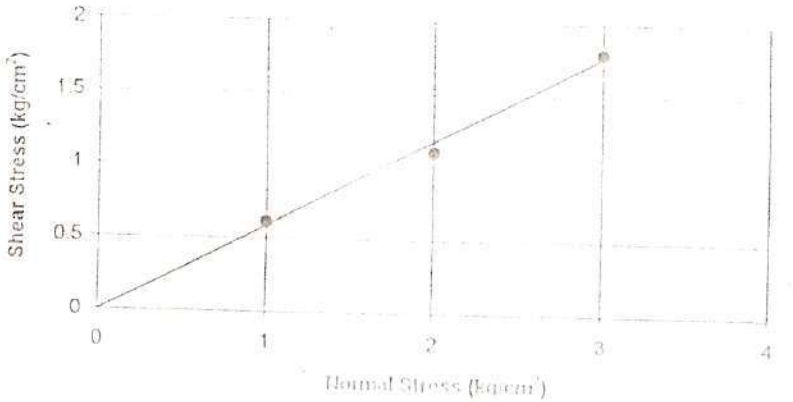


BH No.: BH-2
Depth: 21.00 m

Test Type: UU

c : 0.39 kg/sq. cm
ϕ : 2.5 degree

Direct Shear Test



BH No.: BH-2
Depth: 25.00 m

Test Type: DS

c : 0.00 kg/sq. cm
ϕ : 30.5 degree

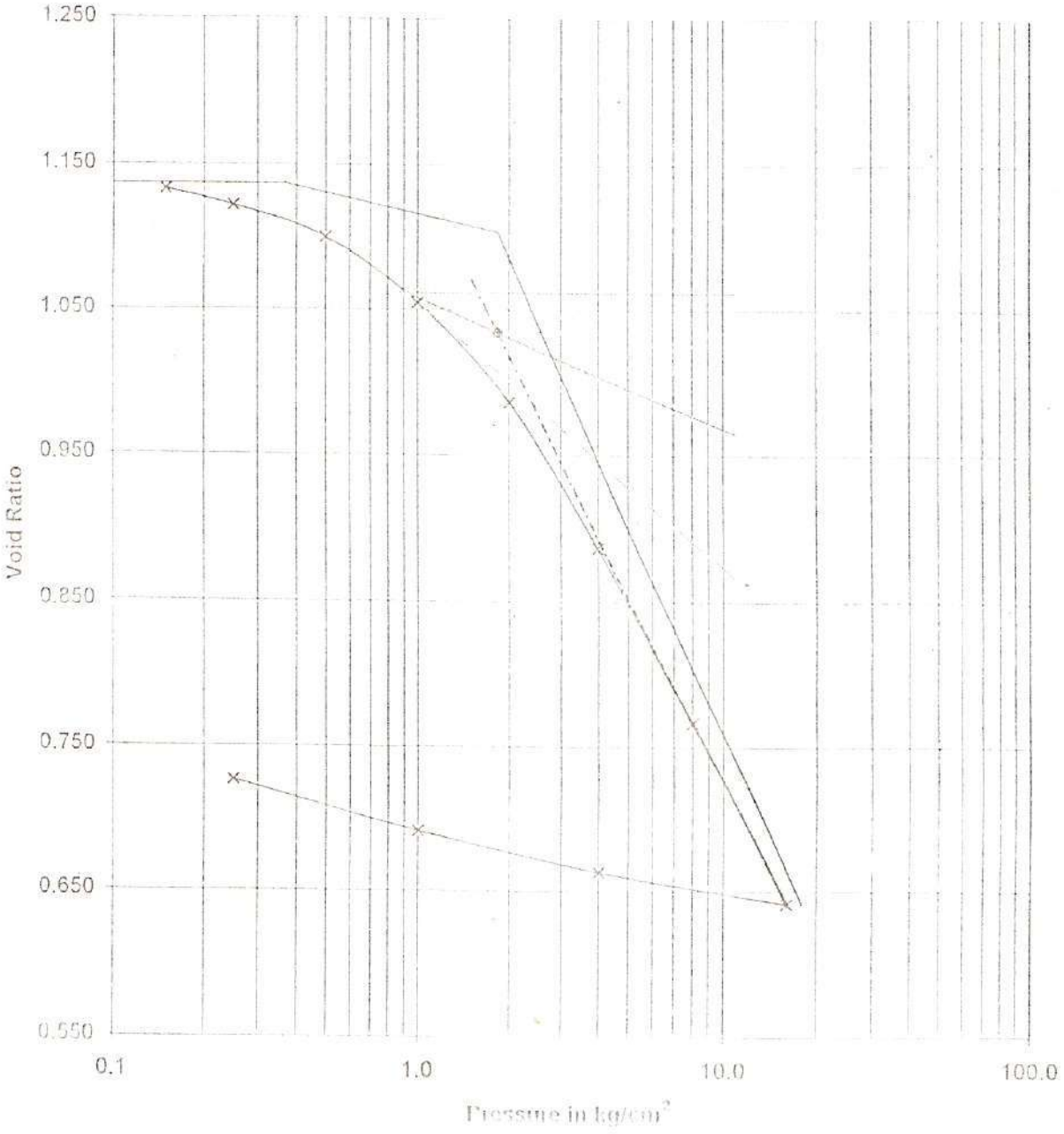
Project: Soil investigation for RRM Scheme for Improvement of Draught in Hooghly River - 3rd Oil Jetty.	Job No.	Fig. No.
	CCPL/0605582	C - 14

e-log p curve

BH-No. : BH-1
Depth : 5.0m
e_0 = 1.1367
p_0 = 0.37 kg/cm²

C_c = 0.4674
$C_c/(1+e_0)$ = 0.2187
p_c = 1.83 kg/cm²
C_s = 0.0469
C_r = 0.0469

Pressure range (kg/cm²)		m_v (Lab) (cm²/kg)
0.25 - 0.50	:	0.0415
0.50 - 1.00	:	0.0429
1.00 - 2.00	:	0.0336
2.00 - 4.00	:	0.0254
4.00 - 8.00	:	0.0158



Project : Soil investigation for RRM Scheme for Improvement of Draught in Hooghly River - 3rd Oil Jetty.

Job No.: CCPL/0605582

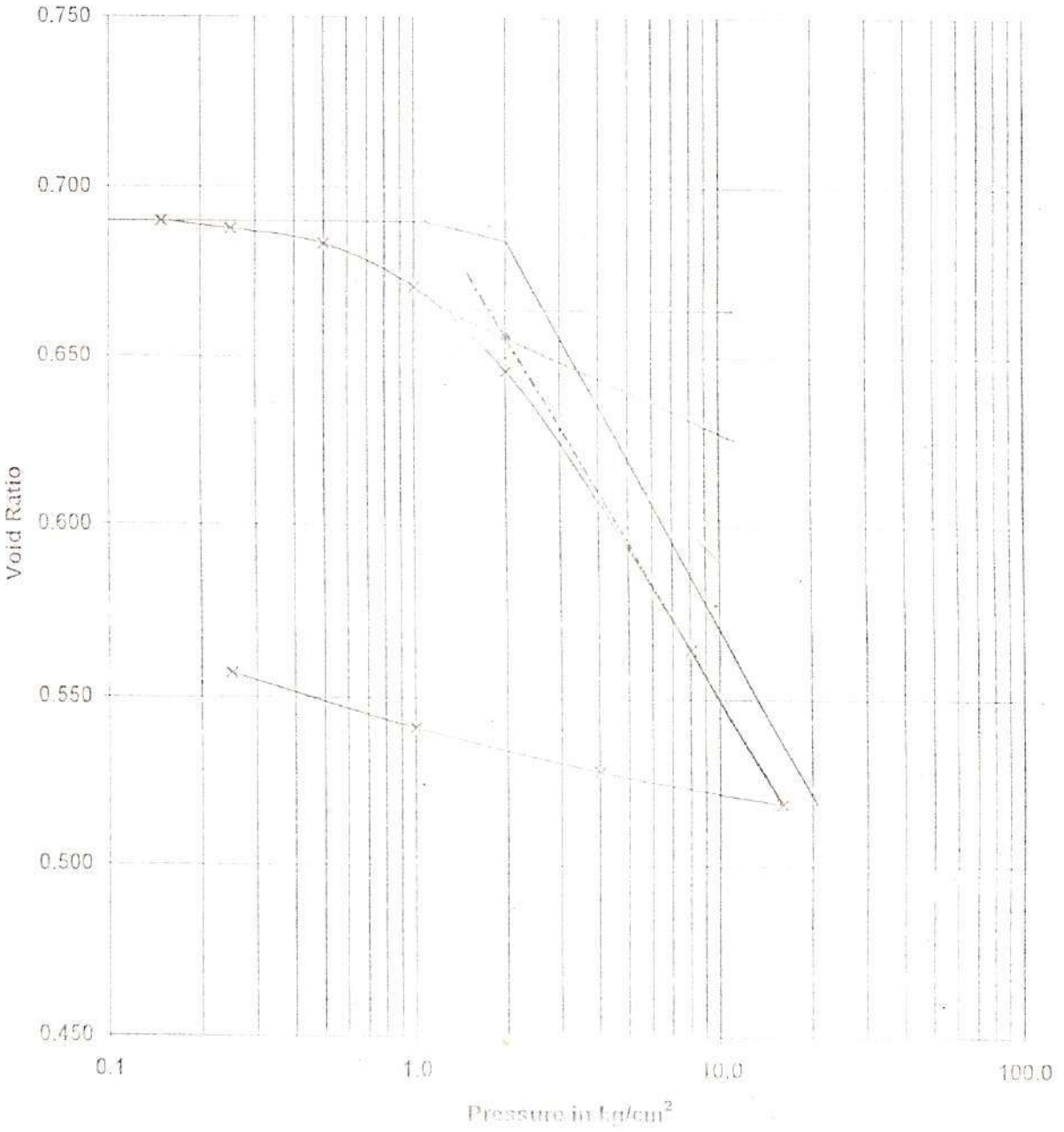
Fig No. C - 15

e-logp curve

BH-No. : BH-1
Depth : 14.0m
e_0 = 0.6901
p_0 = 1.09 kg/cm²

C_c = 0.1633
$C_c/(1+e_0)$ = 0.0966
p_c = 2.00 kg/cm²
C_s = 0.0213
$C_r \approx 0.0213$

Pressure range (kg/cm²)		m_v (Lab) (cm²/kg)
0.25 - 0.50	:	0.0102
0.50 - 1.00	:	0.0152
1.00 - 2.00	:	0.0149
2.00 - 4.00	:	0.0117
4.00 - 8.00	:	0.0067



Project : Soil investigation for RRM Scheme for Improvement of Draught in Hooghly River - 3rd Oil Jetty.

Job No.: CCPL/0605582

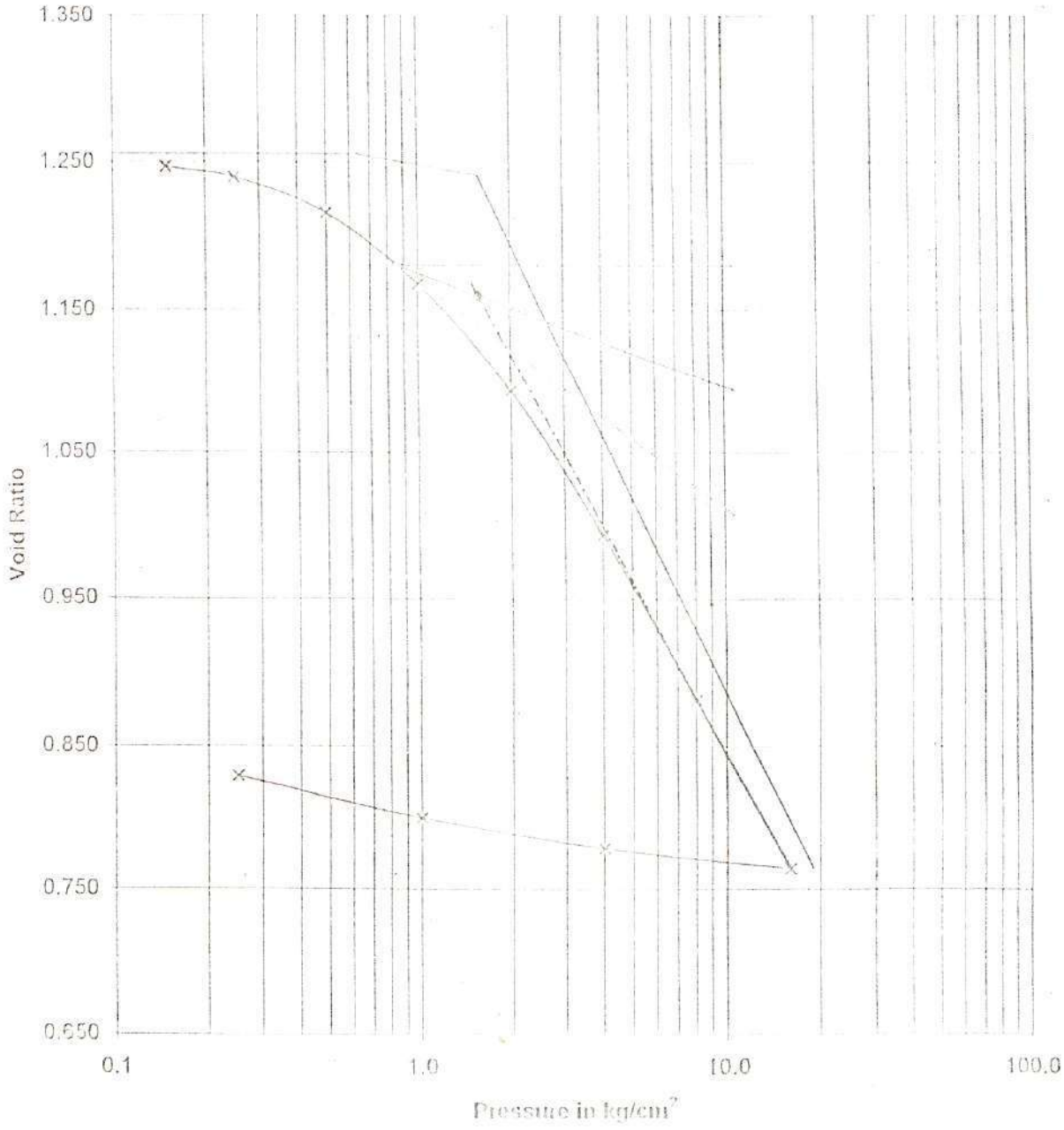
Fig No. C - 16

e-logp curve

BH-No. : BH-2
Depth : 9.0m
e_0 = 1.2558
p_0 = 0.64 kg/cm²

C_c = 0.4414
$C_c/(1+e_0)$ = 0.1957
p_c = 1.57 kg/cm²
C_s = 0.0361
C_r = 0.0361

Pressure range (kg/cm²)		m_v (Lab) (cm²/kg)
0.25 - 0.50	:	0.0429
0.50 - 1.00	:	0.0433
1.00 - 2.00	:	0.0346
2.00 - 4.00	:	0.0237
4.00 - 8.00	:	0.0140



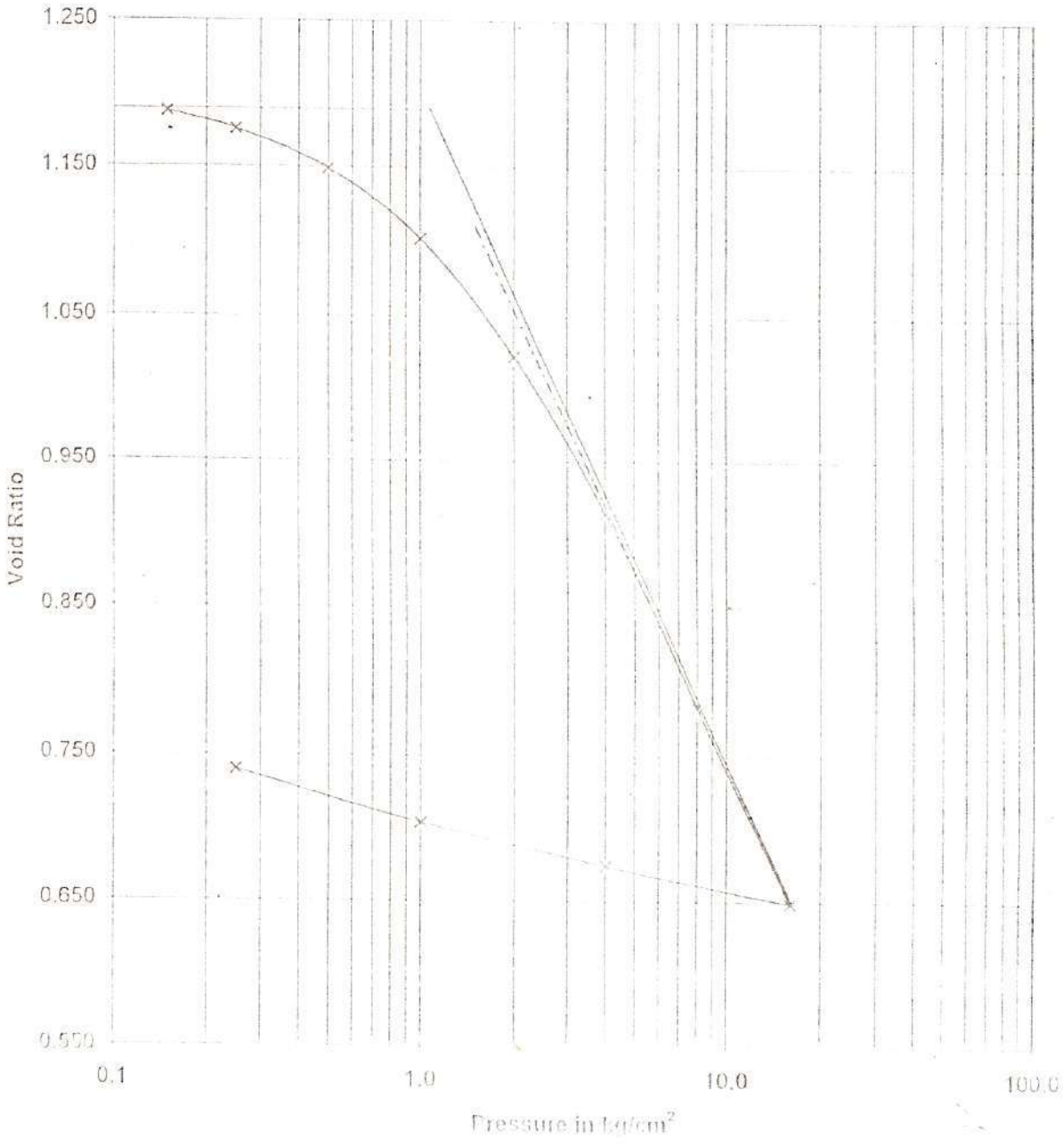
Project : Soil investigation for RRM Scheme for Improvement of Draught in Hooghly River - 3rd Oil Jetty.	Job No.: CCPL/0605582	Fig No. C - 17

e-logp curve

BH-No. : BH-2
Depth : 15.0m
e_0 = 1.1891
p_0 = 1.07 kg/cm²

C_c = 0.4569
$C_c/(1+e_0)$ = 0.2087
p_c = -
C_s = 0.0504
C_r = 0.0504

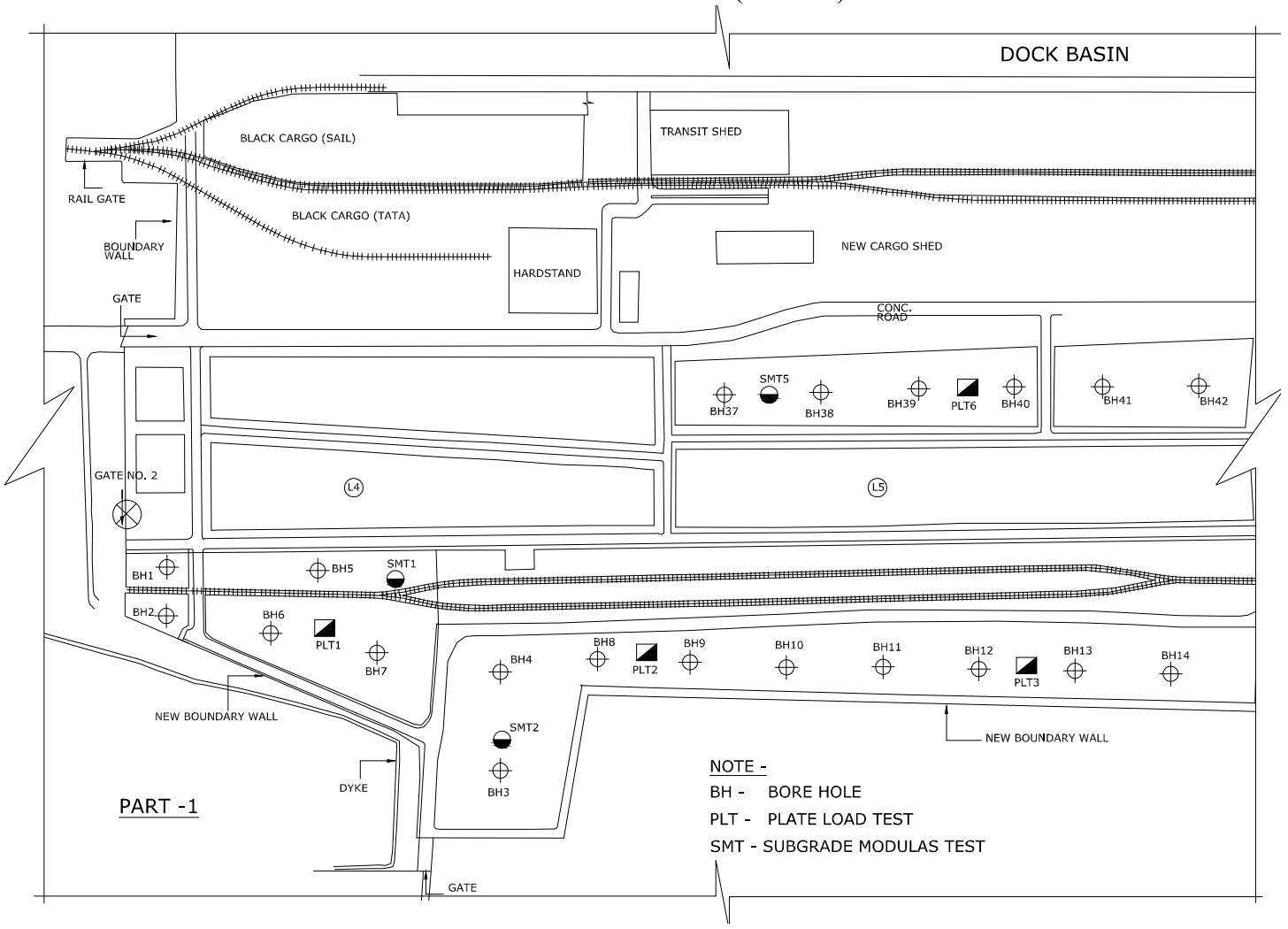
Pressure range (kg/cm²)		m_v (Lab) (cm²/kg)
0.25 - 0.50	:	0.0478
0.50 - 1.00	:	0.0437
1.00 - 2.00	:	0.0376
2.00 - 4.00	:	0.0269
4.00 - 8.00	:	0.0170



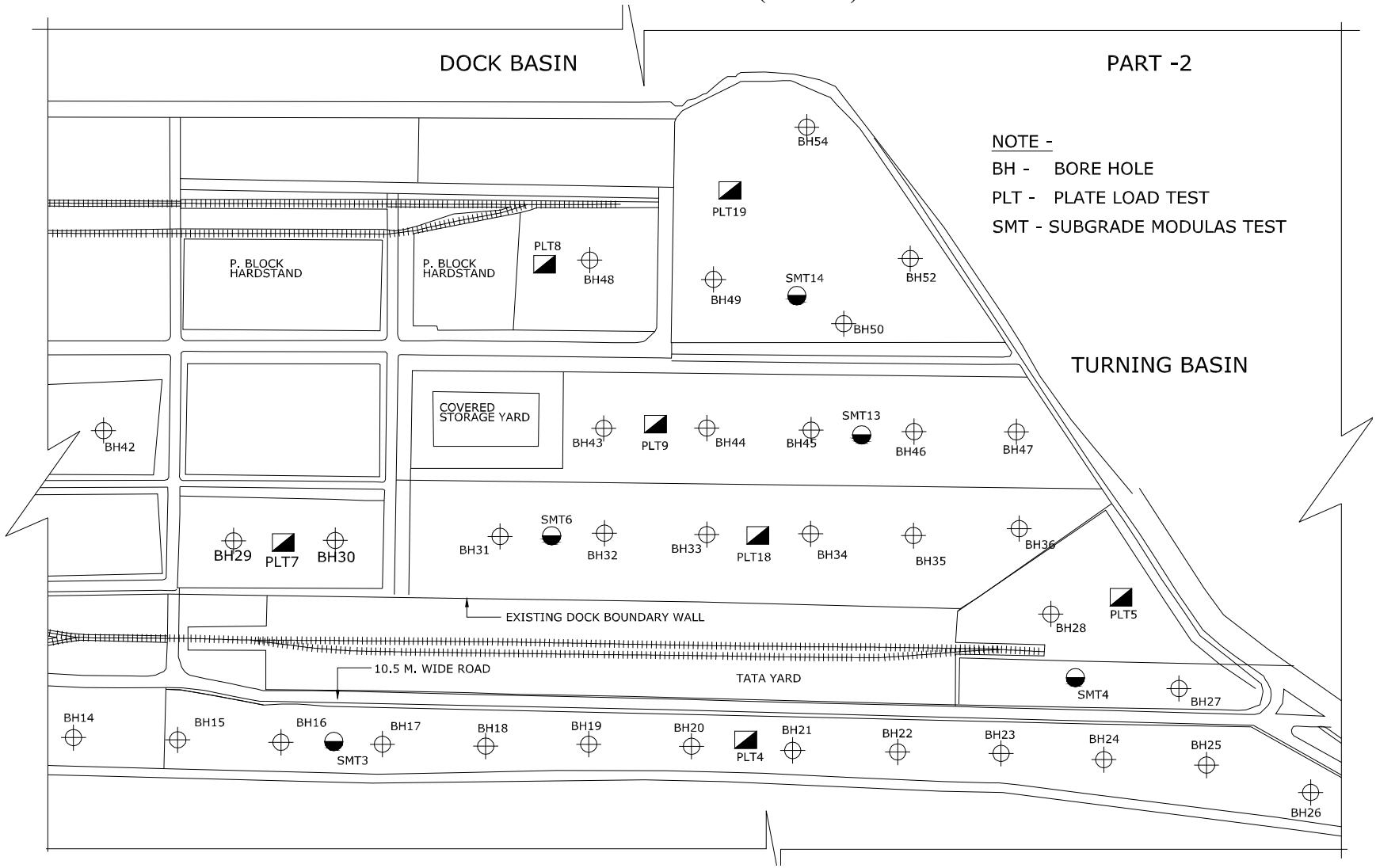
Project : Soil investigation for RRM Scheme for Improvement of Draught in Hooghly River - 3rd Oil Jetty.

Job No.:	Fig No.
CGPL/0605582	C - 18

APPENDIX – A
TEST LOCATION PLAN (PART-1)



APPENDIX – A
TEST LOCATION PLAN (PART-2)



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ENGINEERS PVT. LTD.

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH- 1)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic silt of intermediate plasticity**	MI	-	-	0	0	0	1	89	10	27.59	1.850	1.450	45	29	16	UU	26	7	-	-	2.66	0.110	0.834
1.50		-	4	-	-	-	-	-	-	-	27.46	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		MI	-	-	0	0	0	1	86	13	34.06	1.947	1.452	45	30	15	UU	40	4	17	32	2.66	0.115	0.832
3.00		-	3	-	-	-	-	-	-	-	33.16	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	2	-	-	-	-	-	-	-	29.72	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic clays of intermediate plasticity**	CI	-	-	0	0	0	4	88	8	30.72	1.910	1.461	39	24	15	UU	30	6	-	23	2.66	0.100	0.821
6.00		-	3	-	-	-	-	-	-	-	30.38	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00	**Inorganic silt of intermediate plasticity**	MI	-	-	0	0	0	1	85	14	29.71	1.905	1.469	45	30	15	UU	38	5	-	-	2.66	0.119	0.811
7.50			2	-	-	-	-	-	-	-	30.36	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00		-	3	-	-	-	-	-	-	-	30.75	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50	**Inorganic clays of intermediate plasticity**	CI	-	-	0	0	0	6	88	6	28.59	1.899	1.477	37	21	16	UU	29	6	-	-	2.66	0.099	0.801
10.50			2	-	-	-	-	-	-	-	23.65	-	-	-	-	-	-	-	-	-	-	-	-	-
11.00	**Inorganic silt of low plasticity**	ML		-	0	0	0	16	83	1	30.36	1.937	1.486	30	24	6	UU	17	13	-	-	2.66	0.089	0.790
12.00		-	7	-	-	-	-	-	-	-	36.57	-	-	-	-	-	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH- 1)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
13.00	**Inorganic silt of low plasticity**	ML		-	0	0	0	21	78	1	30.37	1.953	1.498	31	25	6	UU	17	14	-	-	2.66	0.088	0.776
13.50		-	8	-	-	-	-	-	-	-	30.65	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00		-	11	-	-	-	-	-	-	-	25.17	-	-	-	-	-	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH- 2)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic clays of low plasticity**	CL	-	-	1	0	2	19	74	4	21.15	1.751	1.445	33	20	13	UU	25	7	-	28	2.66	0.090	0.841
1.50		-	4	-	-	-	-	-	-	-	28.90	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50	**Inorganic silt of intermediate plasticity**	MI	-	-	0	0	0	1	84	15	30.93	1.912	1.460	55	26	29	UU	40	4	17	40	2.66	0.117	0.822
3.00		-	3	-	-	-	-	-	-	-	38.00	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	4	-	-	-	-	-	-	-	22.00	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic clays of low plasticity**	CL	-	-	0	0	0	6	88	6	33.99	1.960	1.463	34	23	11	UU	23	9	-	28	2.66	0.089	0.818
6.00		-	2	-	-	-	-	-	-	-	39.10	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00	**Inorganic silt of intermediate plasticity**	MI	-	-	0	0	0	2	86	12	37.69	2.024	1.470	44	28	16	UU	29	6	-	16	2.66	0.110	0.810
7.50			2	-	-	-	-	-	-	-	36.59	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00		-	3	-	-	-	-	-	-	-	37.20	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50	**Inorganic clays of low plasticity**	CL	-	-	0	0	0	2	93	5	30.72	1.935	1.480	38	26	12	UU	23	9	-	-	2.66	0.100	0.797
10.50			8	-							41.70	-	-	-	-	-	-	-	-	-	-	-	-	-
11.00		CL		-	0	0	0	6	88	6	26.90	1.884	1.485	37	25	12	UU	22	9	-	-	2.66	0.099	0.791
12.00		-	4	-	-	-	-	-	-	-	36.90	-	-	-	-	-	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH- 2)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
13.00	**Inorganic clays of low plastaicity**	CL		-	0	0	0	3	93	4	30.07	1.947	1.497	33	20	13	UU	25	7	-	-	2.66	0.098	0.777
13.50		-	13	-	-	-	-	-	-	-	33.10	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00		CL	-	-	1	0	2	19	74	4	21.15	1.751	1.445	33	20	13	UU	25	7	-	28	2.66	0.090	0.841

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH- 3)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic clays of low plasticity**	CL	-	-	0	0	0	25	74	1	23.44	1.790	1.450	33	20	13	UU	26	7	-	-	2.66	0.088	0.834
1.50		-	5	-	-	-	-	-	-	-	21.21	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50	**Inorganic clays of intermediate plasticity**	CI	-	-	0	0	1	2	89	8	29.13	1.879	1.455	42	24	18	UU	34	5	-	-	2.66	0.092	0.828
3.00		-	5	-	-	-	-	-	-	-	29.13	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	2	-	-	-	-	-	-	-	30.57	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic silt of low plasticity**	ML	-	-	0	0	0	16	84	0	35.19	1.978	1.463	26	22	4	UU	15	16	-	-	2.66	0.090	0.818
6.00		-	6	-	-	-	-	-	-	-	36.12	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00		ML	-	-	0	0	0	18	82	0	37.03	2.013	1.469	26	22	4	UU	16	16	-	-	2.66	0.089	0.811
7.50			5	-	-	-	-	-	-	-	30.19	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00		-	7	-	-	-	-	-	-	-	34.00	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50		ML	-	-	0	0	0	15	82	3	29.29	1.907	1.475	30	23	7	UU	18	13	-	-	2.66	0.095	0.803
10.50			3	-							32.26	-	-	-	-	-	-	-	-	-	-	-	-	-
11.00	**Inorganic silt of intermediate plasticity**	MI		-	0	0	0	1	89	10	33.60	1.979	1.481	27	22	5	UU	15	16	-	-	2.66	0.112	0.796

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH- 3)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
12.00	**Inorganic silt of low plasticity**	-	2	-	-	-	-	-	-	-	21.76	-	-	-	-	-	-	-	-	-	-	-	-	-
13.00		ML		-	0	0	0	4	95	1	31.88	1.965	1.490	28	23	5	UU	14	16	-	-	2.66	0.090	0.785
13.50		-	9	-	-	-	-	-	-	-	30.10	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00		-	20	-	-	-	-	-	-	-	30.50	-	-	-	-	-	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH- 4)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic silt of intermediate plasticity**	MI	-	-	0	0	0	6	91	3	33.22	1.912	1.435	36	25	11	UU	22	9	-	15	2.66	0.091	0.854
1.50		-	2	-	-	-	-	-	-	-	26.19	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		MI	-	-	0	0	0	7	88	5	28.13	1.841	1.437	43	27	16	UU	29	6	16	32	2.66	0.099	0.851
3.00		-	1	-	-	-	-	-	-	-	25.18	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	2	-	-	-	-	-	-	-	20.51	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00		MI	-	-	0	0	0	6	90	4	29.87	1.875	1.444	36	26	10	UU	22	8	-	-	2.66	0.095	0.842
6.00		-	3	-	-	-	-	-	-	-	35.66	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00	**Inorganic silt and clays of low plasticity**	CL-ML	-	-	0	0	0	21	78	1	26.38	1.833	1.450	27	21	6	UU	17	13	-	-	2.66	0.094	0.834
7.50			2	-	-	-	-	-	-	-	34.44	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00		-	2	-	-	-	-	-	-	-	20.81	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50	**Inorganic silt of low plasticity**	ML	-	-	0	0	1	36	63	0	24.39	1.817	1.461	25	21	4	UU	15	16	-	-	2.66	0.090	0.821
10.50			8	-	-	-	-	-	-	-	39.60	-	-	-	-	-	-	-	-	-	-	-	-	-
11.00		ML		-	0	0	0	40	60	0	30.67	1.921	1.470	23	21	2	UU	10	18	-	-	2.66	0.089	0.810
12.00		-	7	-	-	-	-	-	-	-	26.01	-	-	-	-	-	-	-	-	-	-	-	-	-
13.00		ML		-	0	0	0	15	84	1	30.26	1.929	1.481	27	22	5	UU	14	17	-	-	2.66	0.092	0.796

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH- 4)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
13.50	**Inorganic silt of low plasticity**	-	10	-	-	-	-	-	-	-	32.23	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00		-	12	-	-	-	-	-	-	-	26.29	-	-	-	-	-	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH- 5)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic silt of intermediate plasticity**	MI	-	-	0	0	2	1	90	7	20.10	1.729	1.440	40	25	15	UU	25	7	-	-	2.66	0.112	0.847
1.50		-	3	-	-	-	-	-	-	-	20.18	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		MI	-	-	0	0	0	3	85	12	21.40	1.760	1.450	45	30	15	UU	26	7	-	-	2.66	0.119	0.834
3.00		-	5	-	-	-	-	-	-	-	21.70	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	4	-	-	-	-	-	-	-	22.15	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic clays of low plasticity**	CL	-	-	0	0	0	6	85	9	18.90	1.730	1.455	31	21	10	UU	22	9	-	-	2.66	0.110	0.828
6.00		-	3	-	-	-	-	-	-	-	19.80	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00		CL	-	-	0	0	0	3	94	3	23.10	1.797	1.460	32	23	9	UU	23	9	-	-	2.66	0.090	0.822
7.50			4	-	-	-	-	-	-	-	23.08	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00		-	5	-	-	-	-	-	-	-	23.50	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50	**Inorganic clays of intermediate plasticity**	CI	-	-	0	0	0	8	87	5	24.10	1.818	1.465	37	21	16	UU	28	6	-	-	2.66	0.095	0.816
12.00		-	4	-	-	-	-	-	-	-	20.18	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00		-	2	-	-	-	-	-	-	-	20.50	-	-	-	-	-	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH- 6)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic silt of intermediate plasticity**	MI	-	-	0	0	2	1	89	8	27.10	1.857	1.461	40	25	15	UU	25	7	-	-	2.66		0.821
1.50		-	3	-	-	-	-	-	-	-	28.38	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		MI	-	-	0	0	0	3	85	12	28.75	1.882	1.462	45	30	15	UU	26	5	-	-	2.66		0.819
3.00		-	2	-	-	-	-	-	-	-	29.25	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	2	-	-	-	-	-	-	-	29.37	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic clays of low plasticity**	CL	-	-	0	0	0	8	82	10	27.25	1.865	1.466	33	22	11	UU	21	10	-	-	2.66		0.814
6.00		-	3	-	-	-	-	-	-	-	27.92	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00		CL	-	-	0	0	0	3	94	3	30.45	1.918	1.470	32	23	9	UU	23	9	-	-	2.66		0.810
7.50			3	-	-	-	-	-	-	-	30.43	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00		-	5	-	-	-	-	-	-	-	30.85	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50	**Inorganic clays of intermediate plasticity**	CI	-	-	0	0	0	8	87	5	31.45	1.944	1.479	37	21	16	UU	27	7	-	-	2.66		0.799
12.00		-	4	-	-	-	-	-	-	-	27.53	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00		-	4	-	-	-	-	-	-	-	27.85	-	-	-	-	-	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH-7)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic silt of intermediate plasticity**	MI	-	-	0	0	0	2	93	5	20.10	1.741	1.450	40	26	14	UU	25	7	-	-	2.66	0.098	0.834
1.50		-	5	-	-	-	-	-	-	-	21.18	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		MI	-	-	0	0	0	3	87	10	19.70	1.742	1.455	45	29	16	UU	28	6	-	-	2.66	0.110	0.828
3.00		-	3	-	-	-	-	-	-	-	22.90	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	3	-	-	-	-	-	-	-	23.18	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00		MI	-	-	0	0	3	2	90	5	24.70	1.824	1.463	40	26	14	UU	25	7	-	-	2.66	0.100	0.818
6.00		-	4	-	-	-	-	-	-	-	25.18	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00	**Inorganic silt of low plasticity**	ML	-	-	0	0	0	2	92	6	19.10	1.751	1.470	30	24	6	UU	17	13	-	-	2.66	0.098	0.810
7.50			3	-	-	-	-	-	-	-	19.75	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00		-	3	-	-	-	-	-	-	-	22.90	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50	**Inorganic silt of intermediate plasticity**	MI	-	-	0	0	0	2	92	6	26.18	1.866	1.479	42	26	16	UU	29	6	-	-	2.66	0.098	0.799
12.00		-	4	-	-	-	-	-	-	-	27.15	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00		-	5	-	-	-	-	-	-	-	27.30	-	-	-	-	-	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH-8)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic silt of intermediate plasticity**	MI		-	0	0	2	2	91	5	27.10	1.870	1.471	42	25	17	UU	26	4	-	-	2.66	-	0.808
1.50		-	4	-	-	-	-	-	-	-	29.38	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		MI		-	0	0	2	5	80	13	27.05	1.864	1.467	44	30	14	UU	27	5	-	-	2.66	-	0.813
3.00		-	2	-	-	-	-	-	-	-	30.45	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	3	-	-	-	-	-	-	-	30.40	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00		MI		-	0	3	4	3	83	7	33.05	1.961	1.474	42	25	17	UU	28	5	-	-	2.66	-	0.805
6.00		-	3	-	-	-	-	-	-	-	33.30	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00	**Inorganic silt of low plasticity**	ML		-	1	3	2	4	85	5	26.45	1.871	1.480	31	24	7	UU	19	15	-	-	2.66	-	0.797
7.50			4	-	-	-	-	-	-	-	27.10	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00		-	2	-	-	-	-	-	-	-	30.25	-	-	-	-	-	-	-	-	-	-	-	-	-
12.00	**Inorganic silt of intermediate plasticity**	MI	2	-	0	4	5	1	84	6	33.53			40	26	14	-	-	-	-	-	-	-	-
15.00		-	5	-	-	-	-	-	-	-	34.50	-	-	-	-	-	-	-	-	-	-	-	-	-
		-																						

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH- 9)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic silt of intermediate plasticity**	MI	-	-	0	0	0	10	86	4	25.18	1.803	1.440	36	25	11	UU	22	9	-	-	2.66	0.093	0.847
1.50		-	4	-	-	-	-	-	-	-	20.70	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		MI	-	-	0	0	0	8	88	4	20.75	1.751	1.450	36	26	10	UU	22	9	-	-	2.66	0.095	0.834
3.00		-	2	-	-	-	-	-	-	-	23.18	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	4	-	-	-	-	-	-	-	24.70	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00		MI	-	-	0	0	2	3	88	7	25.10	1.820	1.455	38	26	12	UU	23	9	-	-	2.66	0.093	0.828
6.00		-	4	-	-	-	-	-	-	-	25.00	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00	**Inorganic clays of intermediate plasticity**	CI	-	-	0	0	0	5	85	10	25.15	1.831	1.463	40	25	15	UU	25	7	-	-	2.66	0.110	0.818
7.50			3	-	-	-	-	-	-	-	30.09	-	-	-	-	-	-	-	-	-	-	-	-	-
9.00		-	3	-	-	-	-	-	-	-	24.45	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50		CI	-	-	0	0	3	5	83	9	26.19	1.868	1.480	40	25	15	UU	29	6	-	-	2.66	0.111	0.797
12.00		-	4	-	-	-	-	-	-	-	20.56	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00		-	5	-	-	-	-	-	-	-	21.80	-	-	-	-	-	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH-10)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic silt of intermediate plasticity**	MI		-	0	0	0	13	82	5	25.77	1.819	1.446	36	23	13	UU	23	7	-	-	2.66	-	0.840
1.50		-	4	-	-	-	-	-	-	-	27.30	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		MI		-	0	2	2	6	86	4	27.38	1.901	1.492	35	26	9	UU	24	7	-	-	2.66	-	0.783
3.00		-	2	-	-	-	-	-	-	-	29.50	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	3	-	-	-	-	-	-	-	33.35	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00		MI		-	0	0	5	7	83	5	25.90	1.894	1.504	35	24	11	UU	24	8	-	-	2.66	-	0.767
6.00		-	3	-	-	-	-	-	-	-	25.43	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00	**Inorganic clays of intermediate plasticity**	CI		-	0	0	6	5	75	14	26.90	1.920	1.513	40	27	13	UU	24	7	-	-	2.66	-	0.758
9.00			4	-	-	-	-	-	-	-	30.30	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50		CI		-	0	0	6	4	81	9	26.12	1.815	1.439	40	25	15	UU	27	5	-	-	2.66	-	0.849
12.00			5	-	-	-	-	-	-	-	27.85	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00		-	7	-	-	-	-	-	-	-	26.45	-	-	-	-	-	-	-	-	-	-	-	-	-
		-																						

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH-11)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic silt of intermediate plasticity**	MI	-	-	0	2	2	1	87	8	21.18	1.697	1.400	35	26	9	UU	22	9	17	40	2.66	0.100	0.900
1.50		-	4	-	-	-	-	-	-	-	21.90	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		MI	-	-	2	4	2	2	81	9	22.18	1.784	1.460	35	26	9	UU	21	9	-	-	2.66	0.105	0.822
3.00		-	5	-	-	-	-	-	-	-	24.10	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	3	-	-	-	-	-	-	-	28.63	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00		MI	-	-	3	2	4	8	75	8	19.70	1.766	1.475	35	25	10	UU	20	9	-	-	2.66	0.100	0.803
6.00		-	2	-	-	-	-	-	-	-	19.46	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00	**Inorganic clays of low plasticity**	CL	-	-	2	3	1	3	84	7	21.70	1.801	1.480	31	22	9	UU	22	9	-	-	2.66	0.098	0.797
9.00		-	3	-	-	-	-	-	-	-	25.10	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50		CL	-	-	2	2	3	5	84	4	22.10	1.825	1.495	30	22	8	UU	17	14	-	-	2.66	0.095	0.779
12.00		-	4	-	-	-	-	-	-	-	22.87	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			5		-	-	-	-	-	-	27.75	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00		CL	6	-	2	3	2	4	83	6	19.15	-	-	-	-	-	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH-12)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic silt of intermediate plasticity**	MI		-	0	1	1	1	87	10	24.45	1.868	1.501	35	25	10	UU	23	8	17	40	2.66	-	0.772
1.50		-	3	-	-	-	-	-	-	-	27.40	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		MI		-	0	3	4	1	83	9	25.71	1.879	1.495	35	27	8	UU	22	8	-	-	2.66	-	0.779
3.00		-	5	-	-	-	-	-	-	-	25.68	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	4	-	-	-	-	-	-	-	23.83	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00		MI		-	0	5	4	4	75	12	25.06	1.875	1.499	35	25	10	UU	21	9	-	-	2.66	-	0.775
6.00		-	3	-	-	-	-	-	-	-	23.15	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00	**Inorganic clays of low plasticity**	CL		-	2	3	6	5	76	8	22.20	1.840	1.506	32	22	10	UU	23	8	-	-	2.66	-	0.766
9.00		-	6	-	-	-	-	-	-	-	26.85	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50		CL		-	2	7	4	3	79	5	21.45	1.845	1.519	32	22	10	UU	19	13	-	-	2.66	-	0.751
12.00		-	25	-	-	-	-	-	-	-	27.95	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			6	-	-	-	-	-	-	-	23.16	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00			3	-	-	-	-	-	-	-	24.46	-	-	-	-	-	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH- 13)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic clays of low plasticity**	CL	-	-	0	0	1	1	91	7	19.86	1.744	1.455	31	23	8	UU	17	13	-	-	2.66	0.110	0.828
1.50		-	3	-	-	-	-	-	-	-	22.00	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50	**Inorganic silt of intermediate plasticity**	MI	-	-	1	1	1	1	87	9	20.51	1.763	1.463	36	26	10	UU	22	9	-	-	2.66	0.108	0.818
3.00		-	4	-	-	-	-	-	-	-	20.28	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	5	-	-	-	-	-	-	-	19.11	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00		MI	-	-	4	5	2	3	76	10	18.86	1.747	1.470	37	27	10	UU	22	8	-	-	2.66	0.120	0.810
6.00		-	6	-	-	-	-	-	-	-	17.18	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00		MI	-	-	3	4	4	2	79	8	17.00	1.723	1.473	36	27	9	UU	21	9	-	-	2.66	0.115	0.806
9.00		-	6	-	-	-	-	-	-	-	21.65	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50	**Inorganic clays of low plasticity**	CL	-	-	6	7	6	3	71	7	16.25	1.721	1.480	30	21	9	UU	22	8	-	-	2.66	0.110	0.797
12.00		-	35	-	-	-	-	-	-	-	22.75	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			4		-	-	-	-	-	-	17.96	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00		CL	6	-	3	2	2	1	84	8	19.26	-	-	31	23	8	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH-14)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic clays of low plasticity**	CL		-	1	2	3	4	81	9	26.28	1.870	1.481	30	22	8	UU	18	14	-	-	2.66	-	0.796
1.50		-	3	-	-	-	-	-	-	-	24.57	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50	**Inorganic silt of intermediate plasticity**	MI		-	0	4	5	3	77	11	26.87	1.885	1.486	35	25	10	UU	21	8	-	-	2.66	-	0.790
3.00		-	5	-	-	-	-	-	-	-	28.60	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	3	-	-	-	-	-	-	-	28.45	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00		MI		-	1	4	5	3	74	13	31.40	1.959	1.491	36	26	10	UU	22	8	-	-	2.66	-	0.784
6.00		-	4	-	-	-	-	-	-	-	30.87	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00		MI		-	2	3	7	4	73	11	26.48	1.904	1.505	35	26	9	UU	22	9	-	-	2.66	-	0.767
9.00		-	11	-	-	-	-	-	-	-	24.55	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50	**Inorganic clays of low plasticity**	CL		-	5	8	7	4	67	9	24.53	1.889	1.517	30	21	9	UU	21	8	-	-	2.66	-	0.753
12.00		-	25	-	-	-	-	-	-	-	31.37	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			5	-	-	-	-	-	-	-	25.37	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00		CL	3	-	2	3	3	2	80	10	23.95	-	-	31	23	8	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH- 15)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic silt of intermediate plasticity**	MI	-	-	2	4	2	2	83	7	21.69	1.772	1.456	35	27	8	UU	19	13	-	-	2.66	0.100	0.827
1.50		-	5	-	-	-	-	-	-	-	19.17	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		MI	-	-	2	3	1	2	84	8	21.67	1.784	1.466	37	28	9	UU	22	9	-	-	2.66	0.102	0.814
3.00		-	4	-	-	-	-	-	-	-	23.20	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	2	-	-	-	-	-	-	-	23.73	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00		MI	-	-	1	4	2	2	85	6	25.20	1.844	1.473	35	27	8	UU	19	14	-	-	2.66	0.105	0.806
6.00		-	4	-	-	-	-	-	-	-	24.90	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00		MI	-	-	2	3	4	1	83	7	21.28	1.797	1.482	36	28	8	UU	19	13	-	-	2.66	0.098	0.795
9.00		-	11	-	-	-	-	-	-	-	19.35	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50		MI	-	-	0	0	1	1	90	8	19.33	1.780	1.492	36	28	8	UU	19	12	-	-	2.66	0.095	0.783
12.00		-	27	-	-	-	-	-	-	-	26.17	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			11		-	-	-	-	-	-	20.17	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00		-MI	6	-	0	2	2	3	86	7	18.75	-	-	35	27	8	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH-16)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic silt of intermediate plasticity**	MI		-	1	5	3	3	79	9	24.31	1.821	1.465	35	27	8	UU	18	12	-	-	2.66	-	0.815
1.50		-	2	-	-	-	-	-	-	-	24.43	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		MI		-	1	4	2	3	80	10	22.70	1.804	1.470	37	28	9	UU	21	8	-	-	2.66	-	0.809
3.00		-	3	-	-	-	-	-	-	-	21.96	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	3	-	-	-	-	-	-	-	21.09	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00		MI		-	0	5	3	3	81	8	27.00	1.890	1.488	35	27	8	UU	20	14	-	-	2.66	-	0.787
6.00		-	4	-	-	-	-	-	-	-	23.96	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00		MI		-	1	4	5	2	79	9	22.04	1.828	1.498	35	27	8	UU	18	13	-	-	2.66	-	0.775
9.00		-	9	-	-	-	-	-	-	-	23.50	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50		MI		-	0	1	2	2	85	10	25.78	1.897	1.508	35	27	8	UU	18	12	-	-	2.66	-	0.764
12.00		-	22	-	-	-	-	-	-	-	28.49	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			7	-	-	-	-	-	-	-	27.34	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00		-MI	5	-	0	3	3	4	81	9	21.70	-	-	35	27	8	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH- 17)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic silt of intermediate plasticity**	MI	-	-	1	5	4	2	81	7	19.72	1.724	1.440	37	29	8	UU	19	13	-	-	2.66	0.100	0.847
1.50		-	3	-	-	-	-	-	-	-	19.03	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		MI	-	-	1	4	4	1	83	7	17.50	1.704	1.450	35	27	8	UU	19	14	-	-	2.66	0.105	0.834
3.00		-	5	-	-	-	-	-	-	-	16.56	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	2	-	-	-	-	-	-	-	16.37	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic clays of low plasticity**	CL	-	-	2	3	3	1	85	6	20.80	1.776	1.470	34	26	8	UU	19	12	-	-	2.66	0.100	0.810
6.00		-	5	-	-	-	-	-	-	-	17.99	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00	**Inorganic silt of intermediate plasticity**	MI		-	1	3	3	3	83	7	16.84	1.723	1.475	36	27	9	UU	22	9	-	-	2.66	0.100	0.803
9.00		-	6	-	-	-	-	-	-	-	18.30	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50		MI	-	-	4	1	1	1	87	6	20.58	1.788	1.483	35	25	10	UU	23	10	-	-	2.66	0.098	0.794
12.00		-	13	-	-	-	-	-	-	-	23.29	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			4		-	-	-	-	-	-	22.14	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	**Inorganic clays of low plasticity**	CL	5	-	3	2	1	1	86	7	16.50	-	-	34	26	8	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH-18)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic silt of intermediate plasticity**	MI		-	0	6	5	3	77	9	25.74	1.867	1.485	36	28	8	UU	18	13	-	-	2.66	-	0.791
1.50		-	4	-	-	-	-	-	-	-	26.78	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		MI		-	0	5	5	2	79	9	27.76	1.901	1.488	35	26	9	UU	18	14	-	-	2.66	-	0.787
3.00		-	3	-	-	-	-	-	-	-	28.56	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	3	-	-	-	-	-	-	-	30.16	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic clays of low plasticity**	CL		-	1	4	4	2	81	8	27.67	1.906	1.493	34	26	8	UU	20	12	-	-	2.66	-	0.781
6.00		-	5	-	-	-	-	-	-	-	28.04	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00	**Inorganic silt of intermediate plasticity**	MI		-	0	4	4	4	79	9	29.07	1.940	1.503	36	27	9	UU	21	10	-	-	2.66	-	0.769
9.00		-	9	-	-	-	-	-	-	-	30.49	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50		MI		-	3	2	2	2	83	8	36.76	2.079	1.520	35	25	10	UU	22	11	-	-	2.66	-	0.750
12.00		-	19	-	-	-	-	-	-	-	30.35	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			4	-	-	-	-	-	-	-	31.65	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	**Inorganic clays of low plasticity**	CL	7	-	2	3	2	2	82	9	30.34	-	-	34	26	8	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH- 19)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic clays of low plasticity**	CL	-	-	0	1	1	6	89	3	21.15	1.769	1.460	32	24	8	UU	17	14	-	-	2.66	0.095	0.822
1.50		-	4	-	-	-	-	-	-	-	21.38	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50	**Inorganic silt of intermediate plasticity**	MI	-	-	0	1	1	5	90	3	22.56	1.799	1.468	35	25	10	UU	22	10	-	-	2.66	0.096	0.812
3.00		-	4	-	-	-	-	-	-	-	23.16	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	3	-	-	-	-	-	-	-	25.44	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic clays of intermediate plasticity**	CI	-	-	1	1	2	8	80	8	21.47	1.792	1.475	38	24	14	UU	26	8	-	-	2.66	0.120	0.803
6.00		-	2	-	-	-	-	-	-	-	22.07	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00		CI	-	-	1	2	2	10	75	10	23.87	1.833	1.480	38	24	14	UU	26	7	-	-	2.66	0.120	0.797
9.00		-	4	-	-	-	-	-	-	-	25.29	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50		CI	-	-	2	1	1	8	80	8	31.56	1.957	1.495	40	25	15	UU	26	8	-	-	2.66	0.120	0.779
12.00		-	13	-	-	-	-	-	-	-	35.50	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			5		-	-	-	-	-	-	30.43	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	**Inorganic silt of intermediate plasticity**	MI	5	-	2	2	2	5	84	5	25.14	-	-	35	25	10	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH-20)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic clays of low plasticity**	CL		-	1	2	2	7	83	5	29.03	1.903	1.475	33	25	8	UU	19	14	-	-	2.66	-	0.803
1.50		-	3	-	-	-	-	-	-	-	30.90	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50	**Inorganic silt of intermediate plasticity**	MI		-	0	2	2	6	85	5	30.30	1.928	1.480	35	25	10	UU	21	11	-	-	2.66	-	0.797
3.00		-	2	-	-	-	-	-	-	-	31.81	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	4	-	-	-	-	-	-	-	28.29	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic clays of intermediate plasticity**	CI		-	0	2	3	9	76	10	31.50	1.963	1.493	36	22	14	UU	25	9	-	-	2.66	-	0.781
6.00		-	5	-	-	-	-	-	-	-	30.83	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00		CI		-	0	3	3	11	71	12	30.84	1.967	1.503	36	22	14	UU	25	9	-	-	2.66	-	0.769
9.00		-	16	-	-	-	-	-	-	-	28.30	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50		CI		-	1	2	2	9	76	10	27.42	1.937	1.520	42	27	15	UU	26	8	-	-	2.66	-	0.750
12.00		-	3	-	-	-	-	-	-	-	25.28	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			4	-	-	-	-	-	-	-	25.30	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	**Inorganic silt of intermediate plasticity**	MI	6	-	1	3	3	6	80	7	26.30	-	-	35	25	10	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH- 21)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic silt of intermediate plasticity**	MI	-	-	0	2	2	8	84	4	24.44	1.804	1.450	35	25	10	UU	22	9	-	-	2.66	0.095	0.834
1.50		-	3	-	-	-	-	-	-	-	25.50	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50	**Inorganic clays of intermediate plasticity**	CI	-	-	2	2	5	3	80	8	25.10	1.826	1.460	38	24	14	UU	26	7	-	-	2.66	0.120	0.822
3.00		-	4	-	-	-	-	-	-	-	26.41	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	4	-	-	-	-	-	-	-	23.57	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic silt of intermediate plasticity**	MI	-	-	1	2	2	3	82	10	25.30	1.848	1.475	35	25	10	UU	23	10	-	-	2.66	0.120	0.803
6.00		-	3	-	-	-	-	-	-	-	31.86	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00		MI	-	-	2	2	3	5	78	10	25.64	1.859	1.480	36	25	11	UU	23	9	-	-	2.66	0.120	0.797
9.00		-	27	-	-	-	-	-	-	-	23.10	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50		MI	-	-	2	2	4	10	72	10	22.22	1.827	1.495	36	25	11	UU	22	9	-	-	2.66	0.114	0.779
12.00		-	3	-	-	-	-	-	-	-	20.08	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			4		-	-	-	-	-	-	20.10	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00		MI	5	-	3	2	2	0	85	8	21.10	-	-	36	25	11	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH-22)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic silt of intermediate plasticity**	MI		-	1	3	3	9	78	6	30.40	1.917	1.470	35	24	11	UU	22	10	-	-	2.66	-	0.809
1.50		-	3	-	-	-	-	-	-	-	31.90	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50	**Inorganic clays of intermediate plasticity**	CI		-	1	3	6	4	76	10	25.08	1.839	1.470	36	22	14	UU	27	8	-	-	2.66	-	0.809
3.00		-	2	-	-	-	-	-	-	-	33.11	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	4	-	-	-	-	-	-	-	32.80	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic silt of intermediate plasticity**	MI		-	0	3	3	4	78	12	31.71	1.947	1.478	35	25	10	UU	21	11	-	-	2.66	-	0.799
6.00		-	3	-	-	-	-	-	-	-	31.72	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00		MI		-	1	3	4	6	74	12	27.70	1.913	1.498	37	26	11	UU	22	9	-	-	2.66	-	0.775
9.00		-	30	-	-	-	-	-	-	-	24.70	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50		MI		-	1	3	5	11	68	12	27.33	1.929	1.515	37	26	11	UU	21	9	-	-	2.66	-	0.755
12.00		-	6	-	-	-	-	-	-	-	28.30	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			7	-	-	-	-	-	-	-	29.97	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00		MI	9	-	2	3	3	1	81	10	33.33	-	-	36	22	14	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH- 23)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic silt of intermediate plasticity**	MI	-	-	0	3	2	0	90	5	30.93	1.892	1.445	35	25	10	UU	21	9	-	-	2.66	0.098	0.841
1.50		-	4	-	-	-	-	-	-	-	30.50	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		MI	-	-	2	3	0	0	89	6	19.88	1.738	1.450	36	24	12	UU	23	9	-	-	2.66	0.100	0.834
3.00		-	3	-	-	-	-	-	-	-	27.71	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	5	-	-	-	-	-	-	-	28.08	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00		MI	-	-	2	2	1	4	86	5	25.51	1.832	1.460	38	25	13	UU	25	7	-	-	2.66	0.100	0.822
6.00		-	5	-	-	-	-	-	-	-	25.75	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00		MI	-	-	0	2	3	5	80	10	22.50	1.807	1.475	37	24	13	UU	26	7	-	-	2.66	0.120	0.803
9.00		-	27	-	-	-	-	-	-	-	19.50	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50		MI	-	-	0	2	7	10	72	9	22.13	1.820	1.490	38	25	13	UU	25	8	-	-	2.66	0.110	0.785
12.00		-	9	-	-	-	-	-	-	-	23.10	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			6		-	-	-	-	-	-	24.77	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	**Inorganic clays of intermediate plasticity**	CI	7	-	0	2	10	5	78	5	28.13	-	-	36	24	12	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH-24)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic silt of intermediate plasticity**	MI		-	1	4	3	1	84	7	33.11	1.990	1.495	35	25	10	UU	21	9	-	-	2.66	-	0.780
1.50		-	3	-	-	-	-	-	-	-	33.10	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		MI		-	1	4	1	1	85	8	22.93	1.832	1.490	36	24	12	UU	23	9	-	-	2.66	-	0.785
3.00		-	4	-	-	-	-	-	-	-	30.96	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	3	-	-	-	-	-	-	-	30.30	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00		MI		-	2	3	2	5	81	7	29.56	1.938	1.496	37	24	13	UU	25	7	-	-	2.66	-	0.778
6.00		-	5	-	-	-	-	-	-	-	29.57	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00		MI		-	1	3	4	6	74	12	25.55	1.910	1.521	37	24	13	UU	26	7	-	-	2.66	-	0.749
9.00		-	7	-	-	-	-	-	-	-	22.55	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50		MI		-	3	3	8	11	64	11	25.18	1.928	1.540	37	24	13	UU	25	8	-	-	2.66	-	0.727
12.00		-	27	-	-	-	-	-	-	-	26.15	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			6	-	-	-	-	-	-	-	27.82	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	**Inorganic clays of intermediate plasticity**	CI	11	-	3	3	11	6	70	7	31.18	-	-	36	24	12	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH- 25)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic clays of low plasticity**	CL	-	-	0	0	0	5	90	5	12.10	1.637	1.460	32	23	9	UU	23	9	-	-	2.66	0.090	0.822
1.50		-	4	-	-	-	-	-	-	-	12.80	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50	**Inorganic silt of intermediate plasticity**	MI	-	-	0	2	3	5	82	8	13.10	1.657	1.465	35	25	10	UU	22	9	-	-	2.66	0.100	0.816
3.00		-	3	-	-	-	-	-	-	-	15.67	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	4	-	-	-	-	-	-	-	15.50	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic clays of intermediate plasticity**	CI	-	-	0	2	5	2	80	11	15.70	1.704	1.473	36	24	12	UU	24	9	-	-	2.66	0.102	0.806
6.00		-	4	-	-	-	-	-	-	-	16.18	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00		CI	-	-	0	2	2	2	82	12	16.20	1.720	1.480	36	23	13	UU	25	8	-	-	2.66	0.115	0.797
9.00		-	6	-	-	-	-	-	-	-	16.25	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50		CI	-	-	2	2	3	3	80	10	18.70	1.778	1.498	36	24	12	UU	24	8	-	-	2.66	0.110	0.776
12.00		-	23	-	-	-	-	-	-	-	19.70	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			12		-	-	-	-	-	-	20.80	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	**Inorganic clays of low plasticity**	CL	6	-	2	3	5	5	76	9	21.75	-	-	32	23	9	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH-26)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic clays of low plasticity**	CL		-	1	1	1	6	84	7	30.70	1.987	1.520	33	23	9	UU	23	9	-	-	2.66	-	-
1.50		-	3	-	-	-	-	-	-	-	30.30	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50	**Inorganic silt of intermediate plasticity**	MI		-	2	3	4	6	75	10	20.78	1.824	1.510	35	25	10	UU	22	9	-	-	2.66	-	-
3.00		-	3	-	-	-	-	-	-	-	28.81	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	4	-	-	-	-	-	-	-	27.80	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic clays of intermediate plasticity**	CI		-	1	3	6	3	74	13	27.41	1.929	1.514	36	24	12	UU	24	9	-	-	2.66	-	-
6.00		-	5	-	-	-	-	-	-	-	27.42	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00		CI		-	2	3	3	3	75	14	23.40	1.905	1.544	36	23	13	UU	25	8	-	-	2.66	-	-
9.00		-	8	-	-	-	-	-	-	-	20.40	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50		CI		-	1	3	4	4	76	12	23.03	1.925	1.565	36	24	12	UU	24	8	-	-	2.66	-	-
12.00		-	22	-	-	-	-	-	-	-	24.00	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			15	-	-	-	-	-	-	-	25.67	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	**Inorganic clays of low plasticity**	CL	6	-	1	4	6	6	72	11	29.03	-	-	32	23	9	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH- 27)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic clays of low plasticity**	CL	-	-	0	0	2	3	89	6	18.55	1.719	1.450	33	23	10	UU	21	9	-	-	2.66	0.098	0.834
1.50		-	3	-	-	-	-	-	-	-	25.62	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		CL	-	-	0	2	3	4	83	8	22.97	1.789	1.455	32	22	10	UU	21	8	-	-	2.66	0.095	0.828
3.00		-	5	-	-	-	-	-	-	-	24.82	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	4	-	-	-	-	-	-	-	14.35	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic silt of intermediate plasticity**	MI	-	-	1	2	4	5	78	10	15.20	1.688	1.465	38	26	12	UU	24	8	-	-	2.66	0.100	0.816
6.00		-	5	-	-	-	-	-	-	-	15.47	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00		MI	-	-	2	3	0	5	81	9	27.49	1.880	1.475	37	25	12	UU	23	8	-	-	2.66	0.105	0.803
9.00		-	9	-	-	-	-	-	-	-	28.12	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50	**Inorganic clays of intermediate plasticity**	CI	-	-	0	0	3	8	77	12	18.36	1.764	1.490	40	25	15	UU	25	8	-	-	2.66	0.110	0.785
12.00		-	26	-	-	-	-	-	-	-	22.83	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			7		-	-	-	-	-	-	26.25	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	**Inorganic silt of intermediate plasticity**	MI	8	-	2	0	3	7	79	9	25.40	-	-	35	25	10	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH-28)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic clays of low plasticity**	CL		-	2	1	3	4	82	8	28.29	1.982	1.545	32	22	10	UU	22	10	-	-	2.66	-	0.721
1.50		-	4	-	-	-	-	-	-	-	27.50	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		CL		-	1	3	4	5	77	10	18.63	1.815	1.530	34	24	10	UU	20	8	-	-	2.66	-	0.738
3.00		-	3	-	-	-	-	-	-	-	26.66	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	4	-	-	-	-	-	-	-	25.30	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic clays of intermediate plasticity**	CI		-	0	3	5	6	74	12	25.26	1.919	1.532	36	24	12	UU	23	8	-	-	2.66	-	0.736
6.00		-	5	-	-	-	-	-	-	-	25.27	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00		CI		-	1	4	1	6	77	11	21.25	1.900	1.567	36	24	12	UU	25	8	-	-	2.66	-	0.697
9.00		-	9	-	-	-	-	-	-	-	18.25	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50		CI		-	2	1	4	9	70	14	20.88	1.922	1.590	42	27	15	UU	25	8	-	-	2.66	-	0.672
12.00		-	20	-	-	-	-	-	-	-	21.85	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			10	-	-	-	-	-	-	-	23.52	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	**Inorganic silt of intermediate plasticity**	MI	6	-	1	1	4	8	75	11	26.88	-	-	33	23	10	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH- 29)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic clays of low plasticity**	CL	-	-	2	3	0	5	82	8	21.31	1.771	1.460	32	20	12	UU	21	9	-	-	2.66	0.098	0.822
1.50		-	4	-	-	-	-	-	-	-	20.67	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50	**Inorganic silt of intermediate plasticity**	MI	-	-	0	0	4	5	81	10	20.70	1.780	1.475	35	20	15	UU	21	8	-	-	2.66	0.100	0.803
3.00		-	5	-	-	-	-	-	-	-	20.80	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	3	-	-	-	-	-	-	-	28.02	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic clays of intermediate plasticity**	CI	-	-	0	0	2	3	83	12	26.50	1.885	1.490	38	22	16	UU	24	8	-	-	2.66	0.098	0.785
6.00		-	4	-	-	-	-	-	-	-	24.63	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00	**Inorganic silt of intermediate plasticity**	MI	-	-	2	1	0	8	79	10	15.35	1.730	1.500	35	25	10	UU	23	8	-	-	2.66	0.095	0.773
9.00		-	9	-	-	-	-	-	-	-	18.18	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50		MI	-	-	0	0	2	7	80	11	19.25	1.801	1.510	36	25	11	UU	25	8	-	-	2.66	0.098	0.762
12.00		-	7	-	-	-	-	-	-	-	28.90	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			3		-	-	-	-	-	-	27.50	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00		MI	5	-	0	2	3	5	82	8	26.98	-	-	35	25	10	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH- 30)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic silt of intermediate plasticity**	MI	-	-	0	3	2	1	87	7	15.50	1.663	1.440	35	25	10	UU	22	8	-	-	2.66	0.090	0.847
1.50		-	5	-	-	-	-	-	-	-	16.65	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		MI	-	-	2	4	3	3	80	8	18.40	1.723	1.455	35	26	9	UU	23	8	-	-	2.66	0.097	0.828
3.00		-	7	-	-	-	-	-	-	-	13.11	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	3	-	-	-	-	-	-	-	18.90	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00		MI	-	-	3	4	8	2	74	9	19.12	1.743	1.463	35	25	10	UU	22	9	-	-	2.66	0.100	0.818
6.00		-	4	-	-	-	-	-	-	-	20.27	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00		MI	-	-	2	3	1	4	80	10	20.45	1.783	1.480	35	20	15	UU	25	7	-	-	2.66	0.110	0.797
9.00		-	5	-	-	-	-	-	-	-	21.51	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50		MI	-	-	2	2	4	6	78	8	21.81	1.766	1.450	35	25	10	UU	22	9	-	-	2.66	0.095	0.834
12.00		-	15	-	-	-	-	-	-	-	21.70	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			2		-	-	-	-	-	-	23.45	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00		MI	5	-	2	3	4	5	79	7	22.15	-	-	35	26	9	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH- 31)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic silt and clays of low plasticity**	CL-ML	-	-	0	2	3	0	88	7	20.50	1.699	1.410	33	26	7	UU	21	9	-	-	2.66	0.098	0.887
1.50		-	1	-	-	-	-	-	-	-	27.41	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50	**Inorganic clays of low plasticity**	CL	-	-	0	0	0	6	88	6	21.10	1.714	1.415	34	26	8	UU	21	8	-	-	2.66	0.110	0.880
3.00		-	2	-	-	-	-	-	-	-	26.61	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	3	-	-	-	-	-	-	-	21.25	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic silt of intermediate plasticity**	MI	-	-	0	2	0	10	80	8	27.11	1.805	1.420	35	25	10	UU	24	8	-	-	2.66	0.099	0.873
6.00		-	4	-	-	-	-	-	-	-	27.51	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00	**Inorganic clays of intermediate plasticity**	CI	-	-	0	0	0	11	79	10	28.40	1.836	1.430	40	25	15	UU	23	8	-	-	2.66	0.100	0.860
9.00		-	12	-	-	-	-	-	-	-	28.44	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50		CI	-	-	0	0	5	6	80	9	28.45	1.850	1.440	38	25	13	UU	25	8	-	-	2.66	0.105	0.847
12.00		-	25	-	-	-	-	-	-	-	25.15	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			5		-	-	-	-	-	-	26.40	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	**Inorganic silt of intermediate plasticity**	MI	5	-	0	0	5	7	80	8	26.10	-	-	35	25	10	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH-32)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic silt and clays of low plasticity**	CL-ML		-	1	3	4	1	82	9	25.09	1.795	1.435	32	25	7	UU	21	11	-	-	2.66	-	0.853
1.50		-	2	-	-	-	-	-	-	-	32.81	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50	**Inorganic clays of low plasticity**	CL		-	1	1	1	7	82	8	26.30	1.812	1.435	34	26	8	UU	22	10	-	-	2.66	-	0.853
3.00		-	3	-	-	-	-	-	-	-	32.01	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	4	-	-	-	-	-	-	-	25.97	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic silt of intermediate plasticity**	MI		-	3	3	1	11	72	10	33.31	1.917	1.438	35	25	10	UU	23	9	-	-	2.66	-	0.849
6.00		-	3	-	-	-	-	-	-	-	33.48	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00	**Inorganic clays of intermediate plasticity**	CI		-	2	1	1	12	72	12	33.60	1.941	1.453	41	26	15	UU	24	6	-	-	2.66	-	0.830
9.00		-	7	-	-	-	-	-	-	-	33.64	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50		CI		-	3	1	6	7	72	11	33.65	1.958	1.465	37	26	13	UU	25	9	-	-	2.66	-	0.815
12.00		-	17	-	-	-	-	-	-	-	30.35	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			6	-	-	-	-	-	-	-	31.60	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	**Inorganic silt of intermediate plasticity**	MI	4	-	1	1	6	8	74	10	31.30	-	-	35	25	10	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH- 33)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic clays of low plasticity**	CL	-	-	0	0	2	0	92	6	21.15	1.763	1.455	33	25	8	UU	18	13	-	-	2.66	0.090	0.828
1.50		-	15	-	-	-	-	-	-	-	23.00	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		CL	-	-	2	0	2	5	86	5	23.50	1.803	1.460	33	25	8	UU	14	12	-	-	2.67	0.090	0.829
3.00		-	3	-	-	-	-	-	-	-	27.59	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	4	-	-	-	-	-	-	-	28.58	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic clays of intermediate plasticity**	CI	-	-	0	1	5	2	83	9	28.25	1.885	1.470	35	23	12	UU	22	9	-	-	2.66	0.100	0.810
6.00		-	3	-	-	-	-	-	-	-	28.18	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00		CI	-	-	3	0	2	5	80	10	20.14	1.780	1.482	38	24	14	UU	25	7	-	-	2.66	0.110	0.795
9.00		-	20	-	-	-	-	-	-	-	20.50	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50		CI	-	-	1	0	0	10	76	13	19.07	1.780	1.495	38	25	13	UU	25	8	-	-	2.66	0.119	0.779
12.00		-	9	-	-	-	-	-	-	-	29.47	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			3		-	-	-	-	-	-	25.10	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	**Inorganic silt of intermediate plasticity**	MI	5	-	2	2	2	5	80	9	25.45	-	-	35	25	10	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH-34)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic clays of low plasticity**	CL		-	2	1	3	1	85	8	22.68	1.791	1.460	34	26	8	UU	17	12	-	-	2.66	-	0.821
1.50		-	7	-	-	-	-	-	-	-	30.01	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		CL		-	1	1	3	6	82	7	24.15	1.806	1.455	33	25	8	UU	15	13	-	-	2.67	-	0.828
3.00		-	4	-	-	-	-	-	-	-	29.86	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	3	-	-	-	-	-	-	-	23.47	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic clays of intermediate plasticity**	CI		-	1	2	6	3	77	11	31.16	1.910	1.456	34	22	12	UU	21	10	-	-	2.66	-	0.826
6.00		-	2	-	-	-	-	-	-	-	31.33	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00		CI		-	2	1	3	6	76	12	31.45	1.940	1.476	36	22	14	UU	24	7	-	-	2.66	-	0.802
9.00		-	15	-	-	-	-	-	-	-	31.49	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50		CI		-	0	1	1	11	72	15	31.50	1.959	1.490	38	25	13	UU	26	8	-	-	2.66	-	0.785
12.00		-	7	-	-	-	-	-	-	-	28.20	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			4	-	-	-	-	-	-	-	29.45	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	**Inorganic silt of intermediate plasticity**	MI	7	-	1	3	3	6	76	11	29.15	-	-	35	25	10	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH- 35)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic silt of intermediate plasticity**	MI	-	-	0	0	2	1	88	9	21.15	1.745	1.440	45	29	16	UU	29	6	-	-	2.66	0.100	0.847
1.50		-	5	-	-	-	-	-	-	-	26.51	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		MI	-	-	0	0	0	1	89	10	24.51	1.799	1.445	46	28	18	UU	28	6	-	-	2.66	0.105	0.841
3.00		-	5	-	-	-	-	-	-	-	23.28	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	4	-	-	-	-	-	-	-	27.77	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic clays of low plasticity**	CI	-	-	0	0	0	4	88	8	27.52	1.855	1.455	39	24	15	UU	27	6	-	-	2.66	0.107	0.828
6.00		-	5	-	-	-	-	-	-	-	27.15	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00		CL	-	-	0	0	0	4	92	4	28.10	1.882	1.469	32	23	9	UU	22	9	-	-	2.66	0.090	0.811
9.00		-	9	-	-	-	-	-	-	-	28.75	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50		CL	-	-	0	0	0	1	93	6	27.45	1.880	1.475	33	21	12	UU	23	9	-	-	2.66	0.095	0.803
12.00		-	15	-	-	-	-	-	-	-	27.55	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			6		-	-	-	-	-	-	28.15	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	**Inorganic silt and clays of low plasticity**	CL-ML	7	-	0	0	0	6	88	6	26.45	-	-	31	25	6	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH-36)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic silt of intermediate plasticity**	MI		-	2	1	3	2	81	11	20.27	1.786	1.485	43	27	16	UU	28	7	-	-	2.66	-	0.791
1.50		-	5	-	-	-	-	-	-	-	27.21	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		MI		-	2	1	1	2	82	12	22.00	1.800	1.475	44	26	18	UU	27	7	-	-	2.66	-	0.803
3.00		-	3	-	-	-	-	-	-	-	27.71	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	4	-	-	-	-	-	-	-	20.97	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic clays of low plasticity**	CI		-	1	1	1	5	82	10	29.01	1.902	1.474	37	22	15	UU	26	7	-	-	2.66	-	0.805
6.00		-	8	-	-	-	-	-	-	-	29.18	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00		CL		-	3	1	1	5	84	6	29.30	1.938	1.499	30	21	9	UU	21	10	-	-	2.66	-	0.775
9.00		-	17	-	-	-	-	-	-	-	29.34	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50		CL		-	1	1	1	2	87	8	29.35	1.960	1.515	31	19	12	UU	22	10	-	-	2.66	-	0.756
12.00		-	7	-	-	-	-	-	-	-	26.05	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			2	-	-	-	-	-	-	-	27.30	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	**Inorganic silt and clays of low plasticity**	CL-ML	5	-	4	1	1	7	79	8	27.00	-	-	29	23	6	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH- 37)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic clays of low plasticity**	CL	-	-	1	0	3	10	80	6	20.50	1.741	1.445	33	25	8	UU	18	13	-	-	2.66	0.090	0.841
1.50		-	5	-	-	-	-	-	-	-	21.60	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		CL	-	-	0	0	0	2	93	5	22.50	1.782	1.455	33	23	10	UU	14	12	-	-	2.66	0.095	0.828
3.00		-	4	-	-	-	-	-	-	-	24.52	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	2	-	-	-	-	-	-	-	23.31	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic silt and clays of low plasticity**	CL-ML	-	-	0	0	0	6	88	6	22.50	1.792	1.463	33	26	7	UU	22	9	-	-	2.66	0.096	0.818
6.00		-	3	-	-	-	-	-	-	-	23.15	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00	**Inorganic silt and clays of low plasticity**	MI	-	-	0	0	0	1	88	11	23.75	1.825	1.475	38	26	12	UU	25	7	-	-	2.66	0.110	0.803
9.00		-	7	-	-	-	-	-	-	-	24.50	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50		CL-ML	-	-	0	0	0	8	85	7	25.65	1.871	1.489	33	26	7	UU	25	8	-	-	2.66	0.100	0.786
12.00		-	13	-	-	-	-	-	-	-	26.50	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			5		-	-	-	-	-	-	25.17	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	**Inorganic clays of low plasticity**	CL	10	-	0	2	2	4	86	6	25.50	-	-	33	26	9	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH- 38)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic silt of intermediate plasticity**	MI	-	-	0	0	2	1	90	7	20.10	1.729	1.440	40	25	15	UU	25	7	-	-	2.66	0.112	0.847
1.50		-	7	-	-	-	-	-	-	-	20.18	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		MI	-	-	0	0	0	3	85	12	21.40	1.760	1.450	45	30	15	UU	26	7	-	-	2.66	0.119	0.834
3.00		-	6	-	-	-	-	-	-	-	21.70	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	3	-	-	-	-	-	-	-	22.15	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic clays of low plasticity**	CL	-	-	0	0	0	6	85	9	18.90	1.730	1.455	31	21	10	UU	22	9	-	-	2.66	0.110	0.828
6.00		-	4	-	-	-	-	-	-	-	19.80	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00		CL	-	-	0	0	0	3	94	3	23.10	1.797	1.460	32	23	9	UU	23	9	-	-	2.66	0.090	0.822
9.00		-	16	-	-	-	-	-	-	-	23.50	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50	**Inorganic clays of intermediate plasticity**	CI	-	-	0	0	0	8	87	5	24.10	1.818	1.465	37	21	16	UU	28	6	-	-	2.66	0.095	0.816
12.00		-	12	-	-	-	-	-	-	-	20.18	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			5	-	-	-	-	-	-	-	20.90	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00		-	11	-	-	-	-	-	-	-	20.50	-	-	-	-	-	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH- 39)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic clays of low plasticity**	CL	-	-	0	0	0	6	91	3	22.20	1.772	1.450	30	22	8	UU	29	6	-	-	2.66	0.090	0.834
1.50		-	7	-	-	-	-	-	-	-	23.21	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		CL	-	-	0	0	0	8	88	4	23.50	1.797	1.455	30	22	8	UU	28	6	-	-	2.66	0.095	0.828
3.00		-	5	-	-	-	-	-	-	-	24.49	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	6	-	-	-	-	-	-	-	27.98	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic clays of intermediate plasticity**	CI	-	-	0	0	0	6	84	10	26.80	1.863	1.469	40	25	15	UU	27	6	-	-	2.66	0.100	0.811
6.00		-	7	-	-	-	-	-	-	-	26.40	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00		CI	-	-	0	0	3	4	80	13	25.65	1.857	1.478	40	25	15	UU	22	9	-	-	2.66	0.105	0.800
9.00		-	18	-	-	-	-	-	-	-	23.40	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50	**Inorganic silt of intermediate plasticity**	MI	-	-	0	0	0	6	82	12	21.67	1.813	1.490	45	30	15	UU	23	9	-	-	2.66	0.107	0.785
12.00		-	9	-	-	-	-	-	-	-	21.33	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			3		-	-	-	-	-	-	21.50	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	**Inorganic clays of low plasticity**	CL	9	-	0	0	2	5	88	5	23.15	-	-	30	21	9	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH-40)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic clays of low plasticity**	CL		-	2	1	1	7	84	5	22.25	1.846	1.510	28	20	8	UU	28	7	-	-	2.66	-	0.762
1.50		-	6	-	-	-	-	-	-	-	24.41	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		CL		-	2	1	1	9	81	6	19.85	1.792	1.495	28	20	8	UU	27	7	-	-	2.66	-	0.779
3.00		-	7	-	-	-	-	-	-	-	25.56	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	3	-	-	-	-	-	-	-	18.47	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic clays of intermediate plasticity**	CI		-	3	1	1	7	76	12	26.86	1.893	1.492	38	23	15	UU	26	7	-	-	2.66	-	0.783
6.00		-	4	-	-	-	-	-	-	-	27.03	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00		CI		-	1	1	4	5	74	15	27.15	1.935	1.522	38	23	15	UU	21	10	-	-	2.66	-	0.748
9.00		-	24	-	-	-	-	-	-	-	27.19	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50	**Inorganic silt of intermediate plasticity**	MI		-	1	1	1	7	76	14	27.20	1.959	1.540	43	28	15	UU	22	10	-	-	2.66	-	0.727
12.00		-	8	-	-	-	-	-	-	-	23.90	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			4	-	-	-	-	-	-	-	25.15	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	**Inorganic clays of low plasticity**	CL	7	-	2	1	3	6	81	7	24.85	-	-	28	19	9	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH- 41)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic clays of low plasticity**	CL	-	-	1	4	4	3	82	6	20.10	1.741	1.450	32	24	8	UU	29	6	-	-	2.66	0.095	0.834
1.50		-	9	-	-	-	-	-	-	-	21.61	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		CL	-	-	1	5	4	4	80	6	22.40	1.781	1.455	32	24	8	UU	28	6	-	-	2.66	0.096	0.828
3.00		-	3	-	-	-	-	-	-	-	21.00	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	2	-	-	-	-	-	-	-	21.58	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic silt and clays of low plasticity**	CL-ML	-	-	3	3	4	1	82	7	21.90	1.783	1.463	32	25	7	UU	27	6	-	-	2.66	0.099	0.818
6.00		-	6	-	-	-	-	-	-	-	22.15	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00	**Inorganic clays of low plasticity**	CL	-	-	4	2	2	1	83	8	23.31	1.816	1.473	34	25	9	UU	22	9	-	-	2.66	0.101	0.806
9.00		-	15	-	-	-	-	-	-	-	22.31	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50	**Inorganic silt and clays of low plasticity**	CL-ML	-	-	1	3	3	2	85	6	23.10	1.828	1.485	33	26	7	UU	23	9	-	-	2.66	0.090	0.791
12.00		-	9	-	-	-	-	-	-	-	22.51	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			4		-	-	-	-	-	-	23.41	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00		CL-ML	6	-	3	2	1	1	86	7	23.46	-	-	33	26	7	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH-42)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic clays of low plasticity**	CL		-	0	5	5	4	78	8	24.69	1.839	1.475	30	22	8	UU	28	7	-	-	2.66	-	0.803
1.50		-	8	-	-	-	-	-	-	-	27.01	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		CL		-	0	6	5	5	76	8	27.60	1.882	1.475	30	22	8	UU	27	7	-	-	2.66	-	0.803
3.00		-	4	-	-	-	-	-	-	-	26.40	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	3	-	-	-	-	-	-	-	26.30	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic silt and clays of low plasticity**	CL-ML		-	2	4	5	2	78	9	28.10	1.897	1.481	30	23	7	UU	26	7	-	-	2.66	-	0.796
6.00		-	11	-	-	-	-	-	-	-	28.12	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00	**Inorganic clays of low plasticity**	CL		-	3	3	3	2	79	10	28.51	1.923	1.496	32	23	9	UU	21	10	-	-	2.66	-	0.778
9.00		-	11	-	-	-	-	-	-	-	27.51	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50	**Inorganic silt and clays of low plasticity**	CL-ML		-	0	4	4	3	81	8	28.30	1.937	1.510	31	24	7	UU	22	10	-	-	2.66	-	0.762
12.00		-	9	-	-	-	-	-	-	-	27.71	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			3	-	-	-	-	-	-	-	28.61	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00		CL-ML	7	-	2	3	2	2	82	9	28.66	-	-	31	24	7	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH- 43)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic silt of intermediate plasticity**	MI	-	-	0	0	4	6	85	5	15.15	1.664	1.445	36	25	11	UU	21	9	-	-	2.66	0.098	0.841
1.50		-	4	-	-	-	-	-	-	-	16.11	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		MI	-	-	0	0	4	8	82	6	16.00	1.688	1.455	36	26	10	UU	22	9	-	-	2.66	0.095	0.828
3.00		-	3	-	-	-	-	-	-	-	19.02	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	2	-	-	-	-	-	-	-	18.34	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00		MI	-	-	0	2	3	10	80	5	17.50	1.727	1.470	38	26	12	UU	23	9	-	-	2.66	0.100	0.810
6.00		-	3	-	-	-	-	-	-	-	18.10	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00	**Inorganic clays of intermediate plasticity**	CI	-	-	0	0	6	8	76	10	17.10	1.735	1.482	40	25	15	UU	26	7	-	-	2.66	0.110	0.795
9.00		-	9	-	-	-	-	-	-	-	18.30	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50		CI	-	-	0	3	5	2	81	9	19.51	1.783	1.492	40	25	15	UU	25	7	-	-	2.66	0.111	0.783
12.00		-	16	-	-	-	-	-	-	-	19.19	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			3	-	-	-	-	-	-	-	20.15	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00		CI	8	-	0	2	5	3	80	10	19.45	-	-	38	23	15	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH-44)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic silt of intermediate plasticity**	MI		-	2	1	5	7	78	7	19.74	1.760	1.470	35	23	12	UU	20	10	-	-	2.66	-	0.810
1.50		-	18	-	-	-	-	-	-	-	21.51	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		MI		-	1	1	5	9	76	8	21.20	1.788	1.475	35	24	12	UU	21	10	-	-	2.66	-	0.803
3.00		-	4	-	-	-	-	-	-	-	24.42	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	3	-	-	-	-	-	-	-	23.06	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00		MI		-	2	3	4	11	73	7	23.70	1.841	1.488	36	24	12	UU	22	10	-	-	2.66	-	0.788
6.00		-	3	-	-	-	-	-	-	-	24.07	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00	**Inorganic clays of intermediate plasticity**	CI		-	1	1	7	9	70	12	22.30	1.841	1.505	38	23	15	UU	25	8	-	-	2.66	-	0.767
9.00		-	19	-	-	-	-	-	-	-	23.50	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50		CI		-	3	4	6	3	73	11	24.71	1.892	1.517	38	23	15	UU	24	8	-	-	2.66	-	0.753
12.00		-	7	-	-	-	-	-	-	-	24.39	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			4	-	-	-	-	-	-	-	25.35	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00		CI	3	-	2	3	6	4	73	12	24.65	-	-	36	21	15	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH- 45)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic silt of intermediate plasticity**	MI	-	-	0	3	2	1	87	7	15.50	1.663	1.440	35	25	10	UU	22	8	-	-	2.66	0.090	0.847
1.50		-	5	-	-	-	-	-	-	-	16.65	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		MI	-	-	2	4	3	3	80	8	18.40	1.723	1.455	35	26	9	UU	23	8	-	-	2.66	0.097	0.828
3.00		-	5	-	-	-	-	-	-	-	13.11	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	4	-	-	-	-	-	-	-	18.90	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00		MI	-	-	3	4	8	2	74	9	19.12	1.743	1.463	35	25	10	UU	22	9	-	-	2.66	0.100	0.818
6.00		-	2	-	-	-	-	-	-	-	20.27	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00		MI	-	-	2	3	1	4	80	10	20.45	1.783	1.480	35	20	15	UU	25	7	-	-	2.66	0.110	0.797
9.00		-	4	-	-	-	-	-	-	-	21.51	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50		MI	-	-	2	2	4	6	78	8	21.81	1.766	1.450	35	25	10	UU	22	9	-	-	2.66	0.095	0.834
12.00		-	5	-	-	-	-	-	-	-	21.70	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			3		-	-	-	-	-	-	23.45	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00		MI	6	-	2	3	4	5	79	7	22.15	-	-	35	26	9	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH-46)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic clay of intermediate plasticity**	CI		-	3	4	3	2	79	9	17.33	1.754	1.495	33	23	10	UU	21	9	-	-	2.66	-	0.779
1.50		-	5	-	-	-	-	-	-	-	18.71	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		CI		-	1	5	4	4	76	10	19.05	1.780	1.495	33	24	9	UU	22	9	-	-	2.66	-	0.779
3.00		-	4	-	-	-	-	-	-	-	22.27	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	3	-	-	-	-	-	-	-	20.56	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic silt of intermediate plasticity**	MI		-	2	5	9	3	70	11	21.55	1.831	1.506	33	23	10	UU	21	10	-	-	2.66	-	0.766
6.00		-	4	-	-	-	-	-	-	-	21.92	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00	**Inorganic clay of intermediate plasticity**	CI		-	1	4	2	5	76	12	20.15	1.836	1.528	33	18	15	UU	24	8	-	-	2.66	-	0.741
9.00		-	8	-	-	-	-	-	-	-	21.35	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50	**Inorganic clay of intermediate plasticity**	CI		-	1	3	5	7	74	10	22.56	1.890	1.542	33	23	10	UU	21	10	-	-	2.66	-	0.725
12.00		-	17	-	-	-	-	-	-	-	22.24	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			7	-	-	-	-	-	-	-	23.20	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00		CI	9	-	1	4	5	6	75	9	22.50	-	-	35	24	11	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH- 47)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic clays of low plasticity**	CL	-	-	0	0	2	3	87	8	16.10	1.695	1.460	31	23	8	UU	22	8	-	-	2.66	0.095	0.822
1.50		-	7	-	-	-	-	-	-	-	16.94	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50	**Inorganic silt of intermediate plasticity**	MI	-	-	0	1	2	3	85	9	18.52	1.719	1.450	36	26	10	UU	23	8	-	-	2.66	0.098	0.834
3.00		-	3	-	-	-	-	-	-	-	17.82	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	4	-	-	-	-	-	-	-	20.12	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00		MI	-	-	4	3	3	2	78	10	22.15	1.777	1.455	37	27	10	UU	22	9	-	-	2.66	0.096	0.828
6.00		-	4	-	-	-	-	-	-	-	27.44	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00		MI	-	-	3	4	4	4	77	8	15.30	1.695	1.470	36	27	9	UU	25	7	-	-	2.66	0.100	0.810
9.00		-	9	-	-	-	-	-	-	-	20.45	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50	**Inorganic clays of low plasticity**	CL	-	-	6	7	6	4	71	6	23.25	1.824	1.480	30	21	9	UU	22	9	-	-	2.66	0.096	0.797
12.00		-	7	-	-	-	-	-	-	-	22.25	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			4		-	-	-	-	-	-	22.50	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00		CL	4	-	3	3	3	2	81	8	22.10	-	-	31	22	9	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH-48)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic clays of low plasticity**	CL		-	2	1	3	4	80	10	20.69	1.792	1.485	29	21	8	UU	21	9	-	-	2.66	-	0.791
1.50		-	5	-	-	-	-	-	-	-	22.34	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50	**Inorganic silt of intermediate plasticity**	MI		-	2	2	3	4	78	11	23.72	1.819	1.470	34	24	10	UU	22	9	-	-	2.66	-	0.810
3.00		-	3	-	-	-	-	-	-	-	23.22	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	3	-	-	-	-	-	-	-	24.84	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00		MI		-	3	4	4	3	74	12	28.35	1.891	1.473	35	25	10	UU	21	10	-	-	2.66	-	0.806
6.00		-	2	-	-	-	-	-	-	-	33.41	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00		MI		-	2	5	5	5	73	10	20.50	1.799	1.493	34	25	9	UU	24	8	-	-	2.66	-	0.782
9.00		-	11	-	-	-	-	-	-	-	25.65	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50	**Inorganic clays of low plasticity**	CL		-	5	8	7	5	67	8	28.45	1.933	1.505	28	19	9	UU	21	10	-	-	2.66	-	0.767
12.00		-	15	-	-	-	-	-	-	-	27.45	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			4	-	-	-	-	-	-	-	27.70	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00		CL	6	-	2	4	4	3	77	10	27.30	-	-	29	20	9	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH- 49)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic silt of intermediate plasticity**	MI	-	-	1	6	3	2	81	7	19.75	1.736	1.450	37	29	8	UU	21	9	-	-	2.66	0.090	0.834
1.50		-	5	-	-	-	-	-	-	-	20.18	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		MI	-	-	1	5	5	3	79	7	20.50	1.759	1.460	35	27	8	UU	22	9	-	-	2.66	0.092	0.822
3.00		-	3	-	-	-	-	-	-	-	21.70	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	3	-	-	-	-	-	-	-	22.18	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic clays of low plasticity**	CL	-	-	2	3	3	4	82	6	23.10	1.810	1.470	34	26	8	UU	23	9	-	-	2.66	0.097	0.810
6.00		-	2	-	-	-	-	-	-	-	24.50	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00	**Inorganic silt of intermediate plasticity**	MI	-	-	1	4	4	3	82	6	23.18	1.822	1.479	36	27	9	UU	26	7	-	-	2.66	0.100	0.799
9.00		-	10	-	-	-	-	-	-	-	24.70	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50		MI	-	-	4	1	1	3	84	7	25.12	1.858	1.485	35	25	10	UU	25	7	-	-	2.66	0.110	0.791
12.00		-	4	-	-	-	-	-	-	-	25.45	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			4		-	-	-	-	-	-	22.48	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	**Inorganic clays of low plasticity**	CL	4	-	3	4	2	1	83	7	22.90	-	-	34	26	8	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH-50)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic silt of intermediate plasticity**	MI		-	0	7	4	3	77	9	18.28	1.786	1.510	35	27	8	UU	20	10	-	-	2.66	-	0.762
1.50		-	5	-	-	-	-	-	-	-	19.54	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		MI		-	0	6	6	4	75	9	21.57	1.811	1.490	35	25	10	UU	21	10	-	-	2.66	-	0.785
3.00		-	4	-	-	-	-	-	-	-	21.07	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	3	-	-	-	-	-	-	-	22.34	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic clays of low plasticity**	CL		-	1	4	4	5	78	8	26.20	1.882	1.491	32	24	8	UU	22	10	-	-	2.66	-	0.784
6.00		-	4	-	-	-	-	-	-	-	31.26	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00	**Inorganic silt of intermediate plasticity**	MI		-	0	5	5	4	78	8	18.35	1.794	1.516	35	25	10	UU	25	8	-	-	2.66	-	0.755
9.00		-	11	-	-	-	-	-	-	-	23.50	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50		MI		-	3	2	2	4	80	9	26.30	1.932	1.530	35	25	10	UU	24	8	-	-	2.66	-	0.739
12.00		-	13	-	-	-	-	-	-	-	25.30	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			3	-	-	-	-	-	-	-	25.55	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	**Inorganic clays of low plasticity**	CL	16	-	2	5	3	2	79	9	25.15	-	-	32	24	8	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH- 51)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic silt of intermediate plasticity**	MI	-	-	0	2	1	0	89	8	20.40	1.746	1.450	45	29	16	UU	21	9	-	-	2.66	0.099	0.834
1.50		-	5	-	-	-	-	-	-	-	23.41	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		MI	-	-	0	1	1	0	88	10	25.15	1.827	1.460	46	28	18	UU	22	9	-	-	2.66	0.095	0.822
3.00		-	3	-	-	-	-	-	-	-	30.16	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	2	-	-	-	-	-	-	-	30.91	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic clays of low plasticity**	CI	-	-	0	0	0	4	87	9	22.15	1.802	1.475	39	24	15	UU	23	9	-	-	2.66	0.097	0.803
6.00		-	3	-	-	-	-	-	-	-	17.23	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00		CL	-	-	0	0	0	4	88	8	15.03	1.706	1.483	32	23	9	UU	26	7	-	-	2.66	0.099	0.794
9.00		-	4	-	-	-	-	-	-	-	20.45	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50		CL	-	-	0	0	0	1	93	6	27.64	1.908	1.495	33	21	12	UU	25	7	-	-	2.66	0.098	0.779
12.00		-	6	-	-	-	-	-	-	-	22.62	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			3		-	-	-	-	-	-	22.70	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	**Inorganic silt and clays of low plasticity**	CL-ML	5	-	0	0	0	7	86	7	19.63	-	-	31	25	6	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH-52)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic silt of intermediate plasticity**	MI		-	1	3	2	1	83	10	24.99	1.844	1.475	43	27	16	UU	20	10	-	-	2.66	-	0.803
1.50		-	7	-	-	-	-	-	-	-	28.81	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		MI		-	2	2	2	1	81	12	30.35	1.929	1.480	44	26	18	UU	21	10	-	-	2.66	-	0.797
3.00		-	3	-	-	-	-	-	-	-	32.75	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	4	-	-	-	-	-	-	-	30.47	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic clays of low plasticity**	CI		-	4	1	1	5	78	11	28.35	1.916	1.493	37	22	15	UU	22	10	-	-	2.66	-	0.782
6.00		-	2	-	-	-	-	-	-	-	23.20	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00		CL		-	3	1	1	5	80	10	20.23	1.811	1.506	30	21	9	UU	25	8	-	-	2.66	-	0.766
9.00		-	13	-	-	-	-	-	-	-	25.65	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50		CL		-	1	1	1	2	87	8	32.84	2.019	1.520	31	19	12	UU	24	8	-	-	2.66	-	0.750
12.00		-	14	-	-	-	-	-	-	-	27.82	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			4	-	-	-	-	-	-	-	27.90	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	**Inorganic silt and clays of low plasticity**	CL-ML	4	-	2	1	1	8	79	9	24.83	-	-	29	23	6	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH- 53)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic clays of low plasticity**	CL	-	-	1	0	4	10	79	6	12.10	1.631	1.455	33	25	8	UU	18	13	-	-	2.66	0.090	0.828
1.50		-	6	-	-	-	-	-	-	-	15.16	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		CL	-	-	0	0	0	3	92	5	16.50	1.701	1.460	33	23	10	UU	23	9	-	-	2.66	0.095	0.822
3.00		-	4	-	-	-	-	-	-	-	17.94	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	2	-	-	-	-	-	-	-	21.45	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic silt and clays of low plasticity**	CL-ML	-	-	0	0	0	8	86	6	22.15	1.802	1.475	33	26	7	UU	17	12	-	-	2.66	0.098	0.803
6.00		-	2	-	-	-	-	-	-	-	21.75	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00	**Inorganic silt of intermediate plasticity**	MI	-	-	0	0	0	1	89	10	23.15	1.826	1.483	38	26	12	UU	24	9	-	-	2.66	0.099	0.794
9.00		-	3	-	-	-	-	-	-	-	23.70	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50	**Inorganic silt and clays of low plasticity**	CL-ML	-	-	0	0	0	8	85	7	12.80	1.686	1.495	33	26	7	UU	17	13	-	-	2.66	0.100	0.779
12.00		-	4	-	-	-	-	-	-	-	19.75	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			2		-	-	-	-	-	-	20.25	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	**Inorganic clays of low plasticity**	CL	5	-	0	2	4	4	84	6	25.12	-	-	33	25	8	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH-54)

Bore hole depth	Soil Description	Soil classification	SPT		Grain Size Analysis						Density and Moisture			Atterberg Limits			Shear Strength Parameters			Shrinkage Limit (%)	Free Swell Index (%)	Specific Gravity Gs	Consolidation Characteristic	
			Observed	Corrected	Gravel (%)	Course Sand (%)	Medium Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)	moisture Content (%)	Bulk Density (gm/cc)	Dry Density (gm/ cc)	Liquid Limit (%)	Plastic Limit (%)	Plastic Index (%)	Type of test	C (KN/m^2)	Φ (Degrees)				C_c	Void Ratio, e_0
1.00	**Inorganic silt of low plasticity**	ML		-	0	1	5	11	75	8	22.58	1.839	1.500	31	23	8	UU	17	14	-	-	2.66	-	0.773
1.50		-	6	-	-	-	-	-	-	-	26.01	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50	**Inorganic clays of low plasticity**	CL		-	2	1	1	4	85	7	28.20	1.923	1.500	31	21	10	UU	22	10	-	-	2.66	-	0.773
3.00		-	4	-	-	-	-	-	-	-	33.41	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	3	-	-	-	-	-	-	-	33.13	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic silt and clays of low plasticity**	CL-ML		-	3	1	1	9	78	8	26.20	1.907	1.511	31	24	7	UU	16	13	-	-	2.66	-	0.760
6.00		-	2	-	-	-	-	-	-	-	21.05	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00	**Inorganic silt of intermediate plasticity**	MI		-	5	1	1	2	79	12	18.08	1.805	1.529	36	24	12	UU	23	10	-	-	2.66	-	0.740
9.00		-	12	-	-	-	-	-	-	-	23.50	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50	**Inorganic silt and clays of low plasticity**	CL-ML		-	1	1	1	9	79	9	30.69	2.019	1.545	31	24	7	UU	16	14	-	-	2.66	-	0.722
12.00		-	15	-	-	-	-	-	-	-	25.67	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			3	-	-	-	-	-	-	-	25.75	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	**Inorganic clays of low plasticity**	CL	5	-	2	3	5	5	77	8	22.68	-	-	31	23	8	-	-	-	-	-	-	-	-

APPENDIX 'B'

TABLE-2:- SUMMARY OF TEST RESULTS

Depth	Permeability (10^{-6} Cm/Sec)	Shear Strength Parameters							
		Type of test	C (KN/m^2)	Φ (Degrees)	Type of test	C (KN/m^2)	Φ (Degrees)	Type of Test	C (KN/m^2)
BH-1									
1.00	0.35	CD	24	5	DST	21	4	UC	26
2.50	0.40	CD	38	4	DST	35	3	UC	40
5.00	0.50	CD	28	5	DST	25	4	UC	30
7.00	0.45	CD	36	5	DST	33	3	UC	38
9.50	0.39	CD	27	4	DST	24	3	UC	29
11.00	0.45	CD	15	11	DST	12	10	UC	17
13.00	0.33	CD	15	11	DST	12	10	UC	17
BH-2									
1.00	0.55	CD	22	5	DST	20	4	UC	25
2.50	0.50	CD	37	2	DST	35	1	UC	40
5.00	0.52	CD	20	7	DST	18	6	UC	23
7.00	0.51	CD	26	4	DST	24	3	UC	29
9.50	0.48	CD	20	7	DST	18	6	UC	23
11.00	0.54	CD	19	7	DST	17	6	UC	22
13.50	0.39	CD	22	5	DST	20	4	UC	25
BH-3									
1.00	0.45	CD	23	5	DST	21	4	UC	26
2.50	0.51	CD	31	3	DST	29	2	UC	34
5.00	0.52	CD	12	14	DST	10	13	UC	15
7.00	0.56	CD	13	14	DST	11	13	UC	16
9.50	0.55	CD	15	11	DST	13	10	UC	18
11.00	0.45	CD	12	14	DST	10	13	UC	15
13.50	0.44	CD	11	14	DST	9	13	UC	14

Depth	Permeability (10^{-6} Cm/Sec)	Shear Strength Parameters							
		Type of test	C (KN/m^2)	Φ (Degrees)	Type of test	C (KN/m^2)	Φ (Degrees)	Type of Test	C (KN/m^2)
BH-4									
1.00	0.38	CD	19	7	DST	17	6	UC	22
2.50	0.39	CD	26	4	DST	24	3	UC	29
5.00	0.42	CD	19	6	DST	17	5	UC	22
7.00	0.46	CD	14	11	DST	12	10	UC	17
9.50	0.45	CD	12	14	DST	10	13	UC	15
11.00	0.47	CD	7	16	DST	5	15	UC	10
13.50	0.50	CD	11	15	DST	9	14	UC	14
BH-5									
1.00	0.54	CD	22	5	DST	20	4	UC	25
2.50	0.52	CD	23	5	DST	21	4	UC	26
5.00	0.55	CD	19	7	DST	17	6	UC	22
7.00	0.35	CD	20	7	DST	18	6	UC	23
9.50	0.38	CD	25	4	DST	23	3	UC	28
BH-6									
1.00	0.49	CD	20	4	DST	22	5	UC	26
2.50	0.48	CD	22	6	DST	23	5	UC	25
5.00	0.53	CD	17	8	DST	19	7	UC	24
7.00	0.33	CD	17	6	DST	20	5	UC	22
9.50	0.41	CD	22	5	DST	25	4	UC	26
BH-7									
1.00	0.44	CD	22	5	DST	20	4	UC	25
2.50	0.46	CD	25	4	DST	23	3	UC	28
5.00	0.45	CD	22	5	DST	20	4	UC	25
7.00	0.31	CD	14	11	DST	12	10	UC	17
9.50	0.46	CD	26	4	DST	24	3	UC	29

Depth	Permeability (10^{-6} Cm/Sec)	Shear Strength Parameters							
		Type of test	C (KN/m^2)	Φ (Degrees)	Type of test	C (KN/m^2)	Φ (Degrees)	Type of Test	C (KN/m^2)
BH-8									
1.00	0.39	CD	20	4	DST	22	5	UC	26
2.50	0.42	CD	24	5	DST	25	4	UC	27
5.00	0.43	CD	20	6	DST	22	5	UC	27
7.00	0.29	CD	11	10	DST	14	9	UC	16
9.50	0.49	CD	23	5	DST	26	4	UC	27
BH-9									
1.00	0.55	CD	19	7	DST	17	6	UC	22
2.50	0.34	CD	19	7	DST	17	6	UC	22
5.00	0.51	CD	20	7	DST	18	6	UC	23
7.00	0.54	CD	22	5	DST	20	4	UC	25
9.50	0.58	CD	26	4	DST	24	3	UC	29
BH-10									
1.00	0.50	CD	17	6	DST	19	7	UC	23
2.50	0.30	CD	18	8	DST	19	7	UC	21
5.00	0.49	CD	18	8	DST	20	7	UC	25
7.00	0.52	CD	19	4	DST	22	3	UC	24
9.50	0.61	CD	23	5	DST	26	4	UC	27
BH-11									
1.00	0.49	CD	19	7	DST	17	6	UC	22
2.50	0.53	CD	18	7	DST	16	6	UC	21
5.00	0.42	CD	17	7	DST	15	6	UC	20
7.00	0.47	CD	19	7	DST	17	6	UC	22
9.50	0.45	CD	14	12	DST	12	11	UC	17

Depth	Permeability (10^{-6} Cm/Sec)	Shear Strength Parameters							
		Type of test	C (KN/m^2)	Φ (Degrees)	Type of test	C (KN/m^2)	Φ (Degrees)	Type of Test	C (KN/m^2)
BH-12									
1.00	0.50	CD	17	6	DST	19	7	UC	23
2.50	0.30	CD	18	8	DST	19	7	UC	21
5.00	0.49	CD	18	8	DST	20	7	UC	25
7.00	0.52	CD	19	4	DST	22	3	UC	24
9.50	0.61	CD	23	5	DST	26	4	UC	27
BH-13									
1.00	0.38	CD	14	11	DST	12	10	UC	17
2.50	0.46	CD	19	7	DST	17	6	UC	22
5.00	0.42	CD	19	6	DST	17	5	UC	22
7.00	0.41	CD	18	7	DST	16	6	UC	21
9.50	0.43	CD	19	6	DST	17	5	UC	22
BH-14									
1.00	0.33	CD	12	10	DST	14	11	UC	18
2.50	0.42	CD	18	8	DST	19	7	UC	21
5.00	0.40	CD	17	7	DST	19	6	UC	24
7.00	0.39	CD	15	6	DST	18	5	UC	20
9.50	0.46	CD	16	7	DST	19	6	UC	20
BH-15									
1.00	0.49	CD	16	11	DST	14	10	UC	19
2.50	0.52	CD	19	7	DST	17	6	UC	22
5.00	0.53	CD	16	12	DST	14	11	UC	19
7.00	0.37	CD	16	11	DST	14	10	UC	19
9.50	0.56	CD	16	10	DST	14	9	UC	19
BH-16									
1.00	0.44	CD	14	10	DST	16	11	UC	20
2.50	0.48	CD	18	8	DST	19	7	UC	21

Depth	Permeability (10^{-6} Cm/Sec)	Shear Strength Parameters							
		Type of test	C (KN/m^2)	Φ (Degrees)	Type of test	C (KN/m^2)	Φ (Degrees)	Type of Test	C (KN/m^2)
5.00	0.51	CD	14	13	DST	16	12	UC	21
7.00	0.35	CD	13	10	DST	16	9	UC	18
9.50	0.59	CD	13	11	DST	16	10	UC	17
BH-17									
1.00	0.58	CD	16	11	DST	14	10	UC	19
2.50	0.45	CD	16	12	DST	14	11	UC	19
5.00	0.54	CD	16	10	DST	14	9	UC	19
7.00	0.32	CD	19	7	DST	17	6	UC	22
9.50	0.38	CD	20	8	DST	18	7	UC	23
BH-18									
1.00	0.53	CD	14	10	DST	16	11	UC	20
2.50	0.41	CD	15	13	DST	16	12	UC	18
5.00	0.52	CD	14	11	DST	16	10	UC	21
7.00	0.30	CD	16	6	DST	19	5	UC	21
9.50	0.41	CD	17	9	DST	20	8	UC	21
BH-19									
1.00	0.38	CD	14	12	DST	12	11	UC	17
2.50	0.46	CD	19	8	DST	17	7	UC	22
5.00	0.42	CD	23	6	DST	21	5	UC	26
7.00	0.41	CD	23	5	DST	21	4	UC	26
9.50	0.43	CD	23	6	DST	21	5	UC	26
BH-20									
1.00	0.33	CD	12	11	DST	14	12	UC	18
2.50	0.42	CD	18	9	DST	19	8	UC	21
5.00	0.40	CD	21	7	DST	23	6	UC	28
7.00	0.39	CD	20	4	DST	23	3	UC	25
9.50	0.46	CD	20	7	DST	23	6	UC	24

Depth	Permeability (10^{-6} Cm/Sec)	Shear Strength Parameters							
		Type of test	C (KN/m^2)	Φ (Degrees)	Type of test	C (KN/m^2)	Φ (Degrees)	Type of Test	C (KN/m^2)
BH-21									
1.00	0.58	CD	19	7	DST	17	6	UC	22
2.50	0.45	CD	23	5	DST	21	4	UC	26
5.00	0.54	CD	20	8	DST	18	7	UC	23
7.00	0.32	CD	20	7	DST	18	6	UC	23
9.50	0.38	CD	19	7	DST	17	6	UC	22
BH-22									
1.00	0.53	CD	17	6	DST	19	7	UC	23
2.50	0.41	CD	22	6	DST	23	5	UC	25
5.00	0.52	CD	18	9	DST	20	8	UC	25
7.00	0.30	CD	17	6	DST	20	5	UC	22
9.50	0.41	CD	16	8	DST	19	7	UC	20
BH-23									
1.00	0.44	CD	18	7	DST	16	6	UC	21
2.50	0.46	CD	20	7	DST	18	6	UC	23
5.00	0.45	CD	22	5	DST	20	4	UC	25
7.00	0.31	CD	23	5	DST	21	4	UC	26
9.50	0.46	CD	22	6	DST	20	5	UC	25
BH-24									
1.00	0.39	CD	16	6	DST	18	7	UC	22
2.50	0.42	CD	19	8	DST	20	7	UC	22
5.00	0.43	CD	20	6	DST	22	5	UC	27
7.00	0.29	CD	20	4	DST	23	3	UC	25
9.50	0.49	CD	19	7	DST	22	6	UC	23
BH-25									
1.00	0.58	CD	20	7	DST	18	6	UC	23
2.50	0.45	CD	19	7	DST	17	6	UC	22

Depth	Permeability (10^{-6} Cm/Sec)	Shear Strength Parameters							
		Type of test	C (KN/m^2)	Φ (Degrees)	Type of test	C (KN/m^2)	Φ (Degrees)	Type of Test	C (KN/m^2)
5.00	0.54	CD	21	7	DST	19	6	UC	24
7.00	0.32	CD	22	6	DST	20	5	UC	25
9.50	0.38	CD	21	6	DST	19	5	UC	24
BH-26									
1.00	0.53	CD	18	6	DST	20	7	UC	24
2.50	0.41	CD	18	8	DST	19	7	UC	21
5.00	0.52	CD	19	8	DST	21	7	UC	26
7.00	0.30	CD	19	5	DST	22	4	UC	24
9.50	0.41	CD	18	7	DST	21	6	UC	22
BH-27									
1.00	0.38	CD	18	7	DST	16	6	UC	21
2.50	0.46	CD	18	6	DST	16	5	UC	21
5.00	0.42	CD	21	6	DST	19	5	UC	24
7.00	0.41	CD	20	6	DST	18	5	UC	23
9.50	0.43	CD	22	6	DST	20	5	UC	25
BH-28									
1.00	0.33	CD	16	6	DST	18	7	UC	22
2.50	0.42	CD	17	7	DST	18	6	UC	20
5.00	0.40	CD	19	7	DST	21	6	UC	26
7.00	0.39	CD	17	5	DST	20	4	UC	22
9.50	0.46	CD	19	7	DST	22	6	UC	23
BH-29									
1.00	0.44	CD	18	7	DST	16	6	UC	21
2.50	0.46	CD	18	6	DST	16	5	UC	21
5.00	0.45	CD	21	6	DST	19	5	UC	24
7.00	0.31	CD	20	6	DST	18	5	UC	23
9.50	0.46	CD	22	6	DST	20	5	UC	25

Depth	Permeability (10^{-6} Cm/Sec)	Shear Strength Parameters							
		Type of test	C (KN/m^2)	Φ (Degrees)	Type of test	C (KN/m^2)	Φ (Degrees)	Type of Test	C (KN/m^2)
BH-30									
1.00	0.55	CD	19	7	DST	17	6	UC	22
2.50	0.34	CD	19	7	DST	17	6	UC	22
5.00	0.51	CD	20	7	DST	18	6	UC	23
7.00	0.54	CD	22	5	DST	20	4	UC	25
9.50	0.58	CD	26	4	DST	24	3	UC	29
BH-31									
1.00	0.54	CD	18	7	DST	16	6	UC	21
2.50	0.52	CD	18	6	DST	16	5	UC	21
5.00	0.55	CD	21	6	DST	19	5	UC	24
7.00	0.35	CD	20	6	DST	18	5	UC	23
9.50	0.38	CD	22	6	DST	20	5	UC	25
BH-32									
1.00	0.49	CD	16	6	DST	18	7	UC	22
2.50	0.48	CD	17	7	DST	18	6	UC	20
5.00	0.53	CD	19	7	DST	21	6	UC	26
7.00	0.33	CD	17	5	DST	20	4	UC	22
9.50	0.41	CD	19	7	DST	22	6	UC	23
BH-33									
1.00	0.44	CD	15	11	DST	13	10	UC	18
2.50	0.46	CD	11	10	DST	9	9	UC	14
5.00	0.45	CD	19	7	DST	17	6	UC	22
7.00	0.31	CD	22	5	DST	20	4	UC	25
9.50	0.46	CD	22	6	DST	20	5	UC	25
BH-34									
1.00	0.39	CD	13	10	DST	15	11	UC	19
2.50	0.42	CD	10	11	DST	11	10	UC	13

Depth	Permeability (10^{-6} Cm/Sec)	Shear Strength Parameters							
		Type of test	C (KN/m^2)	Φ (Degrees)	Type of test	C (KN/m^2)	Φ (Degrees)	Type of Test	C (KN/m^2)
5.00	0.43	CD	17	8	DST	19	7	UC	24
7.00	0.29	CD	19	4	DST	22	3	UC	24
9.50	0.49	CD	19	7	DST	22	6	UC	23
BH-35									
1.00	0.38	CD	26	4	DST	24	3	UC	29
2.50	0.46	CD	25	4	DST	23	3	UC	28
5.00	0.42	CD	24	4	DST	22	3	UC	27
7.00	0.41	CD	19	7	DST	17	6	UC	22
9.50	0.43	CD	20	7	DST	18	6	UC	23
BH-36									
1.00	0.33	CD	24	3	DST	26	4	UC	30
2.50	0.42	CD	24	5	DST	25	4	UC	27
5.00	0.40	CD	22	5	DST	24	4	UC	29
7.00	0.39	CD	16	6	DST	19	5	UC	21
9.50	0.46	CD	17	8	DST	20	7	UC	21
BH-37									
1.00	0.58	CD	15	11	DST	13	10	UC	18
2.50	0.45	CD	11	10	DST	9	9	UC	14
5.00	0.54	CD	19	7	DST	17	6	UC	22
7.00	0.32	CD	22	5	DST	20	4	UC	25
9.50	0.38	CD	22	6	DST	20	5	UC	25
BH-38									
1.00	0.55	CD	19	7	DST	17	6	UC	22
2.50	0.34	CD	19	7	DST	17	6	UC	22
5.00	0.51	CD	20	7	DST	18	6	UC	23
7.00	0.54	CD	22	5	DST	20	4	UC	25
9.50	0.58	CD	26	4	DST	24	3	UC	29

Depth	Permeability (10^{-6} Cm/Sec)	Shear Strength Parameters							
		Type of test	C (KN/m^2)	Φ (Degrees)	Type of test	C (KN/m^2)	Φ (Degrees)	Type of Test	C (KN/m^2)
BH-39									
1.00	0.44	CD	26	4	DST	24	3	UC	29
2.50	0.46	CD	25	4	DST	23	3	UC	28
5.00	0.45	CD	24	4	DST	22	3	UC	27
7.00	0.31	CD	19	7	DST	17	6	UC	22
9.50	0.46	CD	20	7	DST	18	6	UC	23
BH-40									
1.00	0.39	CD	24	3	DST	26	4	UC	30
2.50	0.42	CD	24	5	DST	25	4	UC	27
5.00	0.43	CD	22	5	DST	24	4	UC	29
7.00	0.29	CD	16	6	DST	19	5	UC	21
9.50	0.49	CD	17	8	DST	20	7	UC	21
BH-41									
1.00	0.58	CD	26	4	DST	24	3	UC	29
2.50	0.45	CD	25	4	DST	23	3	UC	28
5.00	0.54	CD	24	4	DST	22	3	UC	27
7.00	0.32	CD	19	7	DST	17	6	UC	22
9.50	0.38	CD	20	7	DST	18	6	UC	23
BH-42									
1.00	0.58	CD	15	11	DST	13	10	UC	18
2.50	0.45	CD	11	10	DST	9	9	UC	14
5.00	0.54	CD	19	7	DST	17	6	UC	22
7.00	0.32	CD	22	5	DST	20	4	UC	25
9.50	0.38	CD	22	6	DST	20	5	UC	25
BH-43									
1.00	0.54	CD	18	7	DST	16	6	UC	21
2.50	0.52	CD	19	7	DST	17	6	UC	22

Depth	Permeability (10^{-6} Cm/Sec)	Shear Strength Parameters							
		Type of test	C (KN/m^2)	Φ (Degrees)	Type of test	C (KN/m^2)	Φ (Degrees)	Type of Test	C (KN/m^2)
5.00	0.55	CD	20	7	DST	18	6	UC	23
7.00	0.35	CD	23	5	DST	21	4	UC	26
9.50	0.38	CD	22	5	DST	20	4	UC	25
BH-44									
1.00	0.49	CD	16	6	DST	18	7	UC	22
2.50	0.48	CD	18	8	DST	19	7	UC	21
5.00	0.53	CD	18	8	DST	20	7	UC	25
7.00	0.33	CD	20	4	DST	23	3	UC	25
9.50	0.41	CD	19	6	DST	22	5	UC	23
BH-45									
1.00	0.38	CD	19	6	DST	17	5	UC	22
2.50	0.46	CD	20	6	DST	18	5	UC	23
5.00	0.42	CD	19	7	DST	17	6	UC	22
7.00	0.41	CD	22	5	DST	20	4	UC	25
9.50	0.43	CD	19	7	DST	17	6	UC	22
BH-46									
1.00	0.33	CD	17	5	DST	19	6	UC	23
2.50	0.42	CD	19	7	DST	20	6	UC	22
5.00	0.40	CD	17	8	DST	19	7	UC	24
7.00	0.39	CD	19	4	DST	22	3	UC	24
9.50	0.46	CD	16	8	DST	19	7	UC	20
BH-47									
1.00	0.54	CD	19	6	DST	17	5	UC	22
2.50	0.52	CD	20	6	DST	18	5	UC	23
5.00	0.55	CD	19	7	DST	17	6	UC	22
7.00	0.35	CD	22	5	DST	20	4	UC	25
9.50	0.38	CD	19	7	DST	17	6	UC	22

Depth	Permeability (10^{-6} Cm/Sec)	Shear Strength Parameters							
		Type of test	C (KN/m^2)	Φ (Degrees)	Type of test	C (KN/m^2)	Φ (Degrees)	Type of Test	C (KN/m^2)
BH-48									
1.00	0.54	CD	19	6	DST	17	5	UC	22
2.50	0.52	CD	20	6	DST	18	5	UC	23
5.00	0.55	CD	19	7	DST	17	6	UC	22
7.00	0.35	CD	22	5	DST	20	4	UC	25
9.50	0.38	CD	19	7	DST	17	6	UC	22
BH-49									
1.00	0.58	CD	18	7	DST	16	6	UC	21
2.50	0.45	CD	19	7	DST	17	6	UC	22
5.00	0.54	CD	20	7	DST	18	6	UC	23
7.00	0.32	CD	23	5	DST	21	4	UC	26
9.50	0.38	CD	22	5	DST	20	4	UC	25
BH-50									
1.00	0.54	CD	19	6	DST	17	5	UC	22
2.50	0.52	CD	20	6	DST	18	5	UC	23
5.00	0.55	CD	19	7	DST	17	6	UC	22
7.00	0.35	CD	22	5	DST	20	4	UC	25
9.50	0.38	CD	19	7	DST	17	6	UC	22
BH-51									
1.00	0.38	CD	18	7	DST	16	6	UC	21
2.50	0.46	CD	19	7	DST	17	6	UC	22
5.00	0.42	CD	20	7	DST	18	6	UC	23
7.00	0.41	CD	23	5	DST	21	4	UC	26
9.50	0.43	CD	22	5	DST	20	4	UC	25
BH-52									
1.00	0.33	CD	16	6	DST	18	7	UC	22
2.50	0.42	CD	18	8	DST	19	7	UC	21

Depth	Permeability (10^{-6} Cm/Sec)	Shear Strength Parameters							
		Type of test	C (KN/m^2)	Φ (Degrees)	Type of test	C (KN/m^2)	Φ (Degrees)	Type of Test	C (KN/m^2)
5.00	0.40	CD	18	8	DST	20	7	UC	25
7.00	0.39	CD	20	4	DST	23	3	UC	25
9.50	0.46	CD	19	6	DST	22	5	UC	23
BH-53									
1.00	0.44	CD	15	11	DST	13	10	UC	18
2.50	0.46	CD	20	7	DST	18	6	UC	23
5.00	0.45	CD	14	10	DST	12	9	UC	17
7.00	0.31	CD	21	7	DST	19	6	UC	24
9.50	0.46	CD	14	11	DST	12	10	UC	17
BH-54									
1.00	0.39	CD	13	10	DST	15	11	UC	19
2.50	0.42	CD	19	8	DST	20	7	UC	22
5.00	0.43	CD	12	11	DST	14	10	UC	19
7.00	0.29	CD	18	6	DST	21	5	UC	23
9.50	0.49	CD	11	12	DST	14	11	UC	15
BH-55									
1.00	0.54	CD	19	7	DST	17	6	UC	22
2.50	0.52	CD	20	7	DST	18	6	UC	23
5.00	0.55	CD	20	8	DST	18	7	UC	23
7.00	0.35	CD	20	6	DST	18	5	UC	23
9.50	0.38	CD	15	11	DST	13	10	UC	18
BH-56									
1.00	0.49	CD	17	6	DST	19	7	UC	23
2.50	0.48	CD	19	8	DST	20	7	UC	22
5.00	0.53	CD	18	9	DST	20	8	UC	25
7.00	0.33	CD	17	5	DST	20	4	UC	22
9.50	0.41	CD	12	12	DST	15	11	UC	16

Depth	Permeability (10^{-6} Cm/Sec)	Shear Strength Parameters							
		Type of test	C (KN/m^2)	Φ (Degrees)	Type of test	C (KN/m^2)	Φ (Degrees)	Type of Test	C (KN/m^2)
BH-93									
1.00	0.44	CD	14	11	DST	12	10	UC	17
2.50	0.46	CD	18	7	DST	16	6	UC	21
5.00	0.45	CD	19	7	DST	17	6	UC	22
7.00	0.31	CD	19	7	DST	17	6	UC	22
9.50	0.46	CD	18	7	DST	16	6	UC	21
BH-94									
1.00	0.39	CD	12	10	DST	14	11	UC	18
2.50	0.42	CD	17	8	DST	18	7	UC	20
5.00	0.43	CD	17	8	DST	19	7	UC	24
7.00	0.29	CD	16	6	DST	19	5	UC	21
9.50	0.49	CD	15	8	DST	18	7	UC	19
BH-95									
1.00	0.44	CD	19	7	DST	17	6	UC	22
2.50	0.46	CD	20	7	DST	18	6	UC	23
5.00	0.45	CD	14	11	DST	12	10	UC	17
7.00	0.31	CD	14	12	DST	12	11	UC	17
9.50	0.46	CD	14	13	DST	12	12	UC	17
BH-96									
1.00	0.39	CD	17	6	DST	19	7	UC	23
2.50	0.42	CD	19	8	DST	20	7	UC	22
5.00	0.43	CD	12	12	DST	14	11	UC	19
7.00	0.29	CD	11	11	DST	14	10	UC	16
9.50	0.49	CD	11	14	DST	14	13	UC	15
BH-97									
1.00	0.58	CD	15	11	DST	13	10	UC	18
2.50	0.45	CD	15	12	DST	13	11	UC	18

Depth	Permeability (10^{-6} Cm/Sec)	Shear Strength Parameters							
		Type of test	C (KN/m^2)	Φ (Degrees)	Type of test	C (KN/m^2)	Φ (Degrees)	Type of Test	C (KN/m^2)
5.00	0.54	CD	13	12	DST	11	11	UC	16
7.00	0.32	CD	19	7	DST	17	6	UC	22
9.50	0.38	CD	14	11	DST	12	10	UC	17
BH-98									
1.00	0.53	CD	13	10	DST	15	11	UC	19
2.50	0.41	CD	14	13	DST	15	12	UC	17
5.00	0.52	CD	11	13	DST	13	12	UC	18
7.00	0.30	CD	16	6	DST	19	5	UC	21
9.50	0.41	CD	11	12	DST	14	11	UC	15
BH-99									
1.00	0.54	CD	15	11	DST	13	10	UC	18
2.50	0.52	CD	15	12	DST	13	11	UC	18
5.00	0.55	CD	13	12	DST	11	11	UC	16
7.00	0.35	CD	19	7	DST	17	6	UC	22
9.50	0.38	CD	14	11	DST	12	10	UC	17
BH-100									
1.00	0.55	CD	19	7	DST	17	6	UC	22
2.50	0.34	CD	19	7	DST	17	6	UC	22
5.00	0.51	CD	20	7	DST	18	6	UC	23
7.00	0.54	CD	22	5	DST	20	4	UC	25
9.50	0.58	CD	26	4	DST	24	3	UC	29
BH-101									
1.00	0.44	CD	15	11	DST	13	10	UC	18
2.50	0.46	CD	15	12	DST	13	11	UC	18
5.00	0.45	CD	13	12	DST	11	11	UC	16
7.00	0.31	CD	19	7	DST	17	6	UC	22
9.50	0.46	CD	14	11	DST	12	10	UC	17

Depth	Permeability (10^{-6} Cm/Sec)	Shear Strength Parameters							
		Type of test	C (KN/m^2)	Φ (Degrees)	Type of test	C (KN/m^2)	Φ (Degrees)	Type of Test	C (KN/m^2)
BH-102									
1.00	0.39	CD	13	10	DST	15	11	UC	19
2.50	0.42	CD	14	13	DST	15	12	UC	17
5.00	0.43	CD	11	13	DST	13	12	UC	18
7.00	0.29	CD	16	6	DST	19	5	UC	21
9.50	0.49	CD	11	12	DST	14	11	UC	15
BH-103									
1.00	0.38	CD	15	11	DST	13	10	UC	18
2.50	0.46	CD	15	12	DST	13	11	UC	18
5.00	0.42	CD	13	12	DST	11	11	UC	16
7.00	0.41	CD	19	7	DST	17	6	UC	22
9.50	0.43	CD	14	11	DST	12	10	UC	17
BH-104									
1.00	0.54	CD	15	11	DST	13	10	UC	18
2.50	0.52	CD	15	12	DST	13	11	UC	18
5.00	0.55	CD	13	12	DST	11	11	UC	16
7.00	0.35	CD	19	7	DST	17	6	UC	22
9.50	0.38	CD	14	11	DST	12	10	UC	17
BH-105									
1.00	0.58	CD	15	11	DST	13	10	UC	18
2.50	0.45	CD	15	12	DST	13	11	UC	18
5.00	0.54	CD	13	12	DST	11	11	UC	16
7.00	0.32	CD	19	7	DST	17	6	UC	22
9.50	0.38	CD	14	11	DST	12	10	UC	17

APPENDIX 'B'
TABLE-3: PLATE LOAD TEST RESULTS (PLT-01)

FIELD INVESTIGATION METHOD:

A test plate 45cm x 45cm square was used as a model for the prototype foundation. The plate was placed at 1.0 m below ground and subjected to incremental loading. Settlement at each increment of load was measured and load-settlement curves plotted. The bearing capacity and the settlement of the foundation were determined with the help of the load-settlement curves for the test plate. The test was conducted as per IS: 1888-1982.

Load (T)	Average Settlement (mm)	Cumulative Settlement (mm)
1.25	1.465	1.465
2.50	9.440	10.910
3.75	16.780	27.690

Calculations:

From Load Settlement curve:

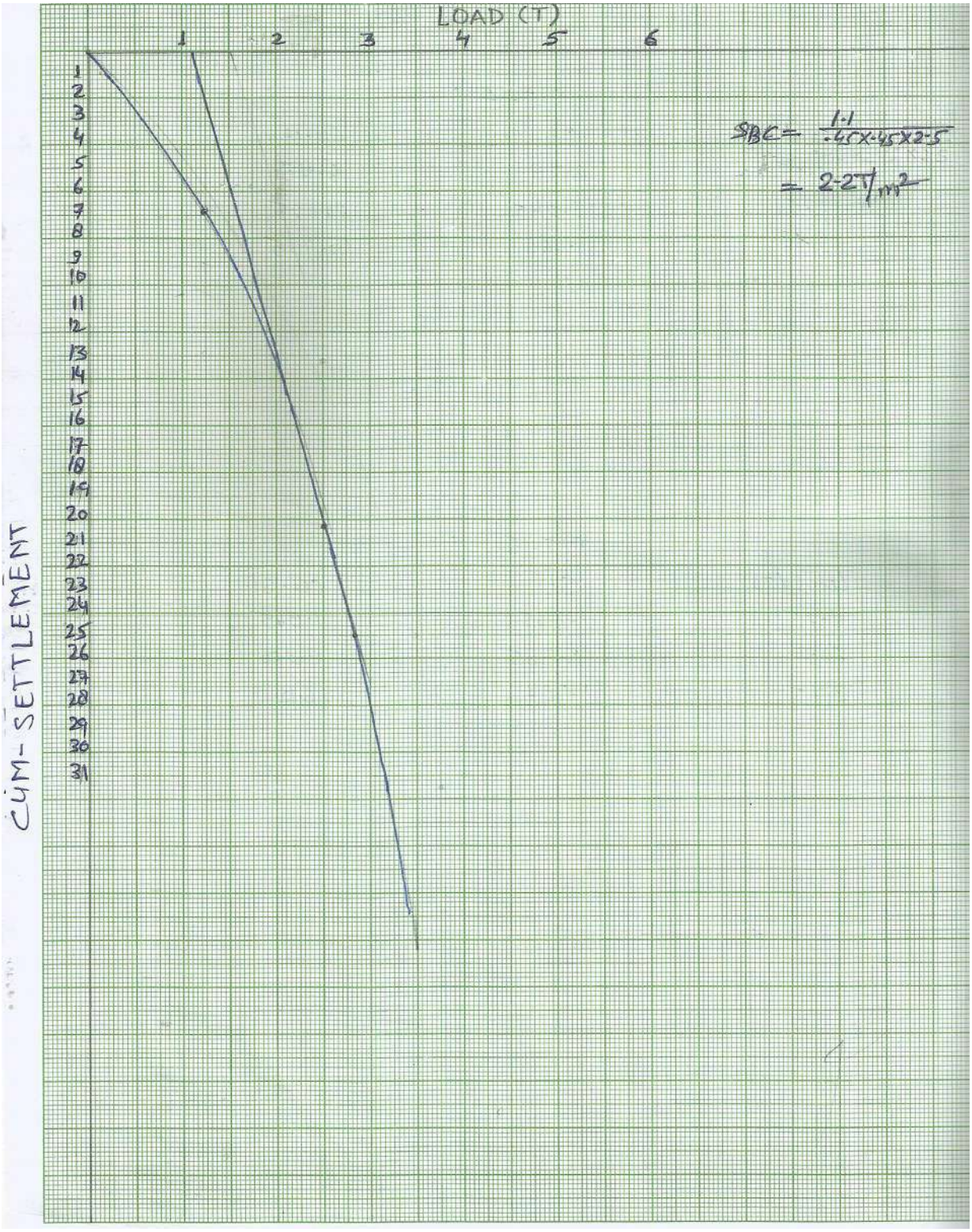
Ultimate Load: 1.10 T

Ultimate Bearing Capacity: 1.10/ (.45x.45) =5.43 T/m^2

Factor of Safety = 2.5

Safe bearing capacity: 5.43/2.5 = 2.17 T/m^2

LOAD VS CUMULATIVE SETTLEMENT CURVE



APPENDIX 'B'

TABLE-3: PLATE LOAD TEST RESULTS (PLT-02)

Load (T)	Average Settlement (mm)	Cumulative Settlement (mm)
1.25	2.315	2.315
2.50	4.545	6.860
3.75	9.330	16.190
5.00	14.210	30.390

Calculations:

From Load Settlement curve:

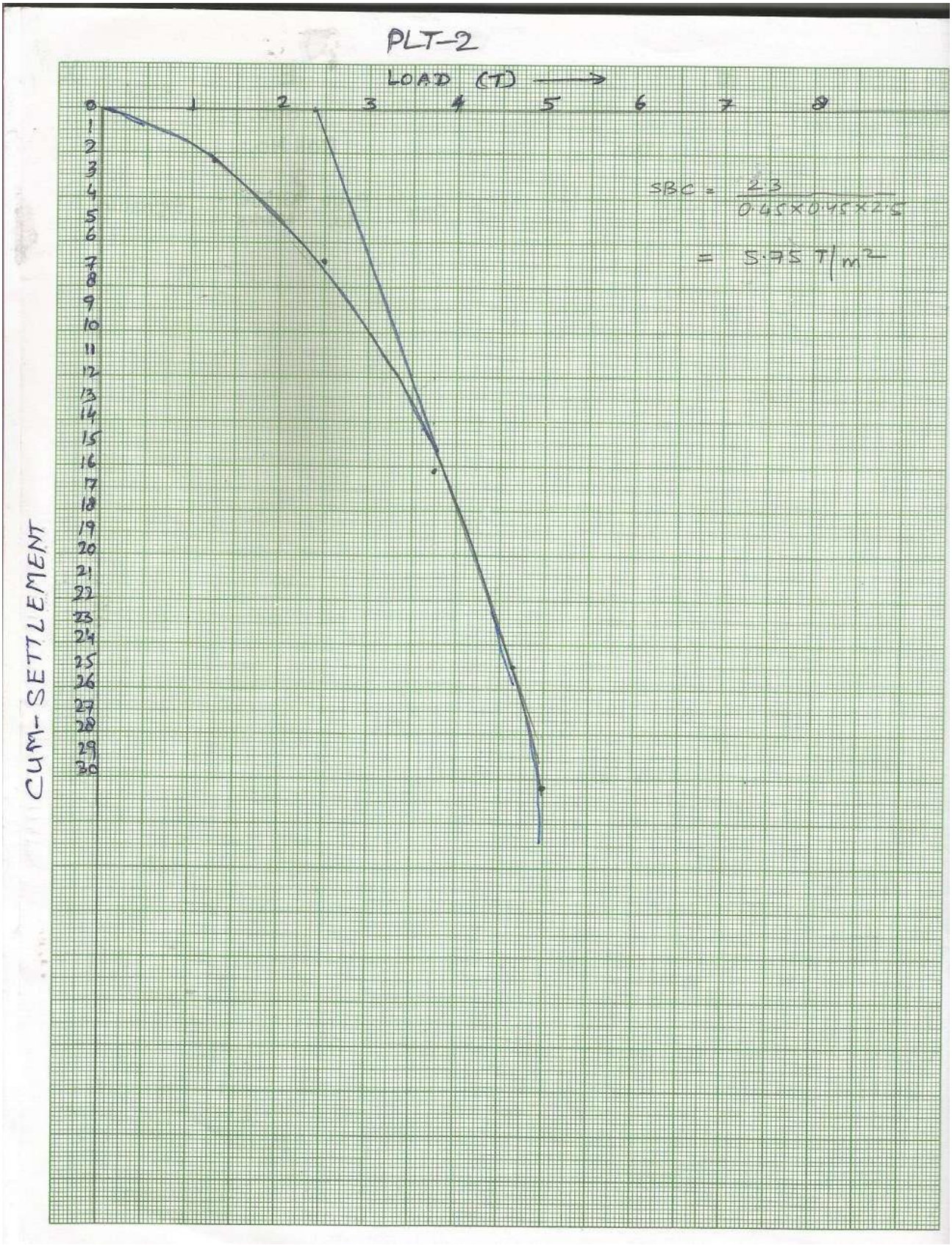
Ultimate Load: 2.30 T

Ultimate Bearing Capacity: 2.30/ (.45x.45) =11.35 T/m^2

Factor of Safety = 2.5

Safe bearing capacity: 11.35/2.5 = 4.54 T/m^2

LOAD VS CUMULATIVE SETTLEMENT CURVE



APPENDIX 'B'

TABLE-3: PLATE LOAD TEST RESULTS (PLT-03)

Load (T)	Average Settlement (mm)	Cumulative Settlement (mm)
1.25	1.450	1.450
2.50	2.000	3.450
3.75	6.120	9.570
5.00	11.420	20.995
6.25	9.370	30.365

Calculations:

From Load Settlement curve:

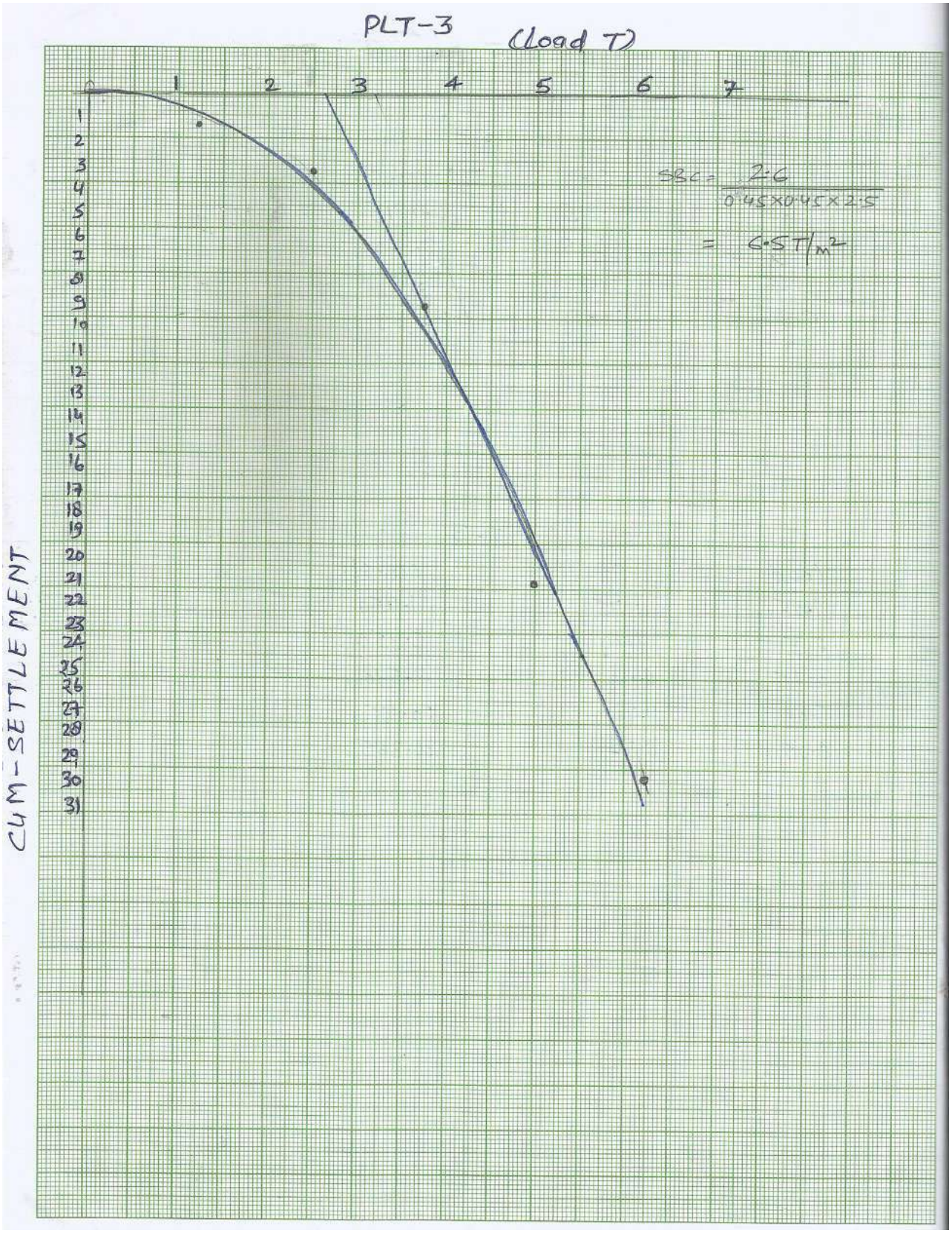
Ultimate Load: 2.60 T

Ultimate Bearing Capacity: 2.60/ (.45x.45) =12.83 T/m^2

Factor of Safety = 2.5

Safe bearing capacity: 12.83/2.5 = 5.14 T/m^2

LOAD VS CUMULATIVE SETTLEMENT CURVE



APPENDIX 'B'

TABLE-3: PLATE LOAD TEST RESULTS (PLT-04)

Load (T)	Average Settlement (mm)	Cumulative Settlement (mm)
1.25	6.780	6.780
2.50	13.245	20.025
3.75	31.460	51.485

Calculations:

From Load Settlement curve:

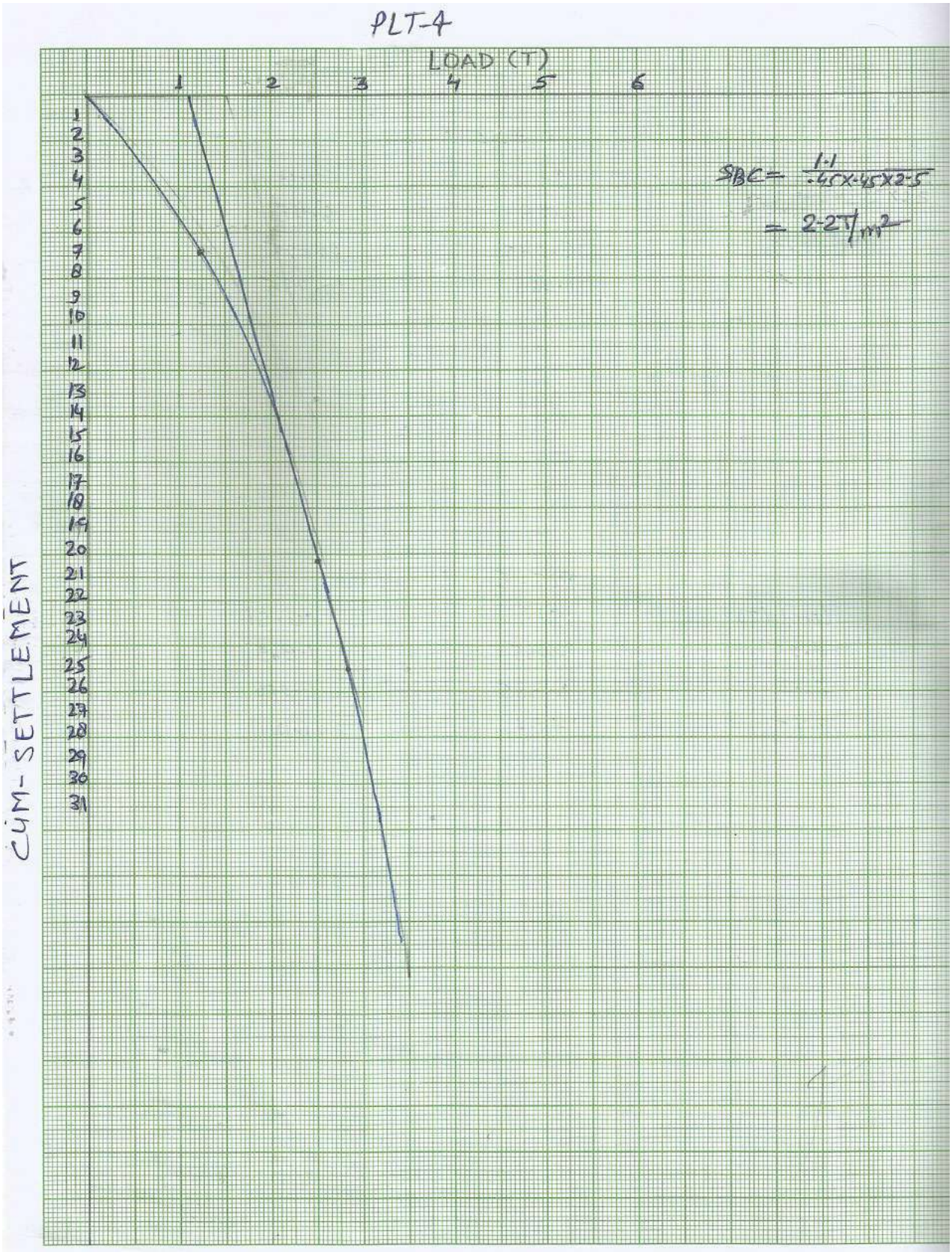
Ultimate Load: 1.10 T

Ultimate Bearing Capacity: 1.10/ (.45x.45) =5.432 T/m^2

Factor of Safety = 2.5

Safe bearing capacity: 5.432/2.5 = 2.17 T/m^2

LOAD VS CUMULATIVE SETTLEMENT CURVE



APPENDIX 'B'

TABLE-3: PLATE LOAD TEST RESULTS (PLT-05)

Load (T)	Average Settlement (mm)	Cumulative Settlement (mm)
1.25	1.865	1.865
2.50	6.385	8.250
3.75	17.870	26.120

Calculations:

From Load Settlement curve:

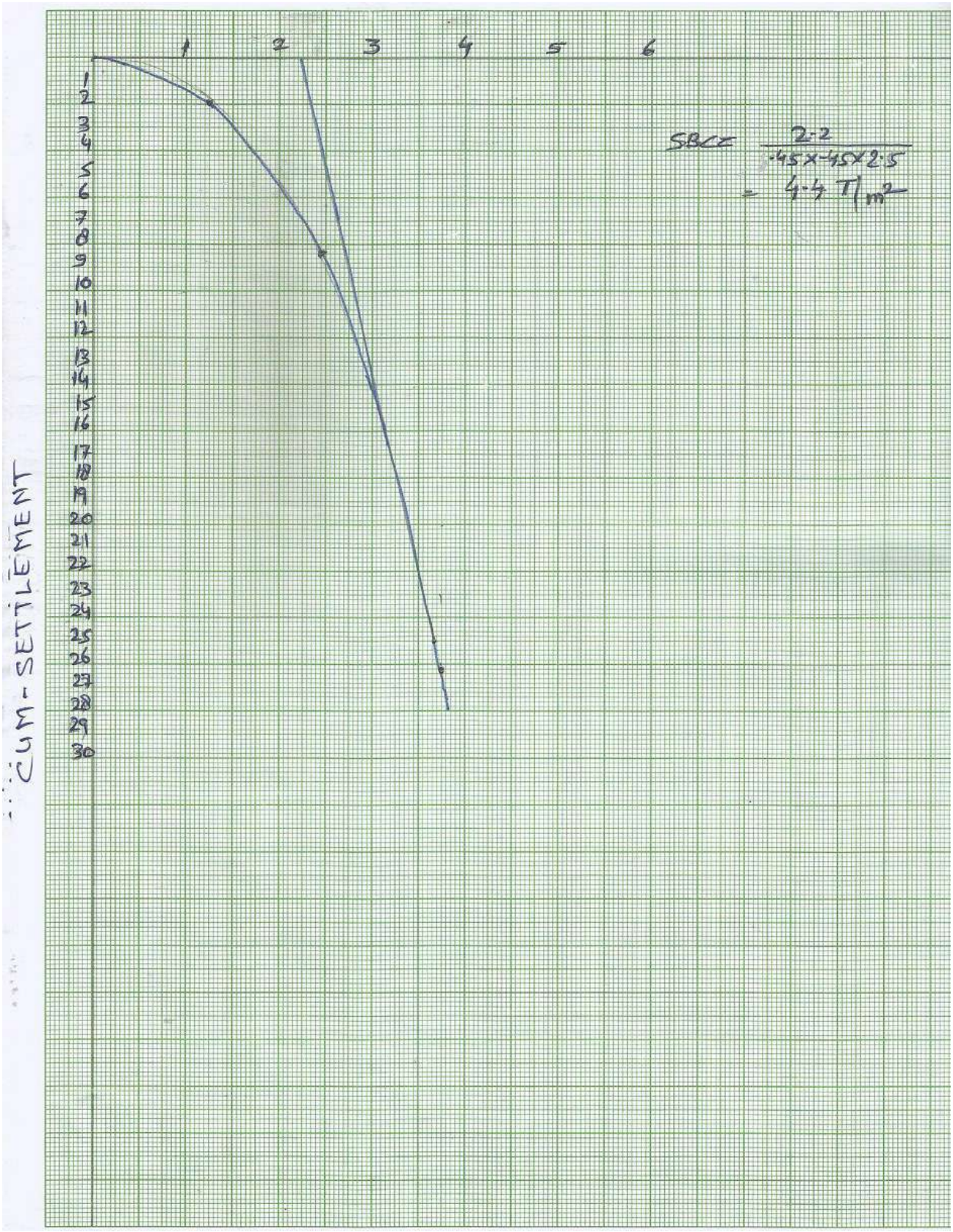
Ultimate Load: 2.20 T

Ultimate Bearing Capacity: 2.20/ (.45x.45) =10.86 T/m^2

Factor of Safety = 2.5

Safe bearing capacity: 10.86/2.5 = 4.34 T/m^2

LOAD VS CUMULATIVE SETTLEMENT CURVE



APPENDIX 'B'

TABLE-3: PLATE LOAD TEST RESULTS (PLT-07)

Load (T)	Average Settlement (mm)	Cumulative Settlement (mm)
1.25	1.930	1.930
2.50	2.520	4.450
3.75	2.360	6.830
5.00	6.015	12.845
6.25	5.970	18.150
7.50	5.635	24.450

Calculations:

From Load Settlement curve:

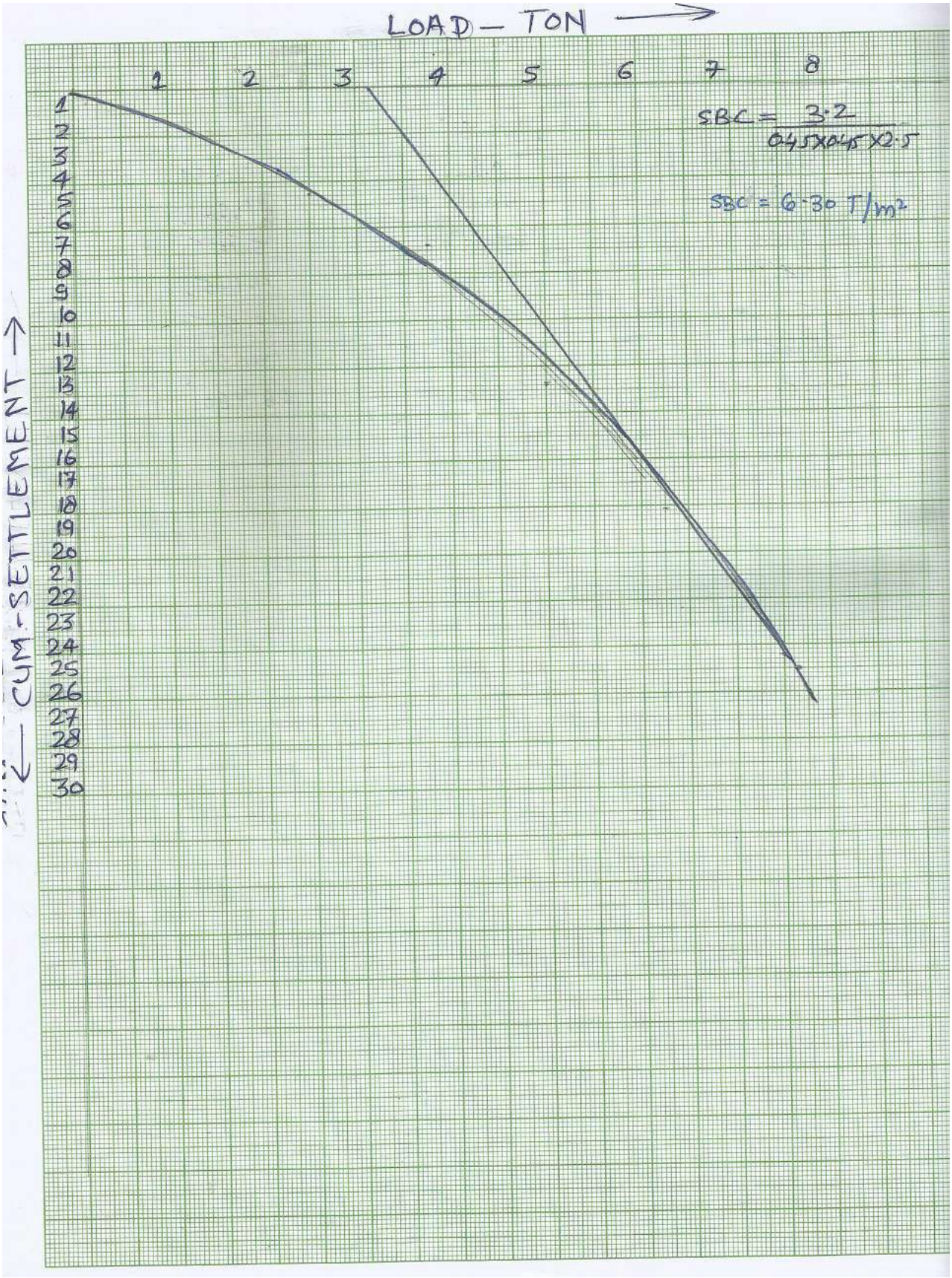
Ultimate Load: 3.20 T

Ultimate Bearing Capacity: 3.20/ (.45x.45) =15.80 T/m^2

Factor of Safety = 2.5

Safe bearing capacity: 15.80/2.5 = 6.32 T/m^2

LOAD VS CUMULATIVE SETTLEMENT CURVE



APPENDIX 'B'

TABLE-3: PLATE LOAD TEST RESULTS (PLT-08)

Load (T)	Average Settlement (mm)	Cumulative Settlement (mm)
1.25	3.700	3.700
2.50	5.590	9.290
3.75	5.100	14.390
5.00	8.480	22.970
6.25	7.525	30.395

Calculations:

From Load Settlement curve:

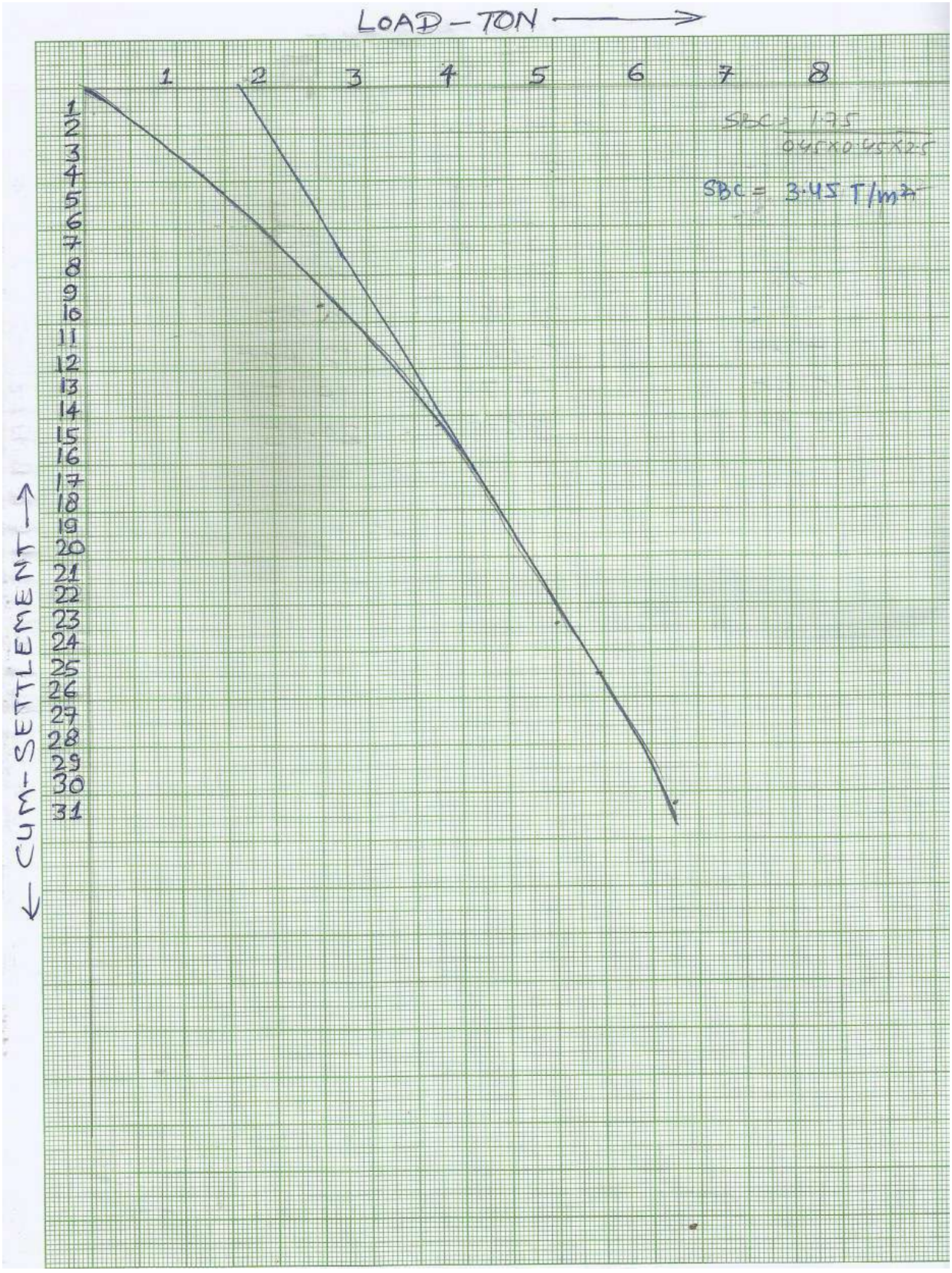
Ultimate Load: 1.75 T

Ultimate Bearing Capacity: 1.75/ (.45x.45) =8.64 T/m^2

Factor of Safety = 2.5

Safe bearing capacity: 8.64/2.5 = 3.45 T/m^2

LOAD VS CUMULATIVE SETTLEMENT CURVE



APPENDIX 'B'

TABLE-3: PLATE LOAD TEST RESULTS (PLT-09)

Load (T)	Average Settlement (mm)	Cumulative Settlement (mm)
1.25	2.015	2.015
2.50	2.705	4.720
3.75	4.005	8.725
5.00	6.085	14.810
6.25	6.955	21.765
7.50	3.930	25.695

Calculations:

From Load Settlement curve:

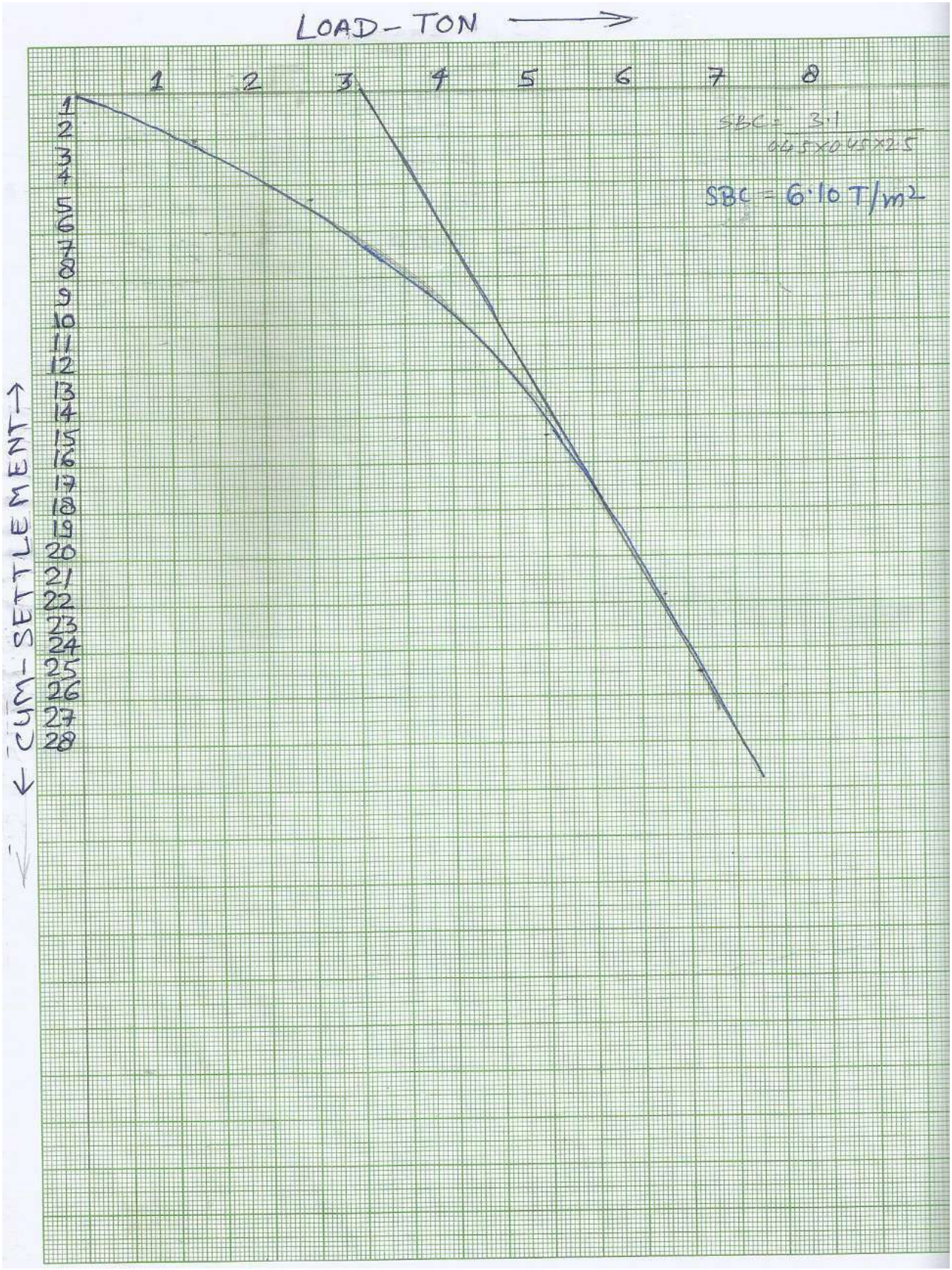
Ultimate Load: 3.10 T

Ultimate Bearing Capacity: 3.10/ (.45x.45) =15.31 T/m^2

Factor of Safety = 2.5

Safe bearing capacity: 15.31/2.5 = 6.12 T/m^2

LOAD VS CUMULATIVE SETTLEMENT CURVE



APPENDIX 'B'

TABLE-3: PLATE LOAD TEST RESULTS (PLT-18)

Load (T)	Average Settlement (mm)	Cumulative Settlement (mm)
1.25	5.560	5.560
2.50	5.325	10.885
3.75	5.165	16.050
5.00	7.430	23.510
6.25	3.560	27.070

Calculations:

From Load Settlement curve:

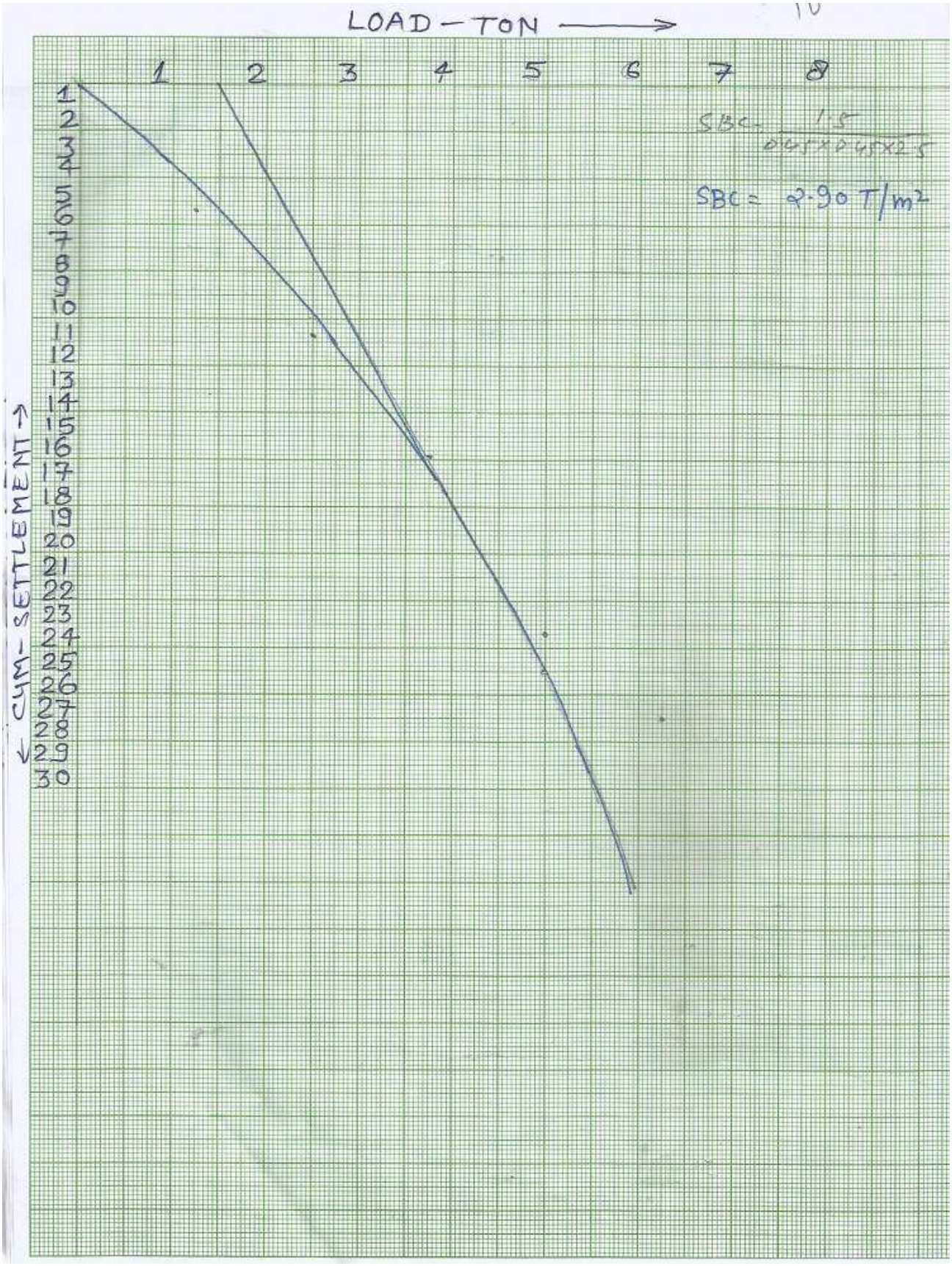
Ultimate Load: 1.50 T

Ultimate Bearing Capacity: 1.50/ (.45x.45) =7.40 T/m^2

Factor of Safety = 2.5

Safe bearing capacity: 7.40/2.5 = 2.90 T/m^2

LOAD VS CUMULATIVE SETTLEMENT CURVE



APPENDIX 'B'

TABLE-3: PLATE LOAD TEST RESULTS (PLT-19)

Load (T)	Average Settlement (mm)	Cumulative Settlement (mm)
1.25	1.520	1.520
2.50	7.555	9.075
3.75	14.910	23.990
5.00	11.360	35.350

Calculations:

From Load Settlement curve:

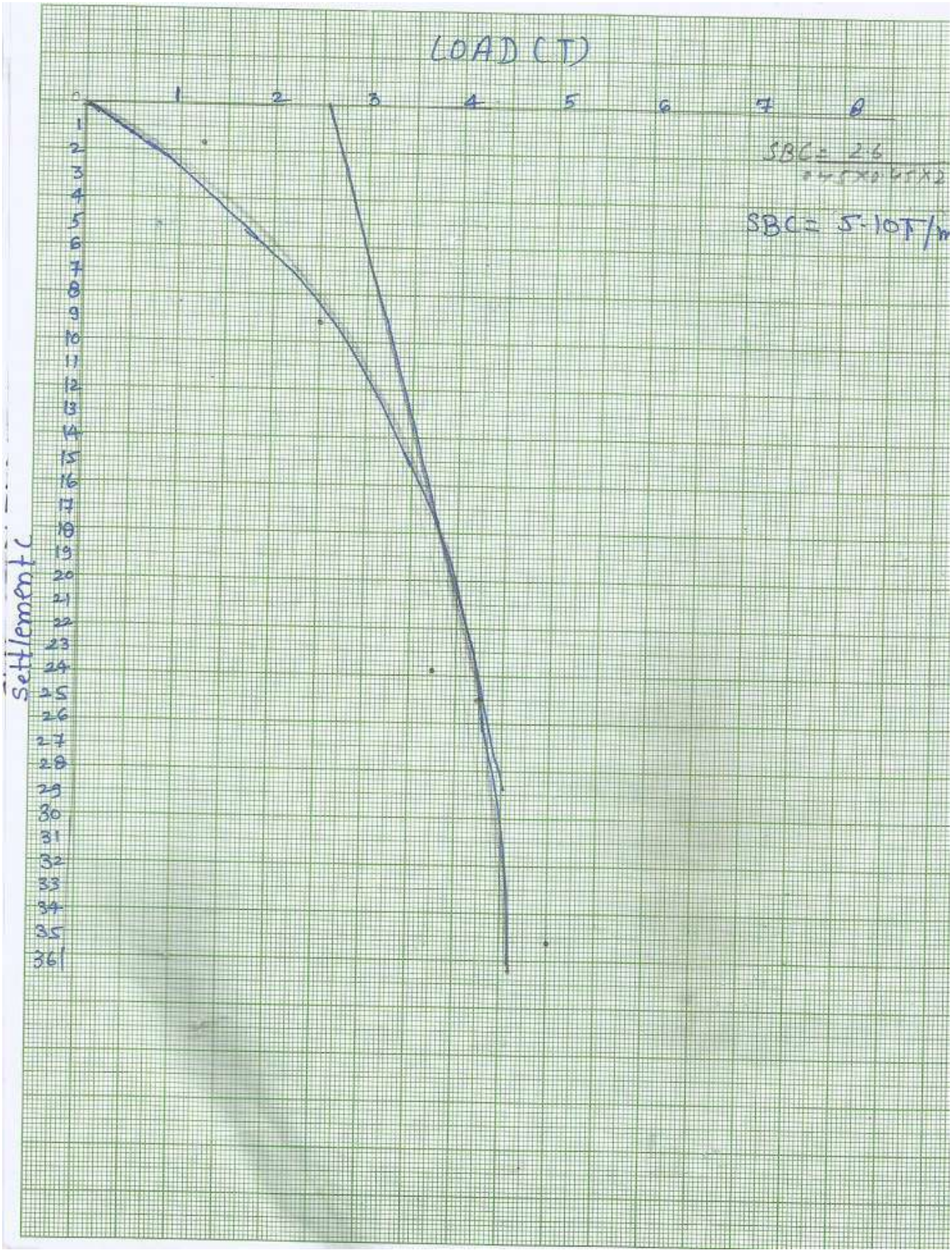
Ultimate Load: 2.60 T

Ultimate Bearing Capacity: 2.60/ (.45x.45) =12.84 T/m^2

Factor of Safety = 2.5

Safe bearing capacity: 12.84/2.5 = 5.10 T/m^2

LOAD VS CUMULATIVE SETTLEMENT CURVE



APPENDIX 'B'

TABLE-4: CBR & PROCTOR TEST RESULT

Test No.	CBR		PROCTOR TEST	
	Unsoaked	Soaked	MDD(gm/cc)	OMC (%)
1	2.45	1.85	1.75	16.50
2	2.50	1.88	1.78	16.80
3	2.35	1.72	1.80	17.10
4	2.40	1.70	1.78	16.90
5	2.38	1.68	1.82	16.70
6	3.00	1.73	1.85	16.80
7	2.78	1.81	1.88	16.20
8	2.50	1.90	1.82	17.10
9	2.56	1.80	1.80	16.94
10	2.60	2.20	1.83	16.56
11	2.45	1.95	1.79	16.44
12	2.90	2.10	1.74	17.20
13	2.75	2.00	1.71	17.40
14	3.10	2.30	1.68	16.58
15	2.30	1.70	1.67	18.75
16	2.85	1.90	1.69	20.45
17	3.10	2.30	1.70	19.90
18	3.20	2.10	1.75	20.80
19	3.60	2.40	1.70	16.78
20	3.50	2.50	1.68	17.20
21	2.80	1.89	1.72	16.90
22	2.70	1.95	1.76	17.10
23	4.20	3.20	1.78	16.50
24	4.50	3.30	1.81	16.60
25	4.85	3.45	1.79	16.32

APPENDIX 'B'
TABLE-5: MODULUS OF SUB GRADE TEST RESULT

FIELD INVESTIGATION METHOD:

A circular test plate 75cm dia metre was used as a model for the prototype foundation. The plate was placed at 1.0 m below ground and subjected to incremental loading. Settlement at each increment of load was measured and load-settlement curves plotted. The modulus of sub grade reaction was calculated by

K=0.07/d MPa/cm

Where d is the deflection of plate on applying a load of 3.72 KN.

Test No.	Settlement (mm)	K (kN/m3)
k-1	6.10	11475
k-2	2.97	23609
k-3	5.45	12844
k-4	4.13	16970
k-5	2.92	24014
k-6	2.83	24735
k-7	1.82	38567
k-8	3.94	17789
k-9	3.10	22617
k-10	5.09	13766
k-11	1.78	39326
k-12	2.93	23932
k-13	2.72	25783
k-14	1.77	39548
k-15	4.94	14184
k-16	3.89	18018
k-17	2.79	25090
k-18	4.08	17178
k-19	2.67	26266
k-20	3.88	18065

Annexure-IX

No. PD-13/1/2018-PPP Cell/e-330932

भारत सरकार/GOVERNMENT OF INDIA

पत्तन, पोत परिवहन और जलमार्ग मंत्रालय

MINISTRY OF PORTS, SHIPPING AND WATERWAYS

(पब्लिक प्राइवेट पार्टनरशिप विंग/PPP WING)

परिवहन भवन/Parivahan Bhawan,

1, संसद मार्ग/1, Sansad Marg,

नई दिल्ली/New Delhi - 110001

दिनांक/Dated 10 May, 2022

OFFICE MEMORANDUM

Subject: Guidelines for dealing with stressed Public Private Partnership (PPP) Projects at Major Ports in respect of (i) Projects which became stressed during construction stage, i.e. Pre-COD stage; and (ii) Projects, both at Pre-COD and Post-COD stage, which became stressed due to borrowings being categorized by the lenders to the projects as NPA and/or lenders have approached NCLT for recovery of their dues.

In the past decade, the Government of India invited private investment in the Major Port Sector and several projects were awarded under DBFOT basis or its similar variants across the major ports in the country. In spite of due diligence and caution at the time of conceptualizing these projects from various perspectives, the survival of some of the projects is at a risk due to various reasons that were either not foreseen or those which were beyond the control of the contracting parties.

2 On examining the issues, it was noticed that these projects are either being operated under stress or have been abandoned/ terminated, some leading to litigation. It was felt that there is a need to address the issues concerning these concessions so that the Major Port Sector continues to attract private investment which would have a positive impact on the growth of port infrastructure in the country.

3 In order to deal with some of such projects and issues, the first Guidelines on Stressed PPP projects were issued by this Ministry vide its letter No.PD-13/1/2018-PPP Cell, dated 11.07.2018. These guidelines covered only those stressed projects which faced issues after resuming Commercial Operations i.e. **Post-Commercial Operation Date.** However, it is observed that there are PPP Projects which have faced issues during construction stage as well i.e. **Pre- Commercial Operation Date.** It has also been observed that there is another category of stressed projects both at Pre-COD and Post COD stage which require a totally different treatment due to their **borrowings being categorized by lenders as NPA and/or lenders have approached NCLT for recovery of their dues.**

4 The Ministry of Ports, Shipping & Waterways constituted a Committee headed by the Additional Secretary & Financial Advisor, Ministry of Ports, Shipping & Waterways (hereinafter **"Committee"**) to examine these guiding principles and to recommend how these could be adopted to deal with PPP projects/cases/issues referred to in Para 3 above in respect of Major Ports. The Committee submitted its report on 24.02.2020 and 2.03.2020.

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5 It is further, informed that the draft policy guidelines were circulated vide O.M. No. PD-13/1/2018-PPP Cell (e330932) dated 4.10.2021 to the Department of Economic Affairs, Department of Expenditure, Department of Legal Affairs and Niti Aayog for comments/ inputs.

6 Based on the report of the Committee and inputs received from the above mentioned departments, the Government has taken the following decisions and provide the below mentioned guidelines to deal with such cases:-

(A) Projects which became stressed during construction stage, i.e., Pre-COD stage i.e. where the work has stopped due to inability of Concessionaire to continue with the execution of the project because of the reasons inter-alia aggressive bidding and the optimistic projections with regard to volumes & charges, unforeseen dynamic changes in their business:

i. In case it is not found feasible to complete the project i.e. to achieve COD of a Stressed Project within the frame work of Concession Agreement of the Project, Major Ports may take up foreclosure of Concession Agreement by way of a written document incorporating terms that are mutually agreed and executed between the parties (i.e. the Concessioning Authority and the Concessionaire).

ii. The Concessioning Authority would pay to the Concessionaire or to the lenders of the Concessionaire (as the case may be), as full and final settlement for taking over the useful assets created by the Concessionaire, an amount equal to the lower of the following sums :

a. the value of the work done by the concessionaire in accordance with the Concession Agreement and found useful by the major port (i.e. the Concessioning Authority); or

b. 90% of Debt Due as defined in the Concession Agreement; or

c. Any other amount as may be mutually agreed in writing between the Concessioning Authority and the Concessionaire as per the relevant provisions of MCA 2021

iii. Valuation of useful work done:

a. The Concessioning Authority should first assess the assets and ascertain that it is economically and financially viable to settle as per the aforesaid methodology which should include the implication of stamp duty and registration charges, if any, in respect of taking over of such assets.

b. The Concessioning Authority shall decide on the useful assets to be taken over which can be put to productive use, and in case of partial completion, the Concessioning Authority shall decide on such assets which can be taken over after undertaking the pending works and can be put to use. For this purpose, the Concessioning Authority will get the usefulness of the assets assessed and appraised by 'Discounted Cash flow method'.

c. The Concessioning Authority shall provide a list of three Independent Valuers to the Concessionaire and the Concessionaire has to select one of them and communicate consent to carry out valuation.

d. The Independent Valuer will complete the valuation of both movable and immovable assets created on 'as is where is basis' and give detailed report with valuation of each component of the project within 3 (three) months from the receipt of mandate in that

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regard. The method of valuation shall be the Actual Cost or Replacement Value (ascertained by following principles as defined in Indian Accounting Standards – IND AS 113) whichever is lower.

iv. Calculation of Debt Due:

a. Wherever there is Debt Due outstanding, the debt due for the purpose of calculation of compensation shall be the dues payable by Concessionaire to lenders as on the Cut Off Date as mutually agreed between the Concessioning Authority, Concessionaire and the lenders of the Concessionaire or as per provisions of Concession Agreement, whichever is lower.

b. In case dues payable by concessionaire to lenders are not covered under the definition of 'Debt Due', as per Concession Agreement, the payment of compensation be restricted to the value of work done, found useful and assessed.

v. Payment of Compensation:

a. The agreed terms for foreclosure between the Concessioning Authority and the Concessionaire should provide that the Concessionaire should ensure that, the project site is handed over to the Concessioning Authority encumbrance free and without litigation of any kind whatsoever.

b. The amount of compensation so arrived (whether or not there is 'Debt Due' on the Concessionaire) shall be paid in the manner laid down in the specific Concession Agreement.

c. The compensation payable by the Concessioning Authority towards taking over the useful assets created by the Concessionaire as cited above, shall be made after deduction of all the statutory dues and charges that is payable by the Concessionaire to Concessioning Authority in respect of such assets and also such other dues and charges payable by the Concessionaire to any other government agency during the construction phase in respect of which the Concessioning Authority has received any communication or order.

d. The Concessioning Authority should preferably make payment to the lenders of the concessionaire (if any) in respect of the project. In case the payment is not required to be made to the lenders, then a 'NOC' must be obtained from the lenders regarding the said payment.

e. payment needs to be made in a manner that fulfils the order either

(a) in accordance with manner laid down in the existing concession agreement or

(b) through the escrow mechanism clearly defining the payment waterfall i.e. order of priority of payments such as taxes and statutory dues payable by the concessionaire, compensation to Senior lenders in terms of financing documents, all amounts due to the Concessioning Authority, payments to other stakeholders, etc.

(B) Projects, both at Pre-COD and Post-COD stage, which became stressed due to borrowings being categorized by the lenders to the projects as NPA and/or lenders have approached NCLT for recovery of their dues, i.e., the PPP projects undertaken by the Major Ports where the work has stopped due to inability of Concessionaire to continue

... 4/-

with the execution of the project on account of borrowings of the Concessionaire having been categorized by lenders as NPA and / or proceedings initiated against it before the NCLT under the Insolvency and Bankruptcy Code 2016 or under Section 241(2) of the Companies Act 2013.

i. Concessioning Authority shall issue a common directive requiring the Concessionaire(s) to immediately inform the Concessioning Authority in case the loan account of the concessionaire in respect of a particular PPP project at the Major Ports has been declared as 'NPA' by the lenders and/or if any insolvency resolution process has been initiated against the Concessionaire by the lenders.

ii. In cases where the lenders after declaring the loan account of the Concessionaire as 'NPA' have initiated insolvency resolution process against the Concessionaire under the IBC or on being informed by Concessionaire or on having come to know otherwise of insolvency resolution proceedings having been initiated against the Concessionaire, the Concessioning Authority should follow the process as given below:

   a. Regularly monitor the insolvency resolution proceedings filed against the Concessionaire.

   b. Identify on its own or through the concessionaire, the status of the NCLT proceedings including the order(s) passed by the NCLT to appoint the Insolvency Resolution Professional (IRP) and the constitution of the Committee of Creditors (CoC).

   c. Be aware of the public notice that is issued by the IRP to invite claims from the creditors (i.e. financial creditors and operational creditors).

   d. After the issuance of public notice by the IRP, the Concessioning Authority should file a claim with the IRP with respect to the outstanding dues against the Concessionaire.

   e. Subsequent to filing of claim by the Concessioning Authority, follow up with the IRP must be done to monitor decisions of the CoC and a written request be made to the IRP for settlement of the Concessionaire's account based on foreclosure of Concession Agreement by way of a written document incorporating the terms that are mutually agreed and executed between the parties (i.e. Concessioning Authority and the lenders). The amount that the Concessioning Authority would offer in the request to IRP shall be equal to the lower of the following:

      i. The value of the work done by the concessionaire in accordance with the Concession Agreement and found useful by the Major Port (i.e. the Concessioning Authority); or

      ii. Amount under claim in NCLT

      iii. Any other amount as may be mutually agreed in writing between the Concessioning Authority and the Lenders

   The valuation of useful work done will be as per Para 6(A)(iii) above.

... 5/-

f. Such settlement should be proposed with the IRP / CoC with the exclusion of the Concessionaire's role as once the insolvency resolution process is initiated against the Concessionaire and the IRP is appointed, the IRP is the designated 'manager' of the Concessionaire and foreclosure process can only be initiated or concluded after the IRP has received approval from the CoC. Accordingly, a declaration be also made in the foreclosure proposal to be submitted stating that beyond this, there will be no other liability on account of the said project on the Concessioning Authority.

g. Once the CoC approves the request for settlement by foreclosure, on the above lines, the Concessioning Authority may conclude the foreclosure of the project / Concessionaire's account as above.

h. Once the foreclosure process is concluded as per the above terms, the Concessioning Authority must take over the project site along with the useful assets created by the Concessionaire at the project site; whereafter all ongoing legal proceedings between the Concessioning Authority and the Concessionaire in respect of the said project shall stand exhausted.

i. If the request for settlement is not approved by the CoC, then the Concessioning Authority shall follow the provisions of the IBC as the Concessioning Authority would be regarded as an 'operational creditor' of the Concessionaire.

7. '*In-principle*' approval of Ministry shall be obtained for the projects to be taken up for revival/resolution under aforementioned guidelines. Also, monthly progress update shall be provided to Ministry till project is successfully revived.

8. The above guidelines have been concurred in by IFW vide Note #378 dated 7th March 2022.

9. These guidelines may be adopted for projects implemented under EPC mode also.

10. This issues with approval of Hon'ble Minister for Ports, Shipping and Waterways.

G. Nayak

(Gopinath Nayak)
Under Secretary to the Government of India
Tel: 011-23311659

To:-

i. Chairpersons, All Major Port Authorities

ii. CMD, KPL

Copy to:-

i. PS to Hon'ble Minister for Ports, Shipping & Waterways

ii. PS to Hon'ble MoS (Shri Shripad Naik), MoPSW

iii. PS to Hon'ble MoS (Shri Shantanu Thakur), MoPSW

iv. PPS to Secretary (Ports, Shipping & Waterways)

.... 6/-

v. PPS to AS&FA, Ministry of Ports, Shipping & Waterways

vi. JS (SM & PPP), MoPSW / JS (Ports and Shipping)

vii. Economic Adviser/ Statistical Adviser, MoPSW

viii. MD, IPA, New Delhi.

G. Nayak

(Gopinath Nayak)
Under Secretary

RESTRICTED

Annexure-V

Plan No. HD-154 2025

FORESHORE SURVEY FROM BERTH NO. 18(O) (3rd OIL JETTY) TO HALDIA DOCK ENTRANCE

Surveyed : 21st & 22nd December,2025

By: A.S.Nandy

Scale: 1 cm = 20.00 Meters

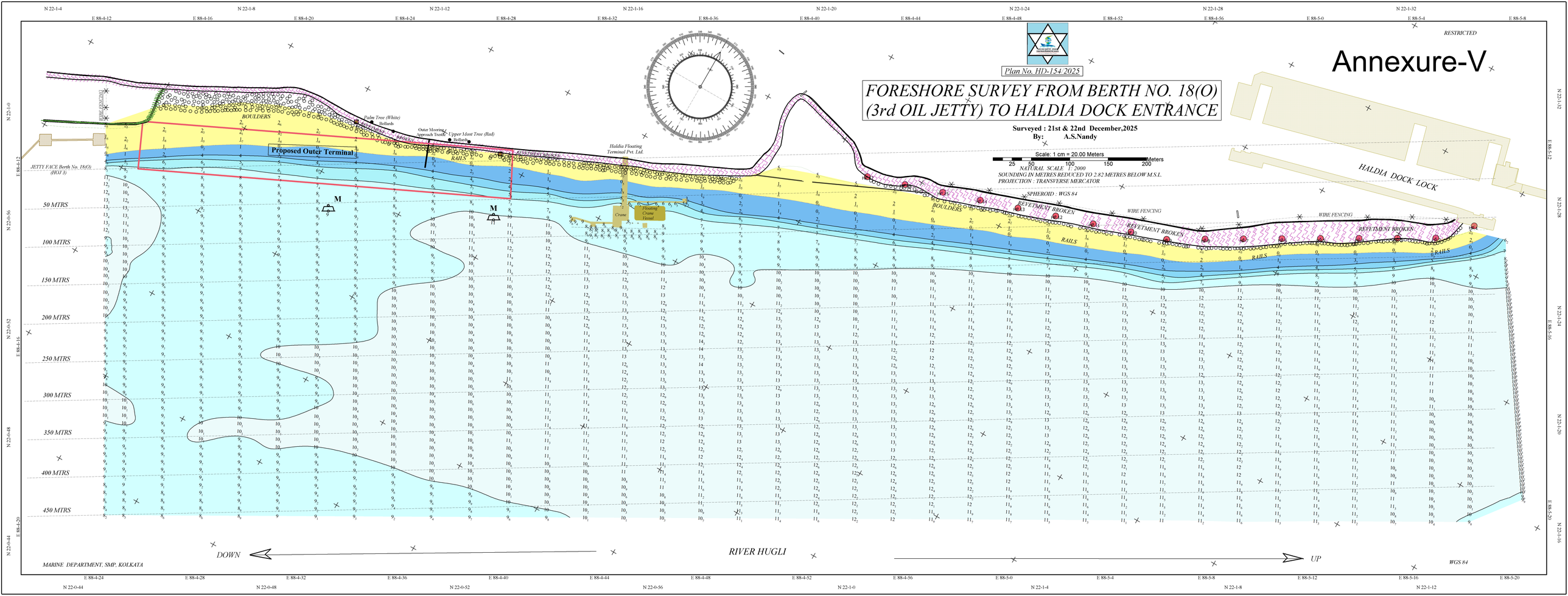
25 50 100 150 200 Meters

NATURAL SCALE 1: 2000

SOUNDING IN METRES REDUCED TO 2.82 METRES BELOW M.S.L.

PROJECTION : TRANSVERSE MERCATOR

SPHEROID : WGS 84



Annexure-VI

No. PD-24015/3/2023
Government of India
Ministry of Ports, Shipping & Waterways

Transport Bhavan
1, Parliament Street, New Delhi- 110 001.
Dated 11th May, 2023

OFFICE MEMORANDUM

Subject: "Harit Sagar" Green Port Guidelines.

The undersigned is directed to forward herewith a copy of the "**Harit Sagar**" Green Port Guidelines for Major Ports for further necessary action please.

2. The document lays down the broad framework for Major Ports to take various Green Initiatives to reduce carbon intensity and to develop an environment friendly ecosystem at Major Ports.

3. The wide publicity of the salient features of these guidelines, amongst all stakeholders, may kindly be ensured.

(Gopinath Nayak)
Deputy Secretary to the Government of India
Tel. No. 011-23714714

Encl: As above.

To: Chairpersons, All Major Ports

Copy to:

(i) PS to Hon'ble Minister (PSW)
(ii) PS to Hon'ble Minister of State, PSW (Shri Shripad Naik)
(iii) PS to Hon'ble Minister of State, PSW (Shri Shantanu Thakur)
(iv) PPS to Secretary(PSW)
(v) PPS to AS & FA (PS W)
(vi) PPS to Addl. Secretary (PS W)
(vii) PPS to JS(P, PHRD &PPP)
(viii) PPS to JS (SM)
(ix) PPS to JS(Admin & IWAI)
(x) PPS to Economic Advisor
(xi) PPS to Advisor (Stat)
(xii) PPS to Development Advisor (Ports)

Copy also to:

(i) Director, NIC: with a request to upload the copy of the guidelines on the Ministry's website please.

Ministry of Ports,
Shipping & Waterways







"Harit Sagar"

Green Port Guidelines

(Issued - May'2023, Rev-0)



“Harit Sagar”

Green Port Guidelines

(Issued – May’ 2023, Rev-0)

Ministry of Ports, Shipping and Waterways,
Government of India

सर्बानंद सोणोवाल
SARBANANDA SONOWAL

सत्यमेव जयते

मंत्री
पत्तन, पोत परिवहन और जलमार्ग एवं आयुष
भारत सरकार
Minister
Ports, Shipping & Waterways and AYUSH
Government of India



MESSAGE

Climate change is the biggest challenge facing humanity today. Indian Ports will play an important role in contributing towards de-carbonization efforts of the country. Ports have to undertake Green initiatives and contribute to the efforts being made by the country for fulfillment of "Panchamrit" commitments announced by Hon'ble Prime Minister during COP-26 Conference at Glasgow.

"Harit Sagar" Guidelines-2023 provide a framework for the Major Ports for drawing out a comprehensive action plan for achieving targeted outcomes in terms of quantified reduction in carbon emission over defined timelines, through focused implementation and close monitoring of Green Initiatives. Guidelines cover all areas of port ecosystem that contribute to the carbon intensity of the Port.

These Guidelines aim to promote sustainability and minimize environmental impact of port operations and will act as a guiding tool for decision making in ensuring carbon neutral development with least disturbance to the surrounding aquatic and atmospheric environment.

I am confident that the "Harit Sagar" Guidelines-2023 will help Major Ports to become sustainable and contribute towards country's efforts in fulfilling "Panchamrit" commitments of reduction in Carbon emission and moving towards Net Zero by the targeted timeline. I extend my compliments to the team for bringing out a comprehensive document to provide guidance to the Major Ports for moving towards Sustainable and Green Port ecosystem.

(Sarbananda Sonowal)

Place: New Delhi
Date: 24 April, 2023

Room No. 201, Transport Bhawan, 1, Sansad Marg, New Delhi - 110001, Ph. : 011-23717422, 23717423, 23717424 (O), 23356709 (F)
E-mail : minister-shipping@gov.in; Website : www.shipmin.gov.in
Room No. 101, AYUSH Bhawan 'B' Block, GPO Complex, INA, New Delhi-110023, Tel.: 011-24651955, 24651935
E-mail : minister-ayush@nic.in; Website : www.ayush.gov.in

श्रीपाद नाईक
राज्य मंत्री
पतन, पोत परिवहन, जलमार्ग एवं पर्यटन
भारत सरकार

SHRIPAD NAIK
Minister of State for
Ports, Shipping, Waterways & Tourism,
Government of India

सत्यमेव जयते

Azadi Ka Amrit Mahotsav



MESSAGE

Consistent rise in ambient temperature has been a cause of concern, both at national as well as international level. The rise in temperature has been attributed to increase in Green House Gas (GHG) emissions. The Emissions Gap Report (UNEP) 2022 recommends that the world must cut emissions by 45 per cent by 2030 to avoid global catastrophe and limit global warming to 1.5°C.

India, as a part of its commitment in COP 26 towards Climate Action, has pledged to reduce the emissions intensity per unit GDP by 45 percent by year 2030 and achieve 50 percent of energy requirements from non-fossil fuel-based energy resources by the year 2030.

Ports of the country will play an important role in contributing towards country's efforts for achieving five nectar elements "Panchamrit" as declared by our Hon'ble Prime Minister during COP 26. "Harit Sagar" Guidelines-2023 envisages ecosystem dynamics in port development, operation and maintenance while aligning with 'Working with Nature' concept and minimizing impact on biotic components of harbor ecosystem. It lays emphasis on use of Clean / Green energy in Port operation, developing Port capabilities for storage, handling and bunkering Greener Fuels viz. Green Hydrogen, Green Ammonia, Green Methanol / Ethanol etc.

I would like to acknowledge here the efforts of all the team for bringing out the much needed "Harit Sagar "Guidelines for the Major Ports of the country.

Shripad Y. Naik

Office : Room No. 215, Transport Bhawan, Parliament Street, New Delhi-110001
Tel. : 011-23718614, 23714324, Fax : 011-23719008, E-mail: shripad.naik52@gov.in, shripad.naik@sansad.nic.in
Res. (Delhi) : 1, Lodhi Estate, New Delhi-110003 Tel: 011-24635396 Fax : 011-24656910
Res. (Goa) : "Vijayshree" House No. 111, St. Pedro, Old Goa, Goa-403402 Tel.: 0832-2444510, 0832-2444088

राज्य मंत्री
पत्तन, पोत परिवहन और जलमार्ग मंत्रालय
भारत सरकार

सत्यमेव जयते

शांतनु ठाकुर
SHANTANU THAKUR

Minister of State
For Ports, Shipping and Waterways
Government of India



Date:- 02.05.2023

MESSAGE

Restricting the rise of the average temperature of the earth by cutting down carbon dioxide emissions is the shared global goal of humanity. Ports and maritime sector would also need to reduce its share of carbon emission and become carbon neutral in the years to come. Ports around the world are making strategies and targets to become carbon neutral in future.

"Harit Sagar" Guidelines-2023 provide a framework to ensure Sustainability in Port Development by adopting environmentally compatible designs in constructing resilient infrastructure, meeting local energy dynamics and minimizing Carbon and other harmful emissions following Eliminate, Reduce, and Control (ERC) approach. Aim is to protect local community, ecology and environment in and around port areas.

The objective of guidelines is to minimize waste through Refuse, Reduce, Reuse, Repurpose and Recycle (5R concept) to attain zero waste discharge from Port operations and promote monitoring, based on Environmental Performance Indicators, in order to measure objectively identifiable progress in environmental port practices.

I hope that the measures listed in the documents will surely guide the way ahead towards development of Green and Sustainable Maritime Sector and add strength to the nations efforts towards achieving long term goal of reaching net-zero emission.

(SHANTANU THAKUR)

सुधांशु पंत
Sudhansh Pant



सत्यमेव जयते

सचिव
SECRETARY
भारत सरकार
GOVERNMENT OF INDIA
पत्तन, पोत परिवहन और
जलमार्ग मंत्रालय
MINISTRY OF PORTS,
SHIPPING AND WATERWAYS

MESSAGE

The Maritime sector plays a crucial role in the economic growth of the country and is also one of the major contributors to carbon emissions. Measures to reduce its share of carbon emissions and to ensure that Ports become more sustainable in future is a laudable objective whose time has come.

"Harit Sagar" Guidelines-2023 will provide comprehensive guidance to the Major Ports of the country for developing an action plan for achieving Sustainable Developmental Goals (SDG). These include obligations on developing resilient infrastructure for safe, efficient and sustainable Ports and to promote environmental reporting as a means of communicating environmentally good behavior to stakeholders.

These guidelines cover aspects of National Green Hydrogen Mission pertaining to Ports, development of green hydrogen facility, LNG bunkering, Offshore Wind Energy etc and provides provisions for adopting global Green Reporting Initiative (GRI) standards.

I am pleased to share the **"Harit Sagar" Guidelines-2023** to all stakeholders and hope that this document will be useful to the Major Ports for bringing a paradigm shift towards sustainability. This will decisively contribute towards fulfilment of the "Panchamrit Commitments" of our country in overcoming the ill-effects of global warming and climate change.

These guidelines would also be recommended to the State Governments and State Maritime Boards for adoption and use for the ports other than Major Ports.

Sudhansh Pant

(Sudhansh Pant)

SAGARMALA

परिवहन भवन, 1, संसद मार्ग, नई दिल्ली–110001, भारत
टेलि.: +91 11 23714938, फैक्स : +91 11 23716656, ई-मेल : secyship@nic.in
Transport Bhawan, 1, Parliament Street, New Delhi-110001, INDIA
Tel. : +91 11 23714938, Fax : +91 11 23716656, E-mail : secyship@nic.in

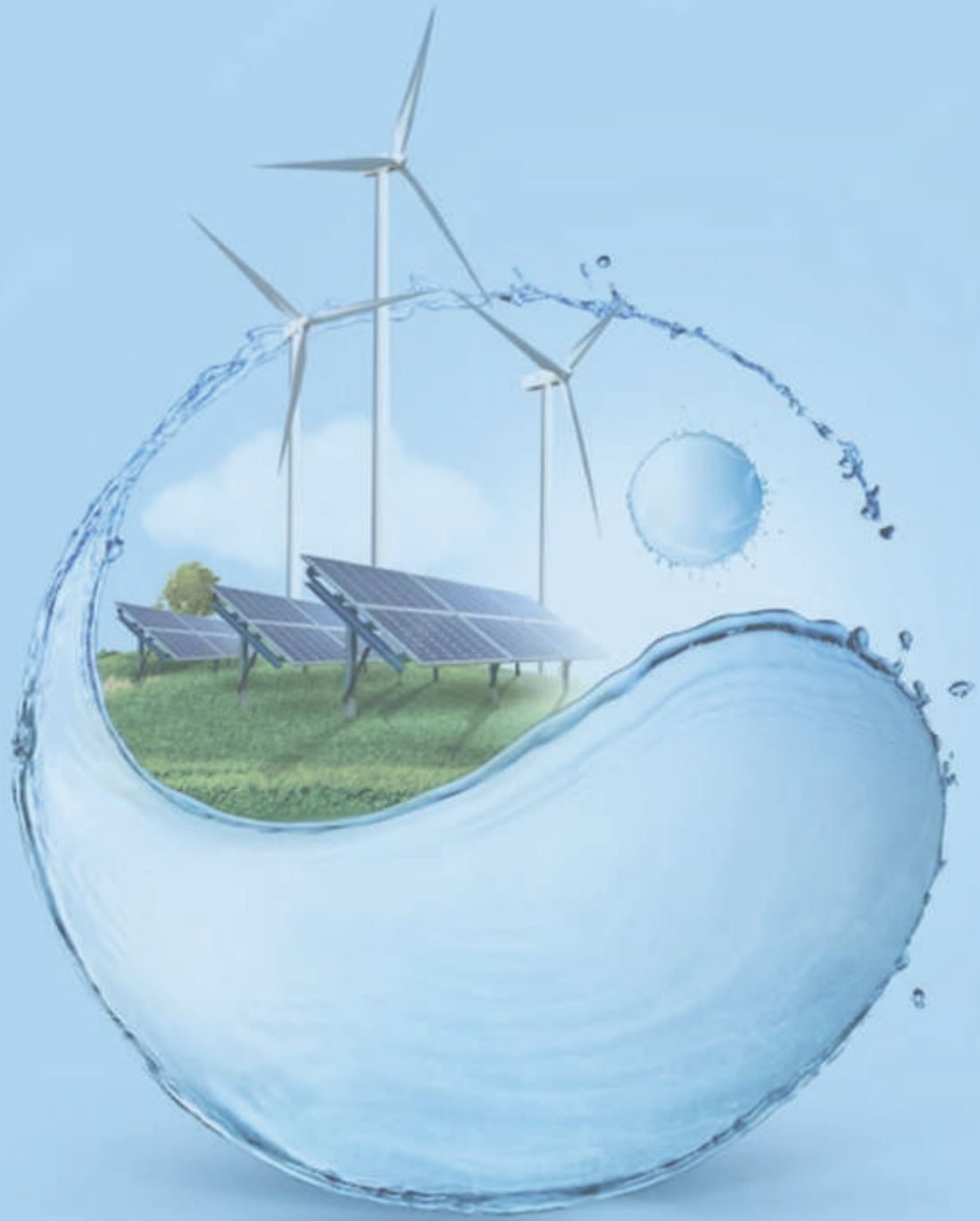


Vision

To reduce carbon intensity and to develop an environment friendly ecosystem at Major Ports with participation of all stakeholders including Terminal Operators, Logistics Service Providers, Partner Government Agencies, Shipping Lines etc. The aim is to position Major Ports as hubs of economic growth and development in a sustainable manner which has to be achieved through optimization of Port Procedures, inducting Green Technologies, reducing wastages, taking steps for reducing the Carbon Intensity per unit of cargo handled and initiatives for achieving the de-carbonization benchmarks set out in the Government's Panchamrit Commitments.

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1. Introduction:

1.1 The country's maritime sector plays a crucial role in the overall trade and growth with 95% share in trade volume and 65% share in trade value. Maritime India Vision (MIV) 2030, the roadmap prepared by the Ministry of Ports, Shipping and Waterways for the maritime sector in the country, aims to strengthen the maritime sector through concerted interventions. There are over 150 initiatives identified under the MIV 2030 to take forward the vision under each segment. 'Sustainable and Green Maritime Sector' is one of the focus areas under the MIV 2030.

1.2 India, as a part of its commitment in COP 26 towards Climate Action, has pledged to reduce the emission intensity per unit GDP by 45 percent by year 2030, from 2005 level and achieve about 50 percent cumulative electric power installed capacity from non-fossil fuel-based energy resources by the year 2030.

1.3 Indian Ports will play an important role in contributing towards de-carbonization efforts of the country. Ports are, therefore, required to undertake green initiatives in line with the broad vision of the country and contribute to the efforts being made by the country in moving towards achieving India's long term goal of reaching net-zero emission by 2070. This will also help in contributing towards moving closer to the UN Sustainable Developmental Goals (SDG) which includes obligations on developing resilient infrastructure for safe, efficient and sustainable ports.

1.4 Key interventions, including promoting use of renewable energy, reducing air emissions, optimizing water usage, improving solid waste management and reducing carbon emission per ton of cargo handled by 30 percent by the year 2030 and 70 percent by the year 2047, have been envisaged by the Ministry in its plan for de-carbonizing the sector.

1.5 The Green Port Guidelines document provides guidance to the Major Ports for drawing out a comprehensive plan of action, covering all the components of the Port ecosystem contributing to the carbon footprint, for achieving targeted outcomes in terms of quantified reduction in carbon emission over defined timelines, through focused implementation of Green Interventions.

1.6 These Guidelines will act as a guiding tool for decision making in ensuring sustainability in development and operation of the Port and establishing frameworks towards attaining carbon neutrality with zero disturbance to the ecosystem dynamics of the surrounding aquatic and atmospheric environment. The guidelines will inculcate sustainability within the framework of the organization and promote use of sustainable materials, practices and technologies.

2. Principles of Green Port Guidelines:

2.1 Ensuring Sustainability (Environmental, Economical and Social) in Port Development by adopting environmentally compatible designs in constructing resilient infrastructure meeting local energy dynamics.

2.2 Ensuring sustainability in Port operation by adopting best practices and employing best available carbon neutral and environment friendly technologies.

2.3 Employing an ecosystem dynamics in Port development, operation and maintenance aligning to 'Working with Nature' concept and 'Panchamrit Commitments', minimizing impact on biotic components of harbor ecosystem.

2.4 Maximizing use of Clean / Green energy in Port operation. Developing Port capabilities for storage, handling and bunkering Greener Fuels viz. Green Hydrogen, Green Ammonia, Green Methanol / Ethanol etc.

2.5 Minimizing Carbon and other harmful emissions following Eliminate, Reduce, and Control (ERC) approach to protect local community, ecology and environment in and around Port areas. Reduction in Carbon intensity by 30 percent per ton of Cargo handled, from the current levels (Baseline FY 2022-23), by the year 2030 and 70 percent by year 2047.

2.6 Minimizing waste through Refuse, Reduce, Reuse, Repurpose and Recycle (5R concept) to attain zero waste discharge from Port operations.

2.7 Conduct appropriate environmental impact assessments for both Port projects and Port development plans.

2.8 Stimulate continuous improvement in the Port environment and its environmental management.

2.9 Promote monitoring, based on Environmental Performance Indicators, in order to measure objectively identifiable progress in environmental Port practices.

2.10 Promote environmental reporting as a means of communicating environmentally good behavior to stakeholders.

2.11 Intensify the communication about environmental improvements achieved by Ports.

3. Applicability:

These guidelines shall be applicable to all Major Ports of India.

4. Focus Areas for Implementation:

Focus areas, which have potential to contribute towards improving thesustainability component of the Port ecosystem and in achieving the "Green Port" benchmarks, have been summarized below. Ports shall make efforts toimplement best practices through induction of environment friendlytechnologies and adopting resilient designs to achieve the global benchmarks for development of sustainable Green Port.

4.1 Green Cover:

Ports shall increase the green area cover to capture the fugitive emissions and attenuate the noise generated in the Port surroundings by carrying out effective plantation, developing landscapes etc. The green belt area shall be increased by more than 20 percent by year 2030 and 33 percent by 2047 of the port area. Green belt will help in -

- Supporting the biological diversity.
- Retaining soil moisture.
- Erosion control and coastal protection.
- Recharging ground water and act as Carbon Sink.

4.2 Electrification of Port Equipments (including Vehicles):

(i) Ports shall make efforts to achieve the target for Electrification of Vehicles/Ports equipments as envisaged in MIV 2030 / Blue Economy 2047 and accordingly, should target more than 50 percent electrification by the Year 2030 which is to be further increased to more than 90 percent by the year 2047.

(ii) Ports should target retro-fitment / conversion of Diesel powered equipments / cranes / forklift / pay loader / vehicles etc. to electrically powered in a phased manner by making suitable plans.

(iii) All future procurements of Port vehicles and cargo handling & other equipments shall preferably be electrically driven / electrically powered or should be compatible with low carbon greener fuels viz., CNG, Methanol, Ethanol, Ammonia, Hydrogen Fuel Cell etc.

4.3 Port crafts:

(i) Ports shall make efforts to retrofit Port Crafts (including Tugs, Pilot Boats, Mooring Boats, Survey Boats etc.) with available technology for propulsion on cleaner and greener fuel viz., Green Ammonia, Green Hydrogen (through Fuel Cell), Green Methanol etc in phased manner.

(ii) Ports shall make an action plan and implement the projects to achieve the targets set for the Ports / Port Crafts in the "National Green Hydrogen Mission", including creation of infrastructure at select Ports for storage, bunkering and refueling of Green Hydrogen and its derivative, within the targeted timelines.

(iii) Green Ammonia bunkers and refueling facilities shall be established at all Major Ports by 2035.

4.4 Renewable Energy:

(i) All Ports shall make efforts to achieve the target of Renewable Energy as envisaged in MIV 2030 / Blue Economy 2047 documents. Share of renewable energy at Ports should exceed 60 percent by the Year 2030 and 90 percent by year 2047.

(ii) Ports shall establish at least one LNG bunkering station by the Year 2030 and adequate number of EV charging stations in port campus or nearby area by the year 2025.

(iii) Select Port(s) shall upgrade / augment their Infrastructure to support Offshore Wind Energy projects by facilitating and providing services to the industry for

assembly, staging, fabrication, storage, and loading of Wind Turbine Generator (WTG) components for offshore installation. V.O. Chidambaranar Port has been selected for a pilot project on offshore wind farm to be executed by Ministry of Power.

4.5 Shore to Ship Power Supply:

All Ports shall develop the infrastructure to provide "Shore to Ship" power in a phased manner:

- 1St Phase- To Port Crafts (By 2023)
- 2nd Phase- To Coast Guard/Navy and small coastal vessels (By 2024)
- 3rd Phase- To EXIM vessels (By 2025)

4.6 Resource Utilization:Ports shall:

(i) Make efforts to increase the capacity of Water Treatment Plants and usage of treated water.

(ii) Achieve more than 20 percent reduction in fresh water consumption / ton of cargo and 100 percent recycle and reuse the waste water by year 2030.

(iii) Install Sewage Treatment Plant (STPs) and to use the treated water for all permissible non potable purposes such as horticulture, sprinkling of water on roads and yards etc., thereby reducing the consumption of fresh water quantity.

(iv) Explore possibility of installation of "Desalination Plants" if not installed as an alternate of ground / surface water.

(v) Explore possibility of utilization of condensed water generated from the chilling plants installed at LNG terminals.

(vi) Make adequate arrangements for "Rain Water Harvesting" for effective collection of rain water wherever possible.

4.7 Use of Energy Efficient equipments:

(i) Ports shall use energy efficient equipments / material viz. LED smart lighting system, highest energy rating equipments such as AC, Fans, Electronic devices etc. to reduce the energy consumption demand.

(ii) No vehicles to be permitted inside the port area without PUC certificate.

(iii) The Ports shall use the digital infrastructure i.e. Sagar Setu-NLP-Marine, EBS, RFID etc. to increase the efficiency of Port operation and in turn reduce the carbon footprint.

(iv) All new buildings shall be built by adopting "Green Building" concept.

(v) All Ports shall achieve more than 20 percent reduction in energy consumption / ton of cargo by year 2030 (Baseline – Year 2023).

4.8 Promotion of Coastal Shipping:

Promotion of "Coastal Shipping" is a cost & energy efficient alternative mode for transportation that can help address the challenges of carbon emission and help to achieve the target of national carbon footprint reduction. Ports shall facilitate coastal shipping through creation of infrastructure and suitably designed mechanisms to make the transport viable for the users.

4.9 Effluent Discharge:

(i) Effluent discharge from the ships calling at ports, shall be monitored closely as per the IMO (MARPOL Annex-IV) /DG Shipping Rules.

(ii) Ships equipped with Exhaust Gas Cleaning Systems, to meet IMO emission standards, should switch to the closed-loop mode of operation if fitted with hybrid type of scrubbers, whereas, the vessels fitted with open-loop scrubbers, would need to switch over to compliant fuel.

(iii) Discharge of any wastewater/ bilge water/ oily bilge/ wastewater generated from ships shall be prohibited in the Port waters.

(iv) Ships calling to the Port shall compulsorily declare type (as per MARPOL) and approximate quantity of waste on board and seek Port's assistance in disposing the same.

4.10 Marine Ecosystem:

(i) To develop programs that will protect and conserve the shore, mangrove forest and habitats.

(ii) To prepare an Emergency Oil Pollution Response Management as per the NOS-DCP (National Oil Spill Disaster Contingency Plan) to combat oil pollution in the event of oil spill within the port limits.

(iii) To implement Ballast Water Management by all ships (as applicable) calling ports as per IMO/DG Shipping Guidelines.

4.11 Waste Management:

All Ports shall provide shore reception facility, with approved vendors, for discharging the waste by ships calling at ports as per the Indian Rules.

4.12 Environment Management:

(i) All Ports shall have approved Environment Management Guidelines, Environment Management Plan & a dedicated Environment Cell to review and monitor the environment compliance in the Port.

(ii) Environment Cell, a dedicated unit of competent trained personnel for sustainable and environment friendly Port operation, to give suggestions/

recommendation to management for effective implementation of environment compliance.

(iii) All Ports to carry out an Independent Annual Environment Audit by a credible agency and report of the same shall be uploaded on the Port's website annually before 30th April of every year**.**

4.13 All Ports shall strive to earn Carbon Credits by reducing Green House Gas (GHG) emissions.

4.14 Incentive Measures:

(i) To promote sustainability, the Green Ship incentives may be introduced at Ports to motivate the green culture at ports. The ships (EXIM/Coastal), which are using cleaner fuel, as compared to conventional fuel, and vessels having shore power reception facility to accommodate the full running load at berth, including cargo handling equipment, may be incentivized in terms of queue priority or rebate in berth dues.

(ii) Private Craft Operators at port using alternate fuel (green fuel) such as Methanol, Ethanol, Hydrogen Fuel Cell technology etc. may also be suitably incentivized.

(iii) Private operators / stevedores / agents /exporters / importers at Port who are running their equipment / vehicles with green fuel / electric for all its fleet may be identified and recognized through green certification and may be suitably incentivized.

(iv) All truck operators who use the green fuel i.e. CNG/LNG/Hydrogen and its derivative or electric fleet may be identified and incentivized.

(v) Ports shall ensure that the Green and Sustainability aspects are suitably incorporated in the DPR (Detailed Project Report) while formulating PPP (Public Private Partnership) projects.

(vi) For the existing PPP Concessionaires, Ports shall devise suitable mechanism(s) to incentivize the concessionaires to adopt greener and carbon neutral designs and procedures in line with the spirit of these guidelines.

4.15 Applicable laws and Rules for protection of environment have been listed in **Annexure-A.** In addition, compliance with other Rules applicable in the matter, as issued by the Government of India, CPCB, State Pollution Control Boards (SPCB) and other such agencies from time to time, shall be ensured by all the Ports.

4.16 Environment Performance Indicators (EPIs):

(i) Environment Performance Indicators (EPIs) pertaining to air quality, water quality, effluent and noise pollution are listed in **Annexure-B.**

(ii) Environment Performance Indicators (EPIs) pertaining to waste management are listed in **Annexure-C.**

(iii) Environment Performance Indicators (EPIs) for sustainability are listed in **Annexure-D.**

5. Methodology for Implementation & Compliance:

5.1 All Ports shall prepare an action plan for developing a monitoring system in reference of **EPIs** listed in **Annexure-B** and formulate Targets/Action plan in reference of **EPIs** listed in **Annexure-D** within a **period of two months from** the date of launch of the guidelines.

5.2 With reference to the EPIs as mentioned in Annexure-B, all Ports shall make suitable efforts to develop the real time Continuous Ambient Air Quality Monitoring Stations (CAAQMS) as per applicable MoEF&CC/CPCB guidelines with digital dashboard and, if already installed, the same to be calibrated with the approved lab showing the real time value with reference to the permissible limit and to be hooked with MoPSW server/portal/Sagarmanthan dashboard for real time monitoring and feedback. Suggested timelines for the above activities are as under:

(i) Ports which are not dealing with dry bulk cargo such as iron ore, coal may install CAAQMS within a period of **6 months** from the date of launch of these guidelines.

(ii) Other Ports may install the CAAQMS within a period of **18 months** from the date of launch of these guidelines. Suitable infrastructure to mitigate the air pollution from dry bulk will have to be created before installing CAAQMS.

5.3 All Ports may make suitable efforts to develop and install real time Continuous Marine Water Quality Monitoring Stations (CMWQMS) as per MoEF&CC/CPCB guidelines with digital dashboard and if already installed the same is to be calibrated by an approved lab showing the real time value with reference to the permissible limits and to be hooked with MoPSW server/portal/ Sagarmanthan dashboard for real time monitoring and feedback within a tentative period of **12 months** from the date of launch of guidelines.

5.4 All Ports may make suitable efforts to develop and install real time Online Continuous Effluent Monitoring system (OCEMS) with reference to the effluent parameter as mentioned in Annexure-B as per MoEF&CC / CPCB guidelines with digital dashboard and if already installed the same is to be calibrated by the approved lab showing the real time value with reference to the permissible limit and to be hooked with MoPSW server/portal/Sagarmanthan dashboard for real time monitoring and feedback within a tentative period **of 12 months** from the date of launch of guidelines.

5.5 Noise level and DG set Noise level monitoring may also be integrated in real time dashboard as mentioned above.

5.6 Till the online platform as stated above is developed in reference of EPIs as listed in Annexure-B, the regular reports may be prepared by credible Independent Environment Auditor and uploaded on the port website before **30th of April** each year.

5.7 Other EPIs as listed in Annexure-C shall be monitored and recorded in scientific manner and annual statement of the same showing real quantity and permissible quantity shall be uploaded on port website annually before **30th of April** each year.

5.8 All Ports shall conduct a baseline study, by engaging an expert agency, in respect of EPIs as listed in Annexure-D, taking FY2022-23 as base year, and submit the report to MoPSW within a period **of 3 months** from the date of launch of these guidelines. The study shall establish baseline, using internationally/nationally accepted protocols/ methods, for:

(i) GHG emission and carbon footprint. The fuel consumption is to be estimated for each piece of machinery i.e. ships calling at port, harbor crafts, port crafts, all cargo handling equipment and other equipment engaged in port operations, trucks used for cargo transportation etc. and calculate the emissions using emission factor.

(ii) Total emissions of different air pollutants from port related sources throughout the entire year to be estimated and annual emissions are then to be scaled to monthly averages and used to simulate the impact on air quality.

5.9 **MoPSW** shall recognize and award the best three Green Performing Ports of the year on the basis of an evaluation criteria.

6. Interpretation & Relaxation of Provisions:

6.1 In case of any ambiguity or doubt regarding any provision of the Guidelines, Ministry of Ports, Shipping and Waterways (MoPSW) has the power to interpret and clarify within the overall framework and spirit of the Guidelines.

6.2 MoPSW is empowered to relax the provisions of these guidelines, in public interest, within the overall framework and spirit of the guidelines, in case of difficulties in implementation.

7. Review of Guidelines:

Ministry of Ports, Shipping & Waterways may renew / amend / modify the provisions of these guidelines from time to time.

8. Green Reporting Initiative (GRI)

Ports shall make all efforts to adopt the Green Reporting Initiative (GRI), a global standard for reporting to communicate and demonstrate accountability for their impacts on the environment, economy and people.

Annexure-A

S. No.	Pollution Element	Applicable Laws
1	Air	National Ambient Air Quality Standards (NAAQS), Central Pollution Control Board Notification (CPCB), dated 18th November 2009 under TheAir (Prevention and Control of Pollution)Act, 1981 as amended in 1987.
2	Noise Level	Noise Pollution (Regulation and Control) Rules, 2000 under Environment (Protection) Act, 1986.
3	DG Set Noise	Environment (Protection) second Amendment Rules vide GSR 371(E), dated 17th May 2002 at serial no.94 and its amendments vide GSR No 520(E) dated 1st July 2003; GSR 448(E), dated 12th July 2004; GSR 315(E) dated 16th May 2005; GSR 464(E) dated 7th August 2006; GSR 566(E) dated 29th August 2007 and GSR 752(E) dated 24th October 2008; G.S.R. 215 (E), dated 15th March, 2011 under the Environment (Protection) Act, 1986)
4	Water	Water (Prevention and Control of Pollution) Act, 1974 and as amended in 2003 (General Standards for Discharge of Environmental Pollutants from CPCB).
5	Waste	
5.1	Hazardous Waste	Hazardous & other Wastes (Management & Transboundry Movement) Rules, 2016 and Hazardous Wastes (Management, Handling& Transboundry Movement) Rules, 2008 under Environment (Protection) Act, 1986
5.2	E-Waste	E-Waste (Management) Rules, 2022 to become effective from 1st April 2023 under Environment (Protection) Act, 1986
5.3	Solid Waste	Solid Waste Management Rules, 2016.
5.4	Bio Medical Waste	Bio-Medical Waste Management Rules, 2016 under Environment (Protection) Act, 1986
5.5	Plastic Waste	Plastic Waste Management Rules, 2016 under Environment (Protection) Act, 1986
5.6	Battery Waste	Battery Waste Management Rules, 2022, under Environment (Protection) Act, 1986
5.7	Construction & Demolition Waste	C&D Waste Management Rules 2016 and latest Guidelines issued by Central Pollution Control Board
6	Environment Clearance	Environment (Protection) Act, 1986.

Annexure-B

Environment Performance Indicator (Air, Water, Noise & Effluent)

Sr. No.	Pollutants
1.	Air
1.1	SO2 (Sulphur dioxide)
1.2	NO2(Nitrogen dioxide)
1.3	PM10 (Particulate Matter-10)
1.4	PM2.5 (Particulate Matter-10
1.5	O3 (Ozone)
1.6	Pb(Lead)
1.7	CO(Carbon Mono Oxide)
1.8	NH3(Ammonia)
1.9	Benzene(C6H6)
1.10	Benzo(a) pyrine (BaP)
1.11	Arsenic(As)
1.12	Nickel(Ni)
2.	Water
2.1	Ph (Alkalinity)
2.2	Dissolved oxygen
2.3	Fecal Coliform
2.4	Biochemical Oxygen Demand (BOD)
	Chemical Oxygen Demand (COD)
2.5	Hg (Mercury)
2.6	Pb(Lead)
2.7	temperature
2.8	Total Dissolved Solids (TDS)
2.9	Conductivity
2.10	Nitrate
2.11	Turbidity
2.12	Salinity
3.	Noise Level
3.1	LAeq (Continuous Noise Level for a particular period)
3.2	LAmax(Maximum Noise Level)
4.	Noise Level DG set
5.	Effluent Discharge (STP)
5.1	Ph
5.2	COD
5.3	BOD
5.4	Total Suspended Solids
5.4	Nitrate
5.5	Ammonia
5.6	Fecal Coliform

Annexure-C

Environment Performance Indicator (Waste Management)

Sr. No.	Waste Type	Source of Generation	Qty. Generated in MT in Last FY	Quantity Disposed off in MT in Last FY	Qty. Remaining in MT	Permissible limit, if any
1	Hazardous Waste					
2	E-Waste					
3	Solid Waste					
4	Plastic Waste					
5	Battery Waste (In Nos.)					
6	Construction & Demolition Waste					
7	Bio Medical Waste					

Annexure-D

Environment Performance Indicator for Sustainability

Sr. No.	EPIs	Target by 2030	Target by 2047
1	% share of Renewable energy consumption at ports (self generated + procurement from grid)	>60%	>90%
2	% Port equipment/vehicles electrified	>50%	>90%
3	% area under green belt	>20%	>33%
4	% reduction in CO2 emission / ton of cargo (Baseline Year 2023)	>30%	>70%
5	%GHG emission reduction in all coastal/ EXIM vessels	>10%	>50%
6	% reduction in fresh-water consumption / ton of cargo (Baseline Year 2023)	>20%	-
7	% recycle and reuse of consumed water	>100%	-
8	% reduction in energy consumption / ton of cargo (Baseline Year 2023)	>20%	-
9	One no. of LNG bunkering station	By year 2030	-
10	Green hydrogen / Ammonia bunkers and refueling facilities	By year 2035	
11	Adequate number of EV charging stations	By year 2025	-



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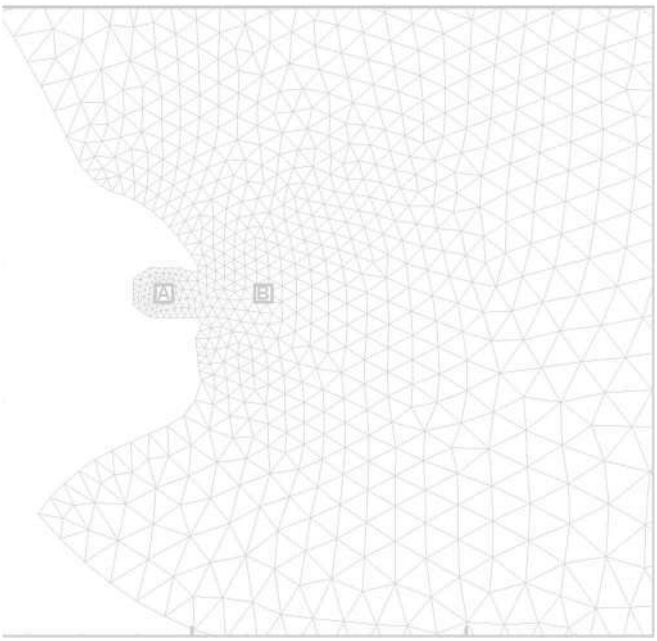
Ministry of Ports, Shipping & Waterways

Government of India



Annexure-VII

EXTENDED MONITORING STUDY OF SHIPPING CHANNEL LEADING TO HALDIA DOCK COMPLEX (PHASE-V)



Interim Report (2023-2024)- Detailed studies on developing OT3

Client

Syamaprasad Mookerjee Port, Kolkata

Consultant

Prof. K. Murali

National Technology Centre for Ports, Waterways and Coasts

Department of Ocean Engineering

Indian Institute of Technology Madras

Chennai – 600 036

January 2025

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1 INTRODUCTION

1.1 Background

Syamaprasad Mookerjee Port, Kolkata vide work order no.: Hyd/9043/D/Part-VI/60 dated on: 07/02/2022, addressed to Prof. K.Murali, National Technology Centre for Ports Waterways & Coasts (NTCPWC), Indian Institute of Technology Madras (IITM), had forwarded the terms of reference to conduct extended monitoring study in the shipping channel leading to Haldia Dock Complex (HDC) and providing updated model studies from time to time for Haldia Dock (Phase-V). The location of the study domain is shown in **Figure.1.**



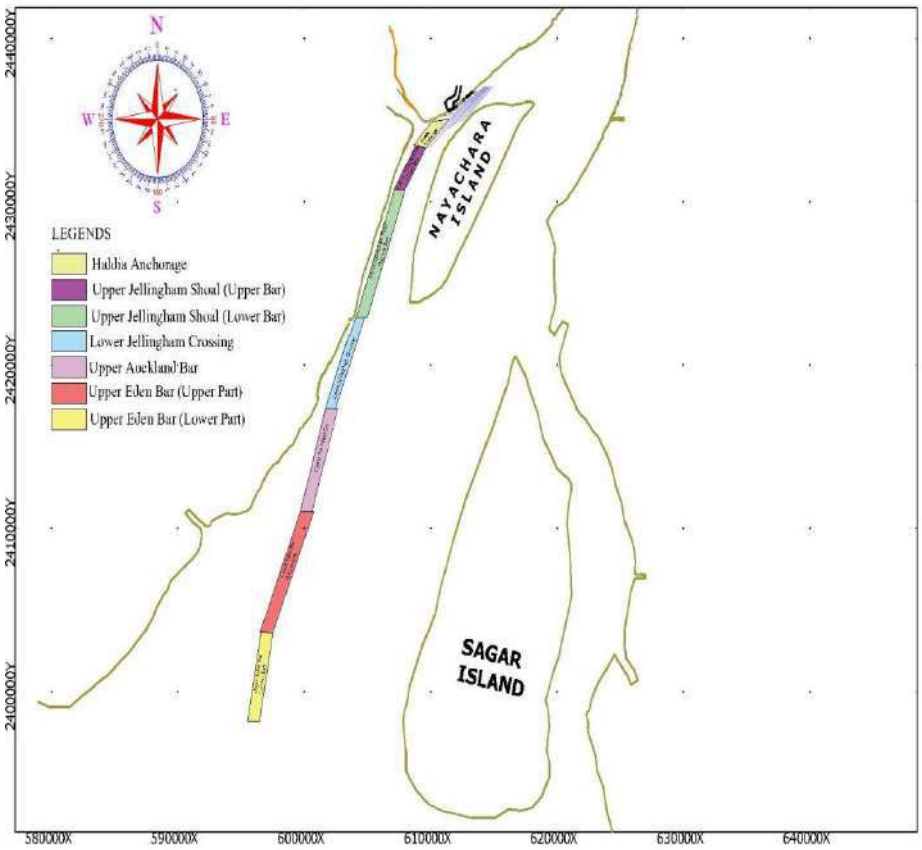


Figure 1 Location map of project site

2 OBJECTIVES OF THE STUDY

The present study is mainly focused on the following objectives,

1) Monitoring & modeling of navigational channels to HDC from 01.01.2022 to 31.12.2026.
2) Further assessment / fine-tuning of maintenance dredging quantum in the shipping channel leading to HDC from 01.01.2022 to 31.12.2026.
3) Continuous technical support for the purpose of ensuring smooth operation of HDC fairways and dredging.
4) Providing updated model studies from time to time and as & when required for addressing issues as may arise.
5) Providing continuous support in terms of firming up the dredging contract and managing the dredging contract technically as per prevailing depths.

The annual report comprising of all items 1-5 above has been submitted during Feb. 2024. This report deals with the additional facilities proposed at Haldia and the likely change in hydro-morphological characteristics in the river and therefore the river health.

3 METHODOLOGY

This stability study has been carried out using Ocirc model, an in-house model developed by IIT Madras. The model calculates tide induced flow in the estuary and computes change in bed levels due to the tidal flow using total sediment load balance in the water column. Site-specific conditions, based on earlier studies, are considered for the present study. The details of the study domain are given below. Monitoring of channel depths helps to understand the sediment dynamics precisely and update the mathematical models for future predictions with proposed developments if any.

3.1 Survey Monitoring

IIT Madras has been conducting Monitoring Survey at Upper Eden from February 2016 to till date and at Haldia Anchorage & Upper Jellingham from August 2016 to till date. In order to cover the monsoonal effect, the survey monitoring shall be continued by IIT Madras till December 2026. Further, beyond this period, Syamaprasad Mookherjee Port, Kolkata shall conduct monitoring survey of the channel and the behavior shall be recorded systematically, with the technical inputs from IIT Madras. The detailed survey monitoring report is submitted.

4 HYDRODYNAMIC AND SILTATION STUDY IN HALDIA DOCK COMPLEX

4.1 Updating of the existing numerical model with most recent measured bathymetry time to time and with proposed facilities and prediction of bed level changes in the navigational channels

Numerical models are used to predict the bed level change based on the hydrodynamic parameters that exist over the region of inspection. In order to pursue the mathematical model studies of hydrodynamics and siltation, the in-house developed hydrodynamic model used is **Ocirc**, the details of which are discussed in **Annexure A.** The model predicts the tide induced flow in the area of interest and computes the changes in the bed levels due to the tidal flow using sediment load balance in the water column.

4.2 Methodology

Demarcation of the study domain is done to set up the extent of the model domain. Hydrodynamic modeling is executed using Ocirc circulation model. Both hydrodynamics and morphodynamics model is simulated for a neap-to-neap condition, which covers all the astronomical aspects of tidal forcing. Estimation of the dredge quantity based on the morphodynamic simulation is carried out. The model domain can be discretized with triangular elements to obtain numerical solutions to the hydrodynamic equations. The final mesh has fine elements near the coastlines and shallower water depths. The average mesh size is found to be about 10-100m, which is very fine near the concentrated study area. The mesh is coarser near the offshore boundaries where the water depths are greater and finer in the channels and their confluence regions. The siltation in the channel regions and other secondary regions need to be estimated, the mesh size in these regions also be refined with the above finer resolutions based on grid independent study. Therefore, the model is capable of capturing the details of the bathymetry significantly closer to reality. The model is validated for this study domain earlier and details are given in the annexure.

The monitoring data of all the navigational channels of HDC can be used to improve the siltation rate prediction with all the partially silting scenarios monitored. A refined model has been developed to accurately represent field conditions, incorporating proposed developments and employing frequent updates of channel soundings obtained from surveys. This updated model serves as a predictive tool for estimating silted volumes within the navigational channel, allowing for a comparison with actual dredge volumes. By continuously updating the model with current data, it facilitates a comprehensive analysis of the impact of proposed developments on siltation and stability, as well as the associated dredging requirements. Furthermore, the updated model enables an assessment of the comparative smoothness of flow between existing and proposed conditions. Through simulations, the model provides insights into the anticipated silted volume within the navigational channel, allowing for a quantification of differences in dredged volume and siltation rates between existing and proposed scenarios. This approach enhances decision-making processes by providing valuable information regarding the potential consequences and benefits of proposed developments on navigational conditions. The monitoring is used to fine tune the model by making changes to the bed load transport model in order to achieve the more appropriate prediction. In this way the model is re-validated using the dredge volume and the validated model can be used to predict the maintenance dredging quantity.

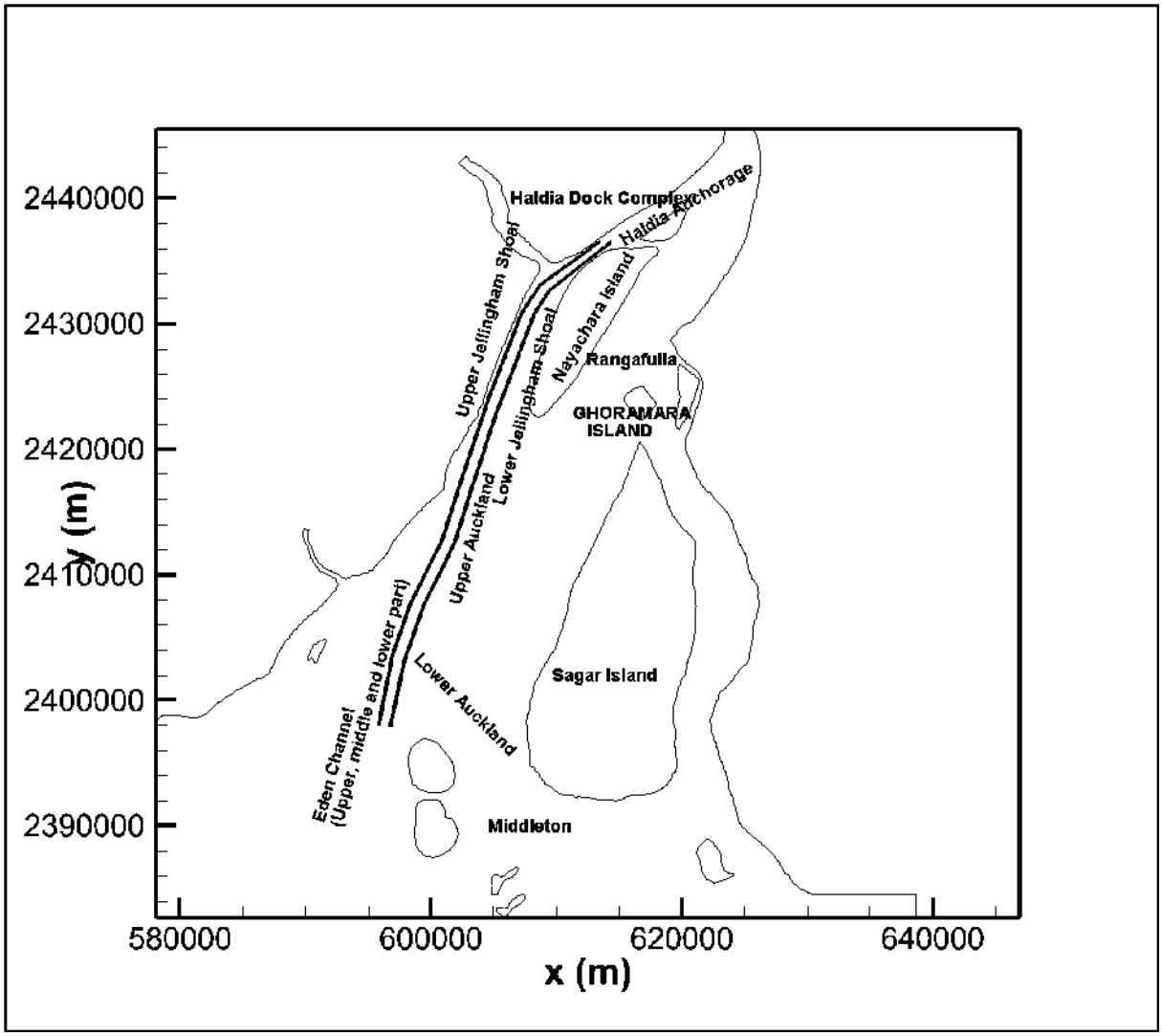


Figure 2 Layout of navigational channels to HDC

4.3 Model set-up and boundary conditions

Hooghly estuary is a tidally driven water body. Thus, the hydrodynamic model for Hooghly estuary shall derive the tidal forcing from Bay of Bengal. The tidal oscillations propagate in to the estuary from the south and are felt more than 120 km into the river. Thus, there is a phase difference in the tidal oscillations along the river.

The water depth (w.r.t CD) in the computational region varies as much as 6-9m in the regions of HDC. The numerical modelling study will be carried out based on the different condition of dredging. Eden Channel (Upper, Middle, and Lower Parts), Upper Auckland, Lower Jellingham, Upper Jellingham Shoal, and Haldia Anchorage are the areas to connect the navigational channel to HDC from Eden Channel.

The solution domain for the present problem is the Hooghly estuary. Since an unstructured approach is being used in the present model, no hybrid meshing scheme is needed for capturing small features in geometry and flow. The domain of study is represented by several bodies representing exterior coastal lines and interior islands. This is basically the geometric configuration of the coastal boundaries. **Figure 2** shows the region of interest considered i.e., Haldia Dock Complex (HDC). Different cases considered for the study is shown in **Table 1**. The computational mesh and bathymetry used for simulation for Case-1 is given in **Figure 3 to Figure 5**. The computational mesh and bathymetry used for simulation for Case-2 is given in **Figure 6 to Figure 8**. The computational mesh and bathymetry used for simulation for Case-3 is given in **Figure 9 to Figure 11**. The final mesh has fine elements near the coastlines and shallower water depths. The average mesh size is found to be about 45-150m which is very fine for a large estuary such as this. The mesh is coarser near the offshore boundaries where the water depths are greater. The mesh size around the dock area is 10-40 m. Detailed numerical model studies have been carried out to investigate the hydrodynamics of tides. It is to be noted that, considering such a time series for the 15 days period covers the neap-neap variations of the astronomical tide and addresses all variations in the astronomical tides. Along with the tidal elevation, discharges are provided in the open boundary in river side.

Table 1 Details of cases considered for the study

Cases	Site conditions
Case- 1	Existing condition with most recent bathymetry
Case- 2	Proposed 500 m long jetty is updated in the model with the most recent bathymetry
Case- 3	Proposed jetty is relocated 45 m closer to bank

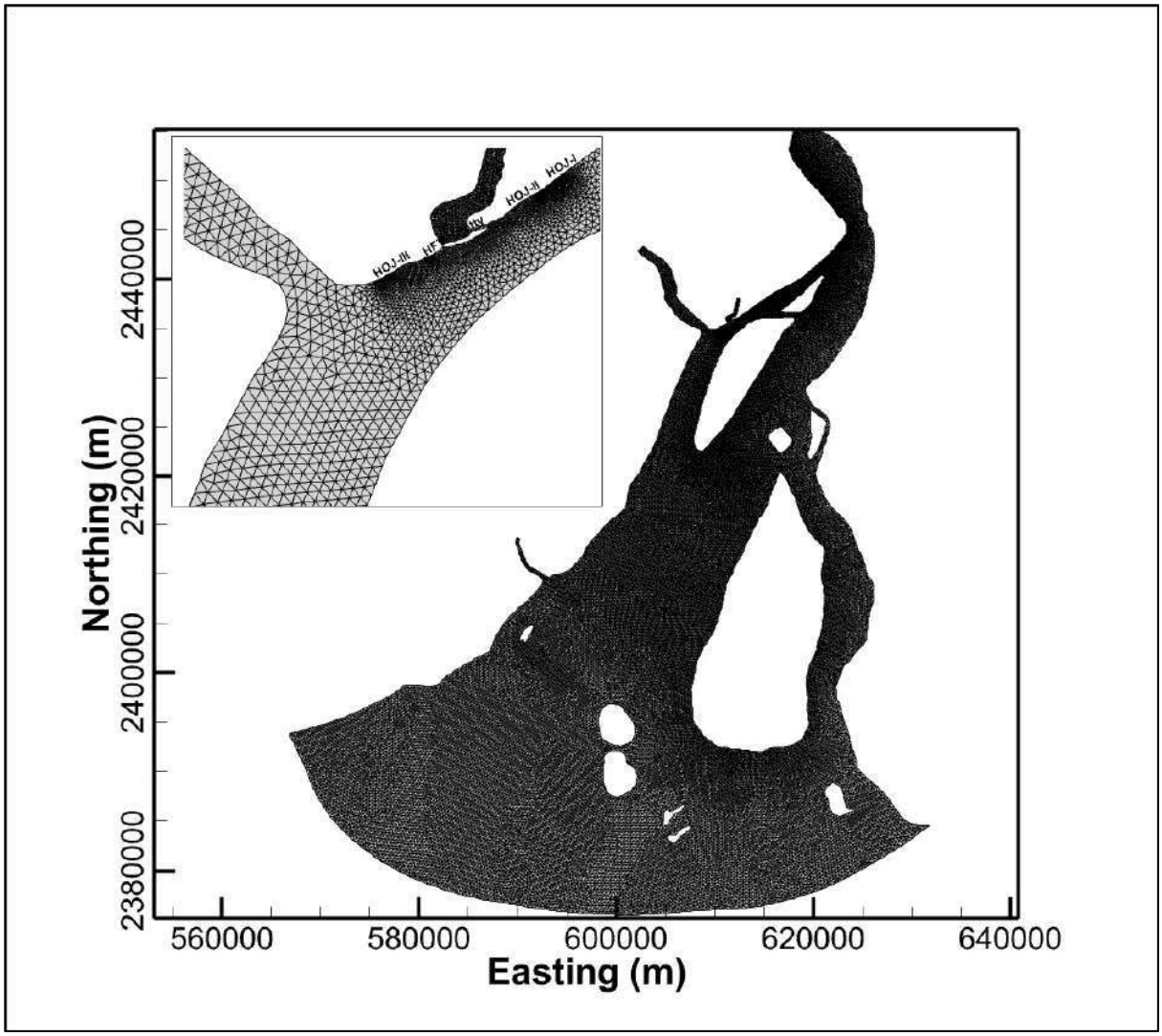


Figure 3 Typical meshing of the domain considered for simulation for existing condition (Case-1)

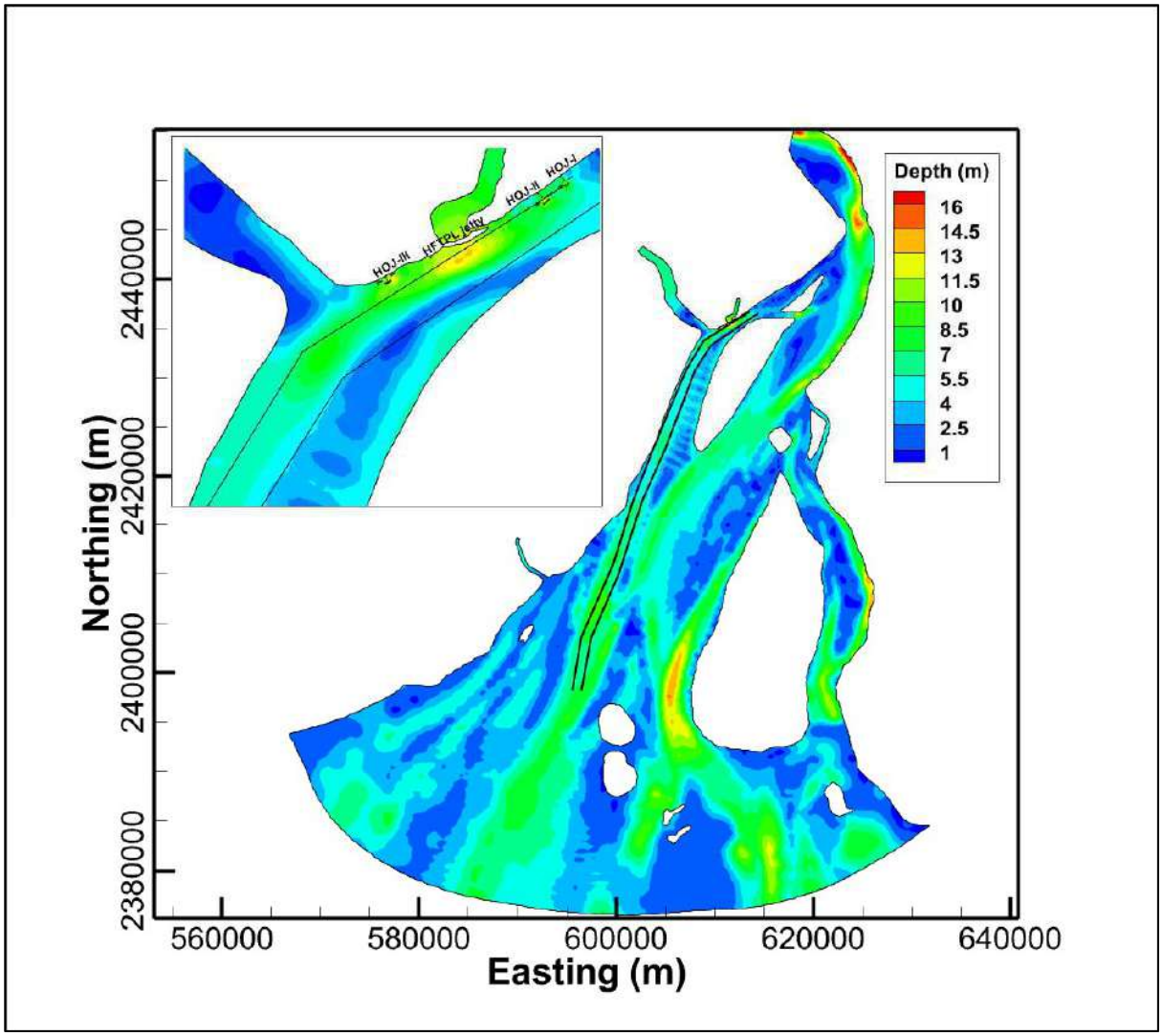


Figure 4 Typical bathymetry of the domain used for simulation for existing condition(Case-1)

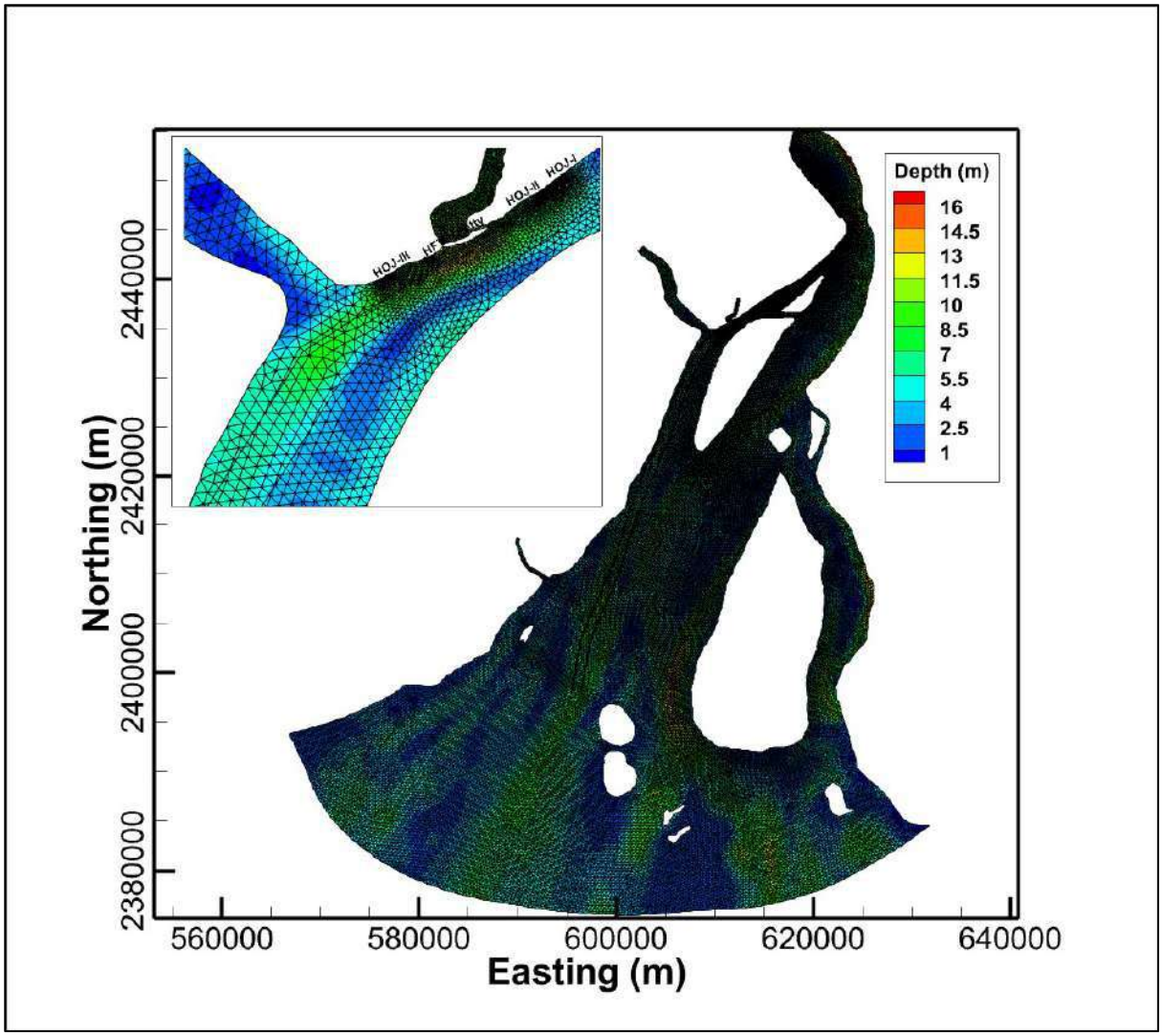


Figure 5 Computational meshing of the domain considered for simulation for existing condition(Case-1)

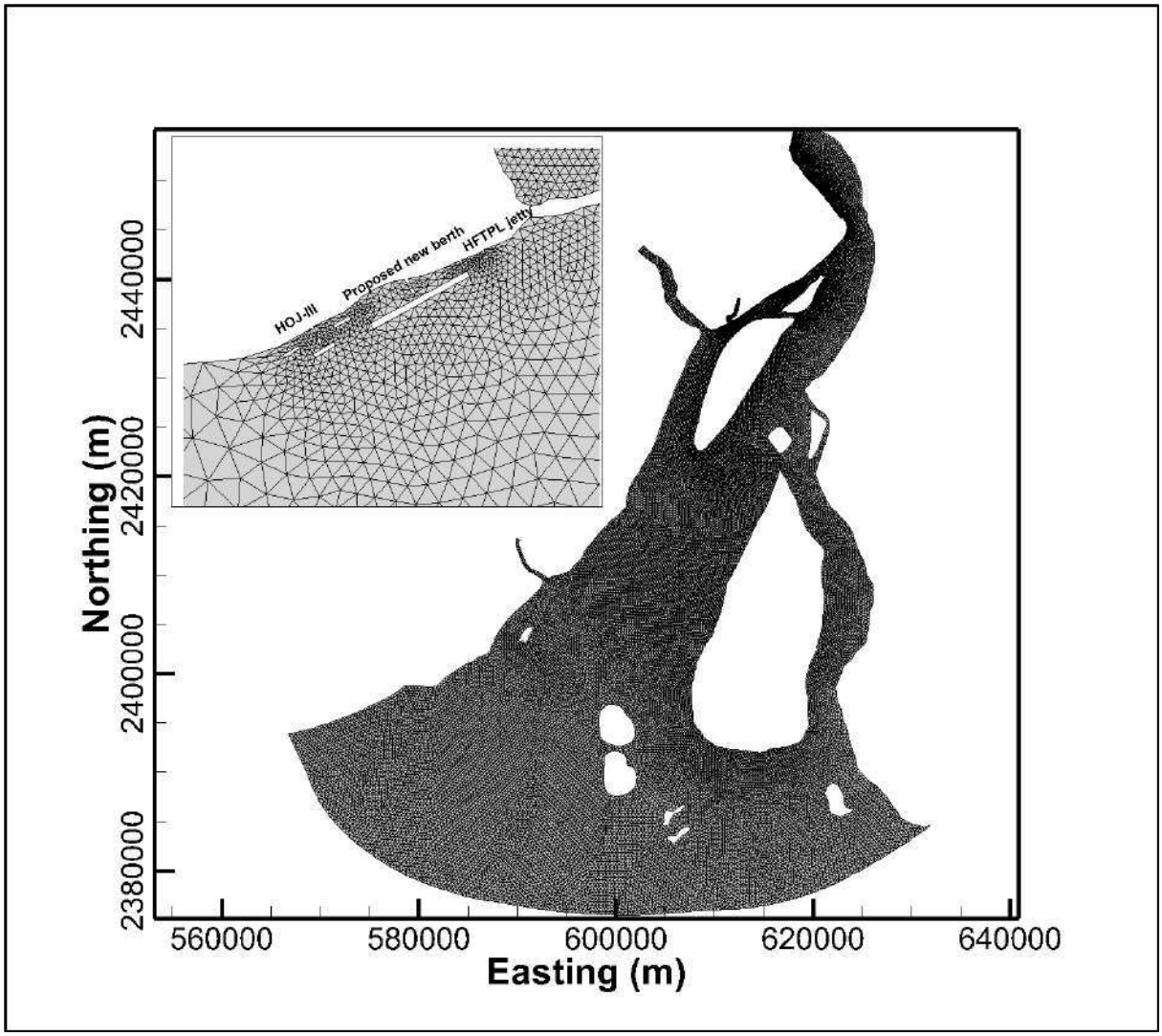


Figure 6 Computational mesh and bathymetry of the considered domain with proposed berth(Case-2)

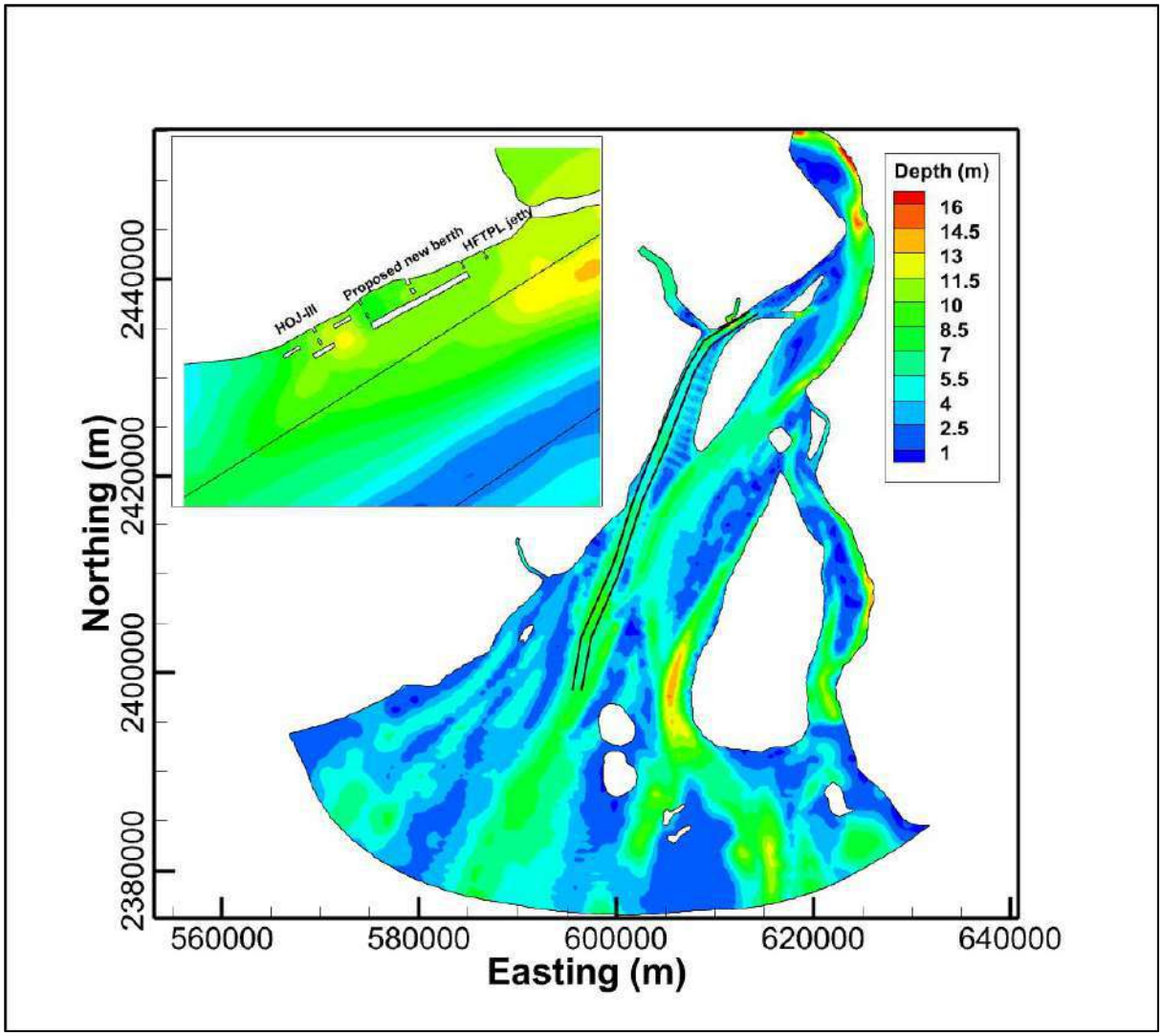


Figure 7 Bathymetry of the considered domain with proposed berth(Case-2)

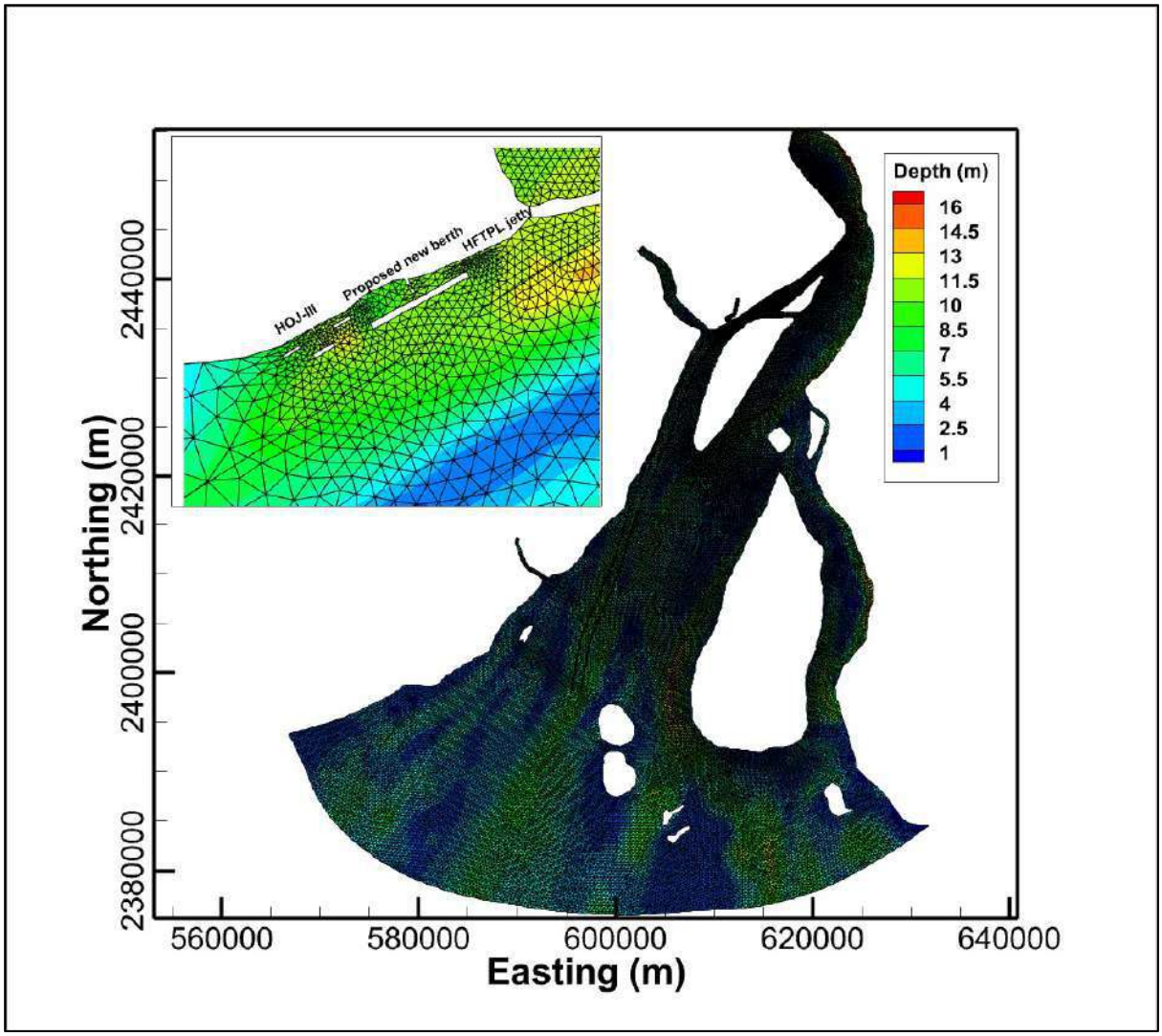


Figure 8 Computational mesh and bathymetry of the considered domain with proposed berth (Case-2)

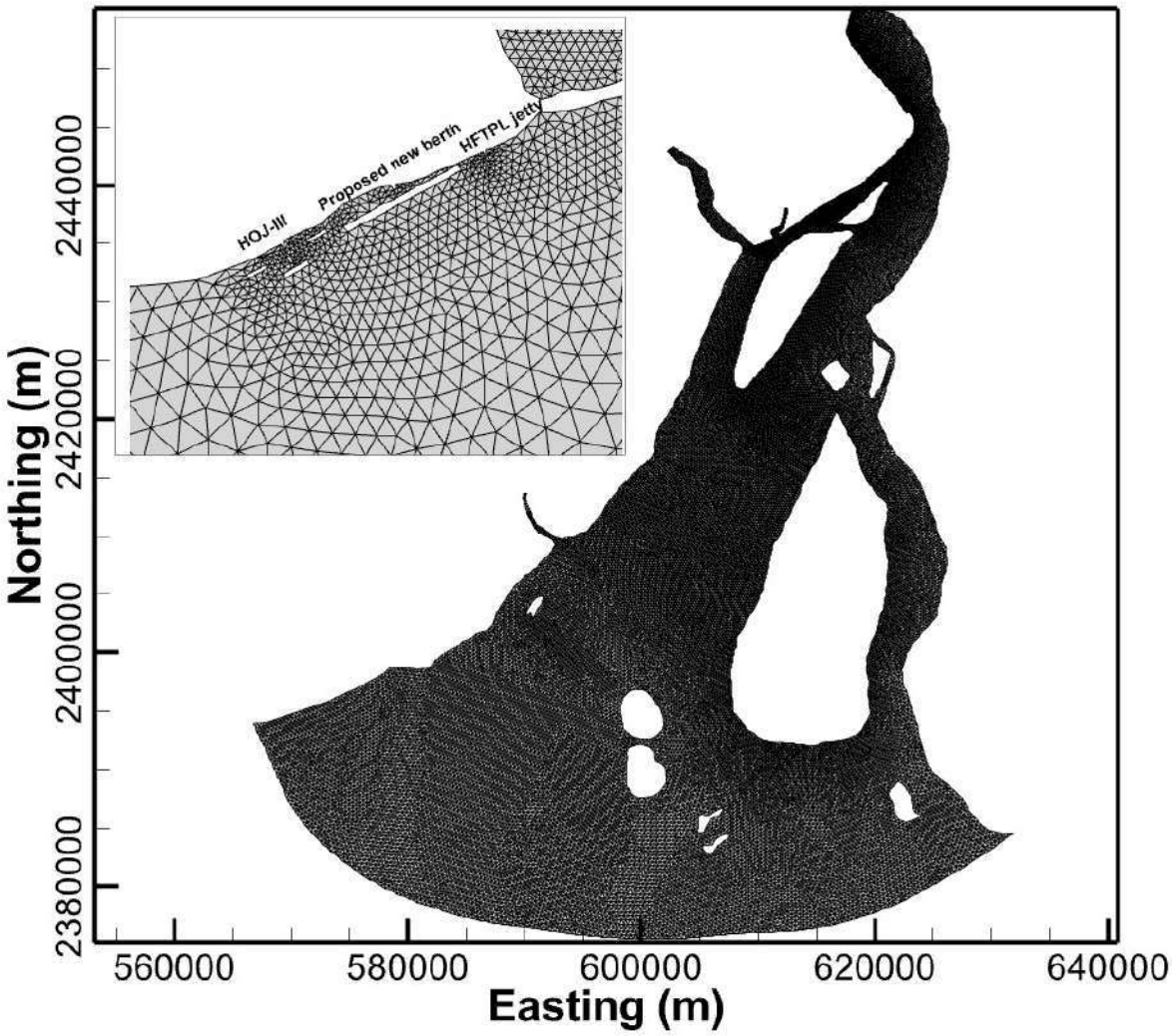


Figure 9 Computational mesh and bathymetry of the considered domain with proposed berth(Case-3)

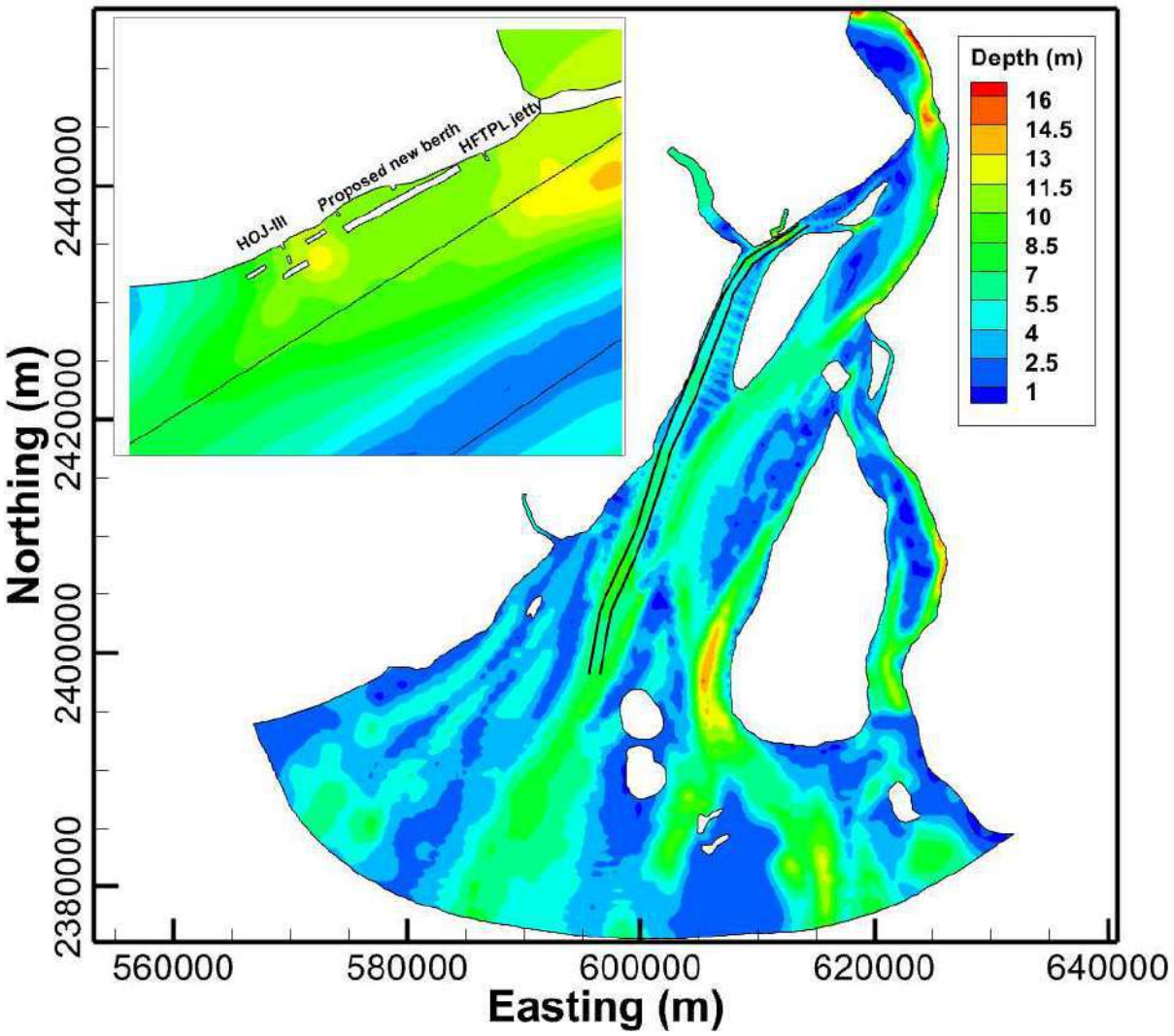


Figure 10 Bathymetry of the considered domain with proposed berth(Case-3)

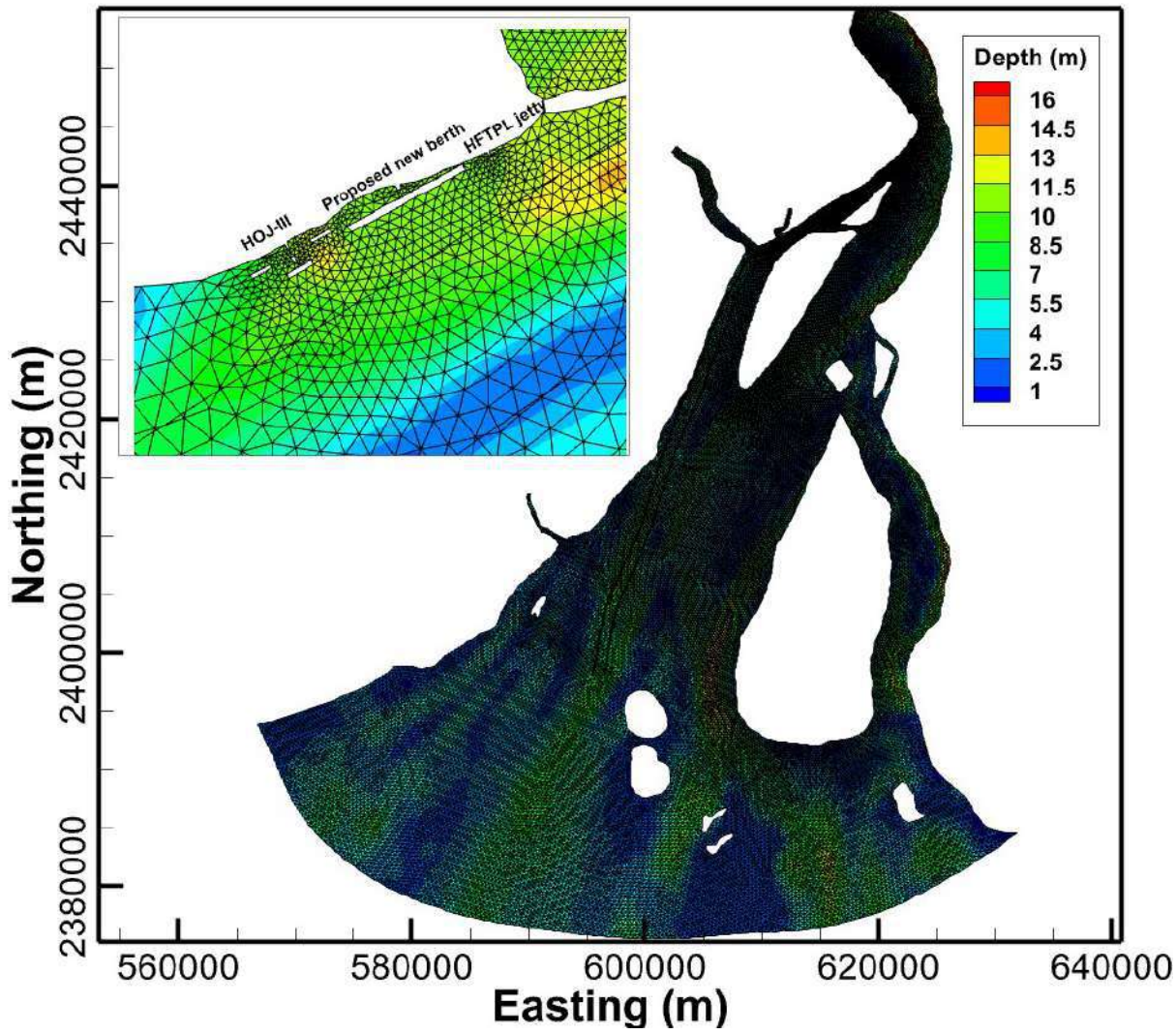


Figure 11 Computational mesh and bathymetry of the considered domain with proposed berth(Case-3)

The interpolated bathymetry on the mesh represents the contours at regular intervals. Detailed numerical model studies have been carried out earlier to investigate the hydrodynamics of tide induced flow features and the tidal boundary conditions employed is shown in Figure 12. It is to be noted that, considering such a time series for the 15 days period covers the spring-neap variations of the astronomical tide and addresses all variations in the astronomical tides.

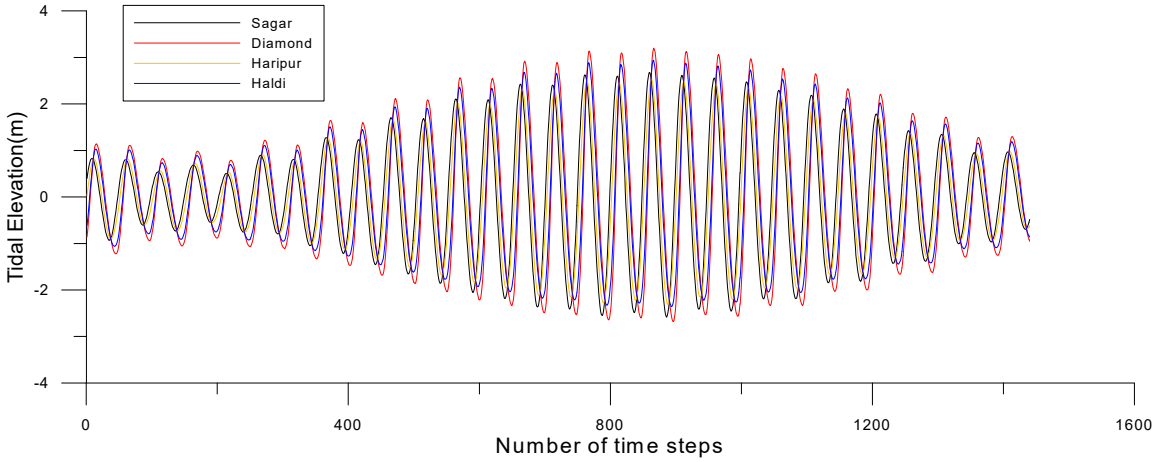


Figure 12 Open boundary conditions used for the study

Along with the tidal elevation current speed components u and v are also provided in the open boundary for driving the tidal currents in this tide dominated domain. The model is capable of capturing the details of the bathymetry significantly closer to reality. For the consequence assessment of the proposed container cum multipurpose berths outside HDC Lock between HOJ-III and HFTPL jetty, three different Cases were envisaged. The existing Oil Jetty 1, 2 &3 (HOJ-I, II&III) are included for the simulation and the model updated is updated with the most recent bathymetry in Case- 1 and for Case- 2 along with the existing jetties, the proposed container cum multipurpose berths outside HDC Lock between HOJ-III and HFTPL jetty are also updated in the model. For Case- 3 the proposed container cum multipurpose berths outside HDC Lock is relocated 45 m closer to bank. Bathymetry considered for simulation for Case-1, Case- 2 and Case- 3 at navigational channel enroute to HDC is represented in **Figure 13**. The proposed dredged depths to be maintained in the proposed 500 m long jetty is (-)10.5m CD.

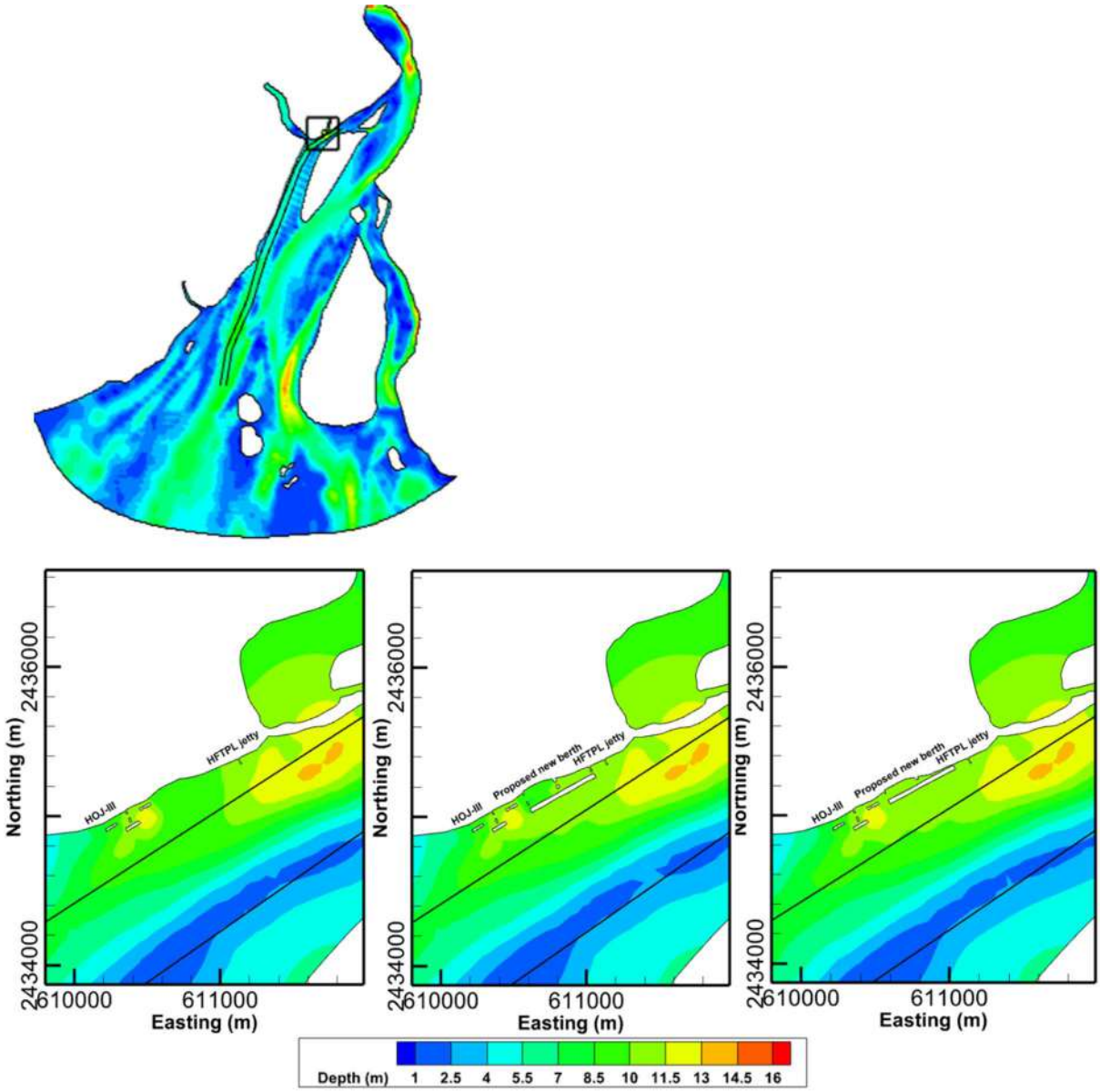


Figure 13 Bathymetry considered for the simulation for Case-1, Case- 2 and Case-3

4.4 Results & discussion

4.4.1 General

The type of computational mesh used in the simulations determines the accuracy of the tidal hydrodynamics near the proposed area. To accurately capture the adjacent shoreline, an unstructured meshing scheme was chosen. All of the boundary and bathymetry details in the study area can be resolved using the unstructured meshing scheme. This typical computational mesh depicts the meshing algorithm's ability to precisely discretize the study area.

4.4.2 Hydrodynamic Modelling in HDC channel regions for existing condition (Case-1)

The current tidal hydrodynamic conditions at the site are characterized primarily by varying flow patterns in various areas of the domain. Typical time instances at which flow patterns have been extracted are shown in **Figure 14**. The starting point is at mean sea level.

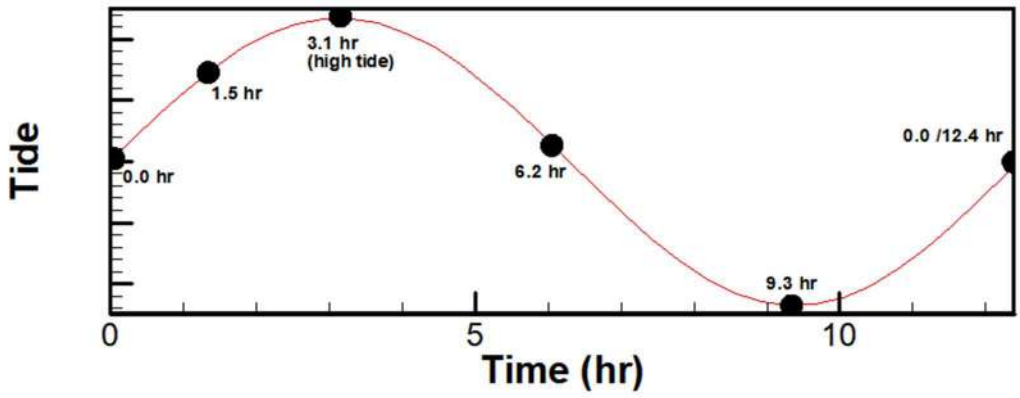


Figure 14 Time of the tide at which the result is plotted

Flooding

The flooding and ebbing phase of the tide is characterized by the flow in the north-south direction. The flow patterns during flooding conditions in navigation channels enroute to the HDC are shown in **Figure 15, 16 and 17**. The figures show a typical flow situation during the rising tide (at about 0 hr.) from which, the magnitudes of current at various locations in the study area can be deduced. The background colour indicates the variation of current magnitude as per the legend provided. The same phenomenon happens in the reversal direction during ebb tide.

During flooding, the direction of flow is towards the estuary from the open ocean. The velocity around the navigation channel region from the Eden channel to HDC has an average current velocity of 0.7-1.4 m/s and a maximum current velocity of 1.9 m/s besides, during the high tide condition the maximum current value in that channel is reduced to average value of 0.2 m/s (**Figure 17**). During high tide, when the domain is devoid of strong currents siltation is expected to take place. For the existing condition, infront of the HOJ-III and HFTPL jetty, during flooding, the maximum velocity reaches up to 1.26 m/s with the flow in North-East direction. In the subsequent high tide, reversal of currents takes place and the velocity reduces drastically in the deeper parts.

Ebbing

During the ebbing phase of the tide, which is followed by the occurrence of high tide, the tidal flow starts to retreat towards the open ocean. The flow patterns during the ebbing condition in navigation channels enroute to the HDC are is shown in **Figure 18 and 19**. The figure shows a typical flow situation during the falling tide (at about 6.2 hr.) from which, the magnitudes of current at various locations in the study area can be deduced.

The average current velocity along the channel is 0.3 m/s and a maximum of 1.4 m/s. The ebbing flow event is followed by the emergence of flooding event shown in **Figure 18**. The current magnitude in the channels during the flooding flow condition is slightly higher when compared to the ebbing flow condition. No major eddies are found to be formed in the study area. During low tide the current magnitude drops drastically to 0.2-0.3 m/s in the channels (**Figure 19**). For the existing condition, in front of the HOJ-III and HFTPL jetty, during the ebb tide the flow velocity again picks up pace and reaches the magnitude of about 0.72 m/s in the South-West direction. In low tide these flow current changes direction with the deeper depths devoid of currents.

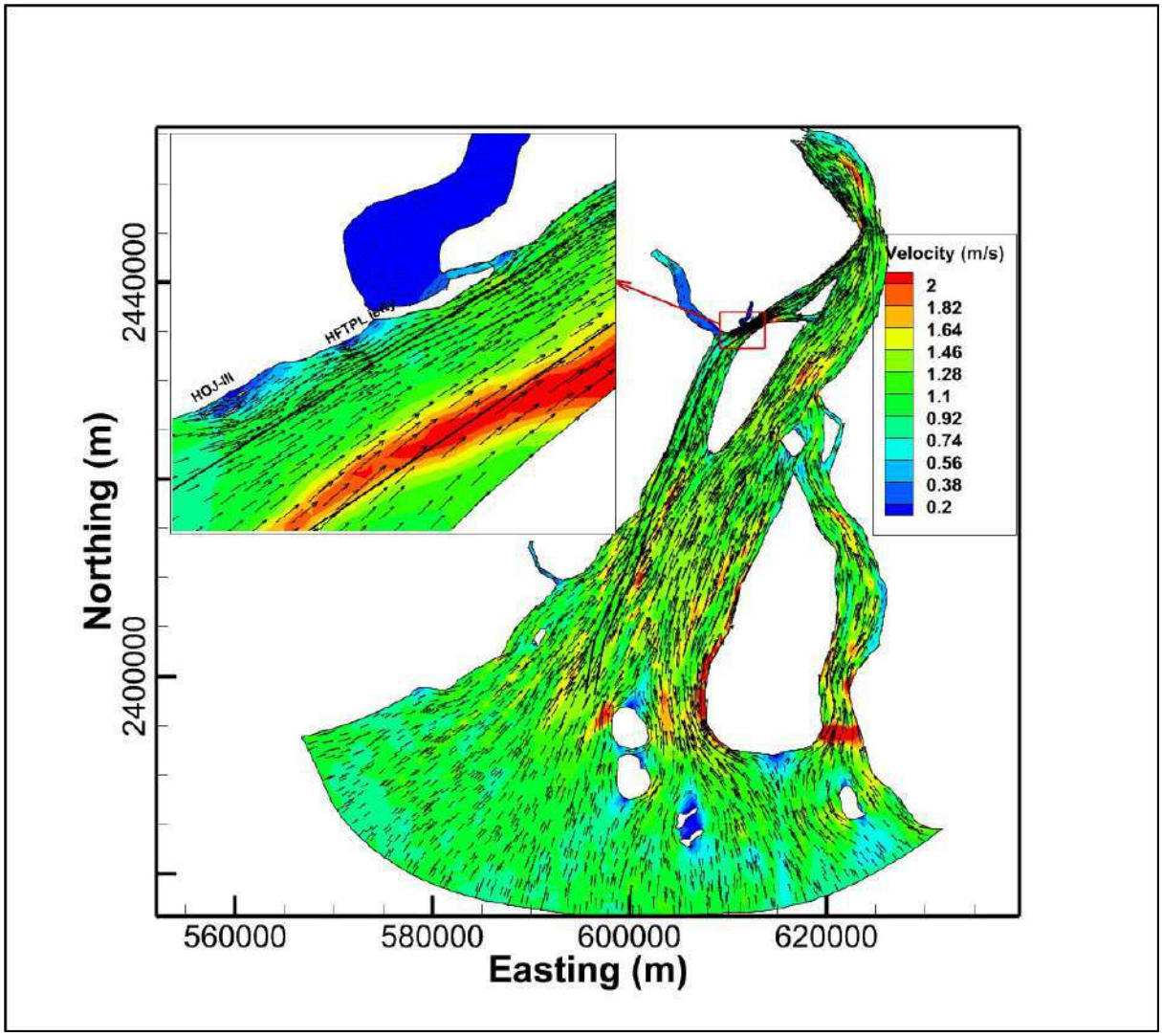


Figure 15 Typical Velocity vectors and contour plots during flooding phase of the tide at 0.0hrs in Hooghly estuary at the navigational channels of the HDC (Case-1)

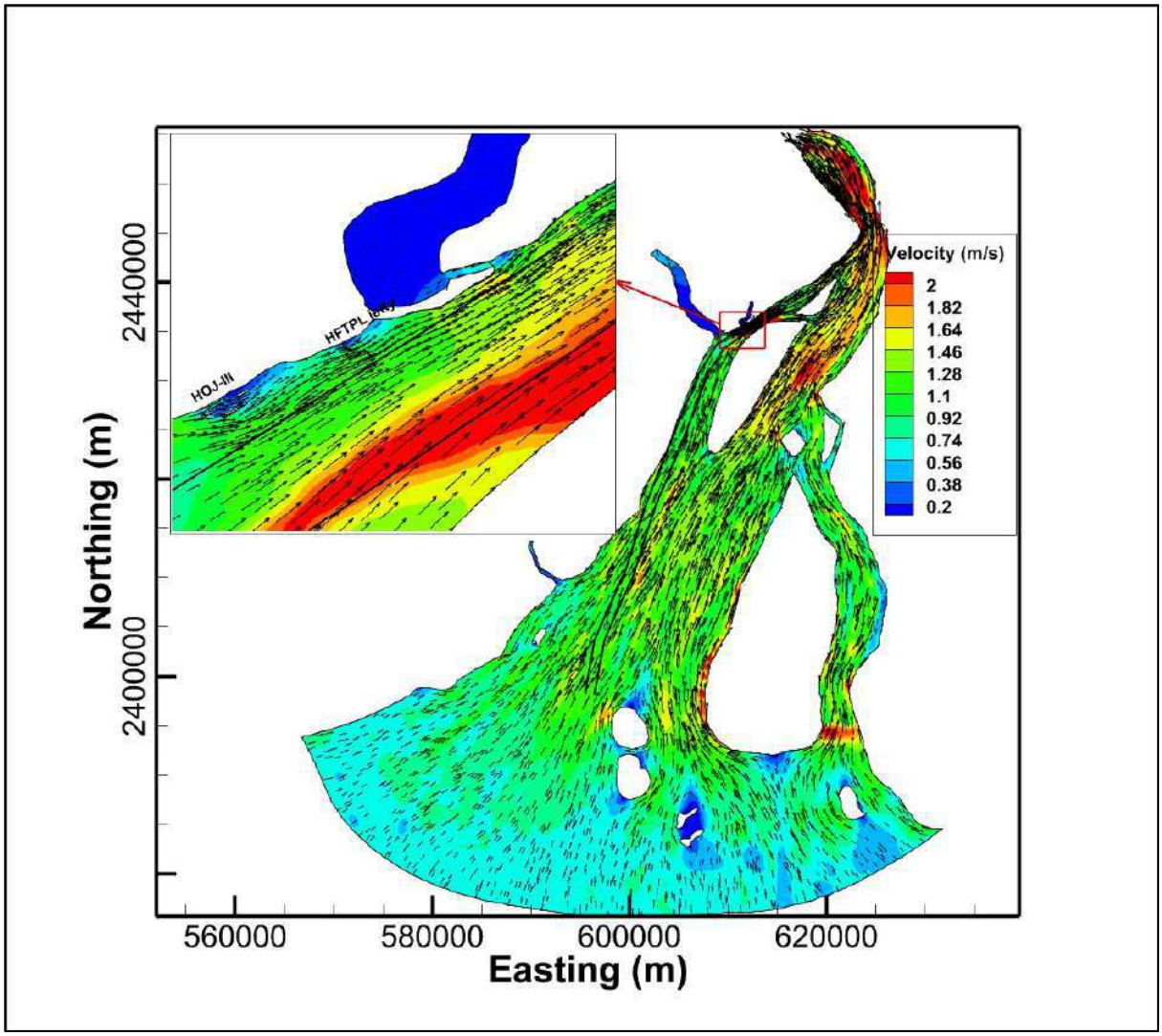


Figure 16 Typical Velocity vectors and contour plots during flooding phase of the tide at 1.5hrs in Hooghly estuary at the navigational channels of the HDC (Case-1)

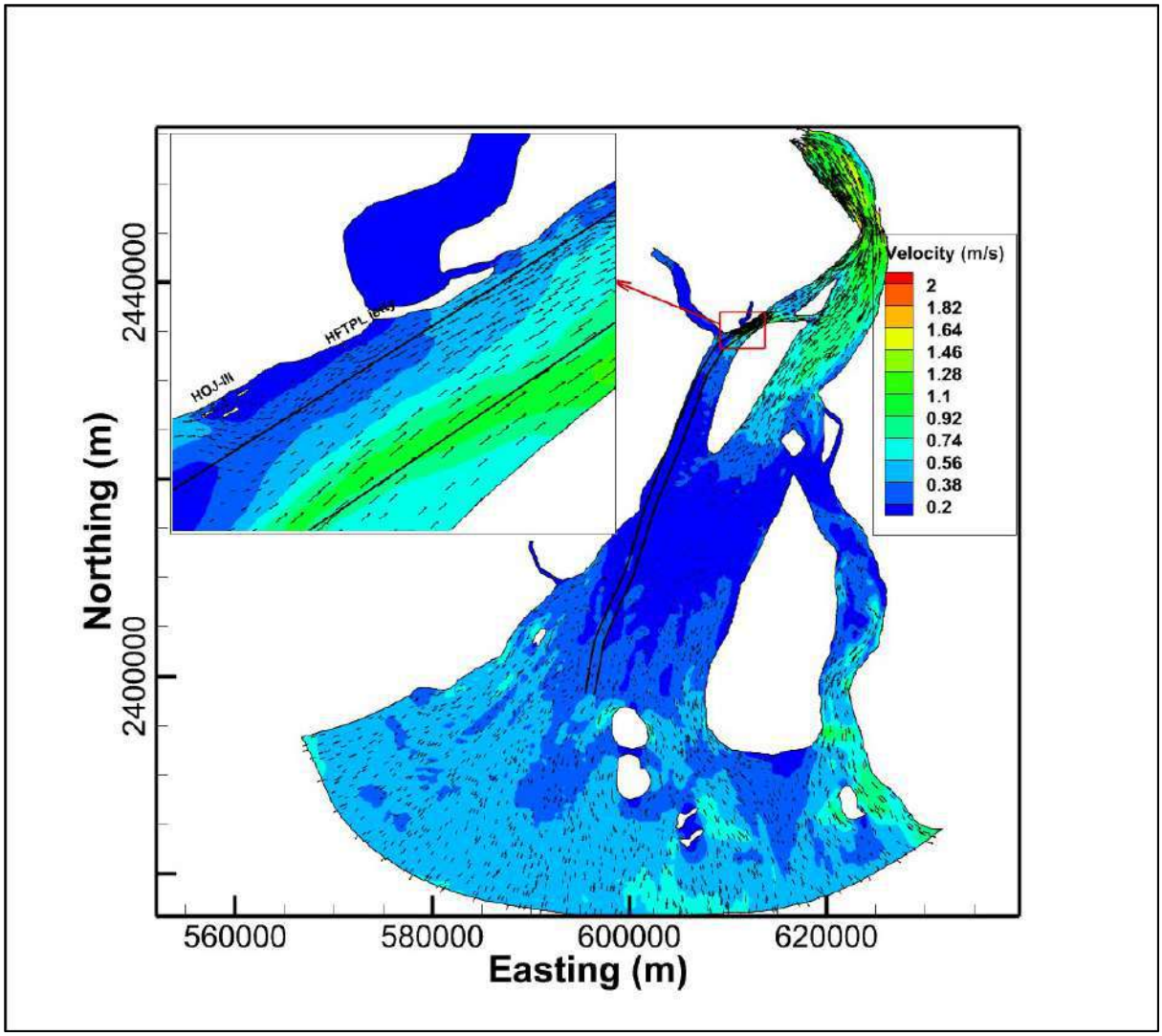


Figure 17 Typical Velocity vectors and contour plots during high tide at 3.1hrs in Hooghly estuary at the navigational channels of the HDC (Case-1)

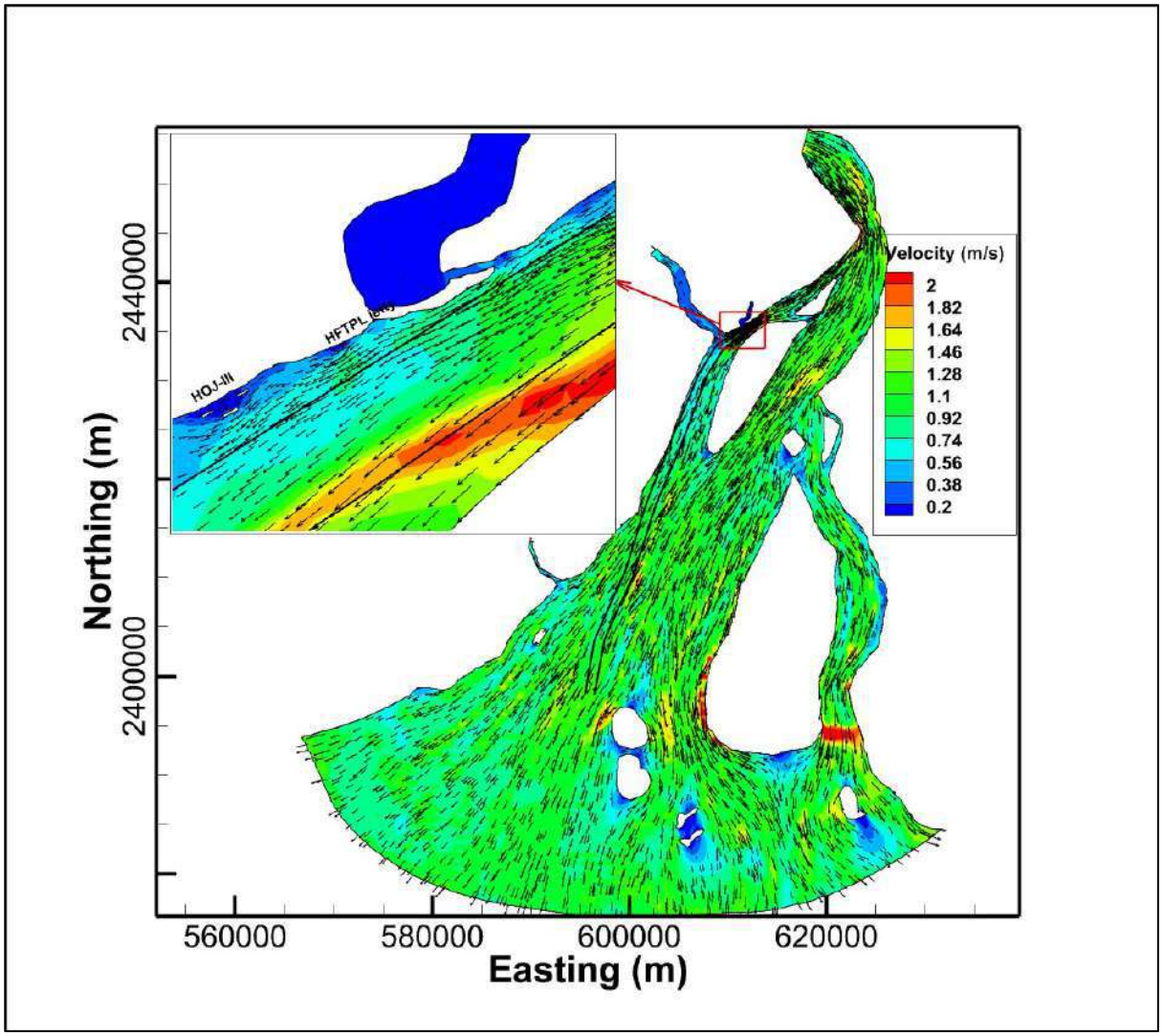


Figure 18 Typical Velocity vectors and contour plots during ebbing at 6.2 hrs in Hooghly estuary at the navigational channels of the HDC (Case-1)

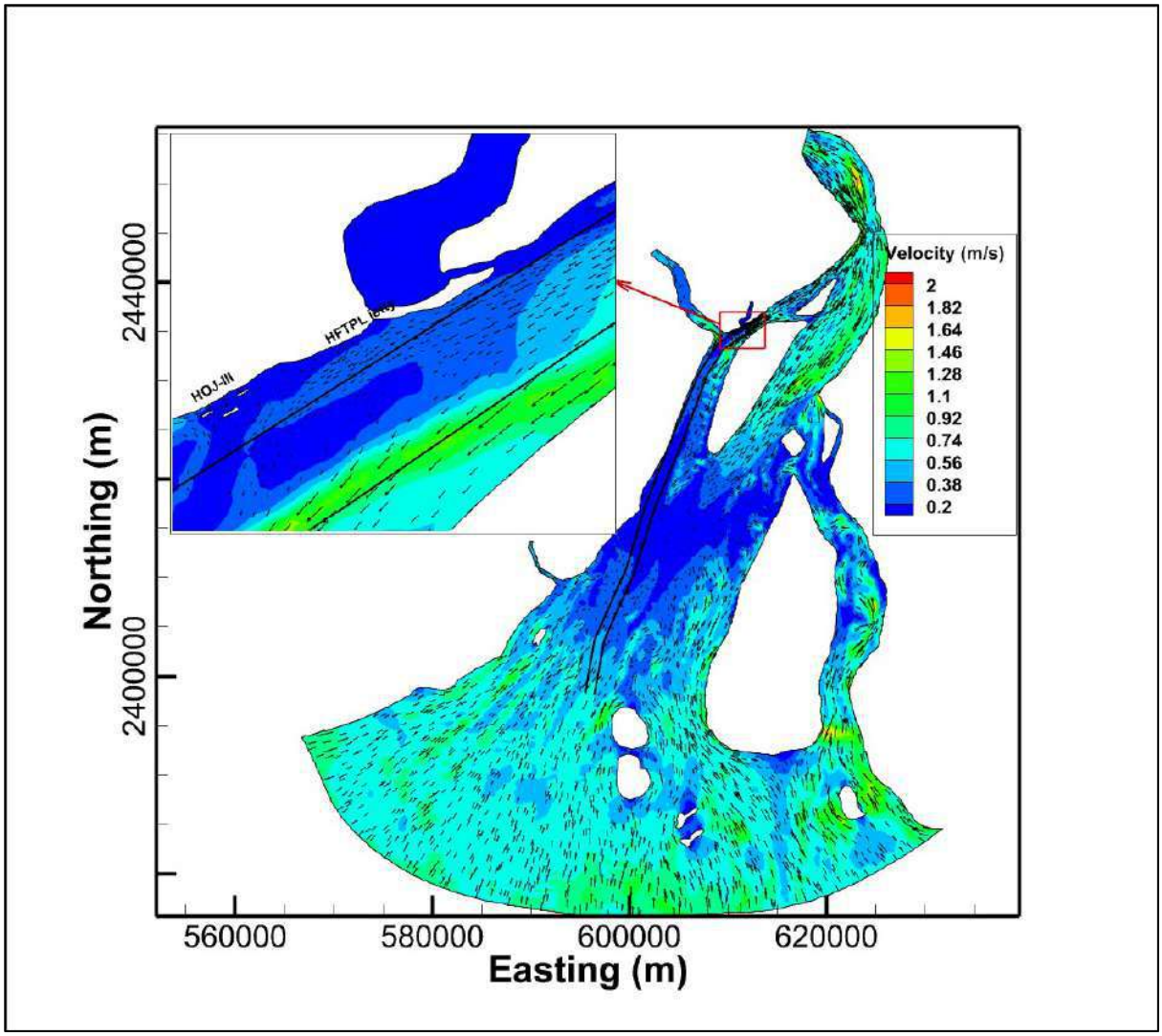


Figure 19 Typical Velocity vectors and contour plots during low tide at 9.3hrs in Hooghly estuary at the navigational channels of the HDC (Case-1)

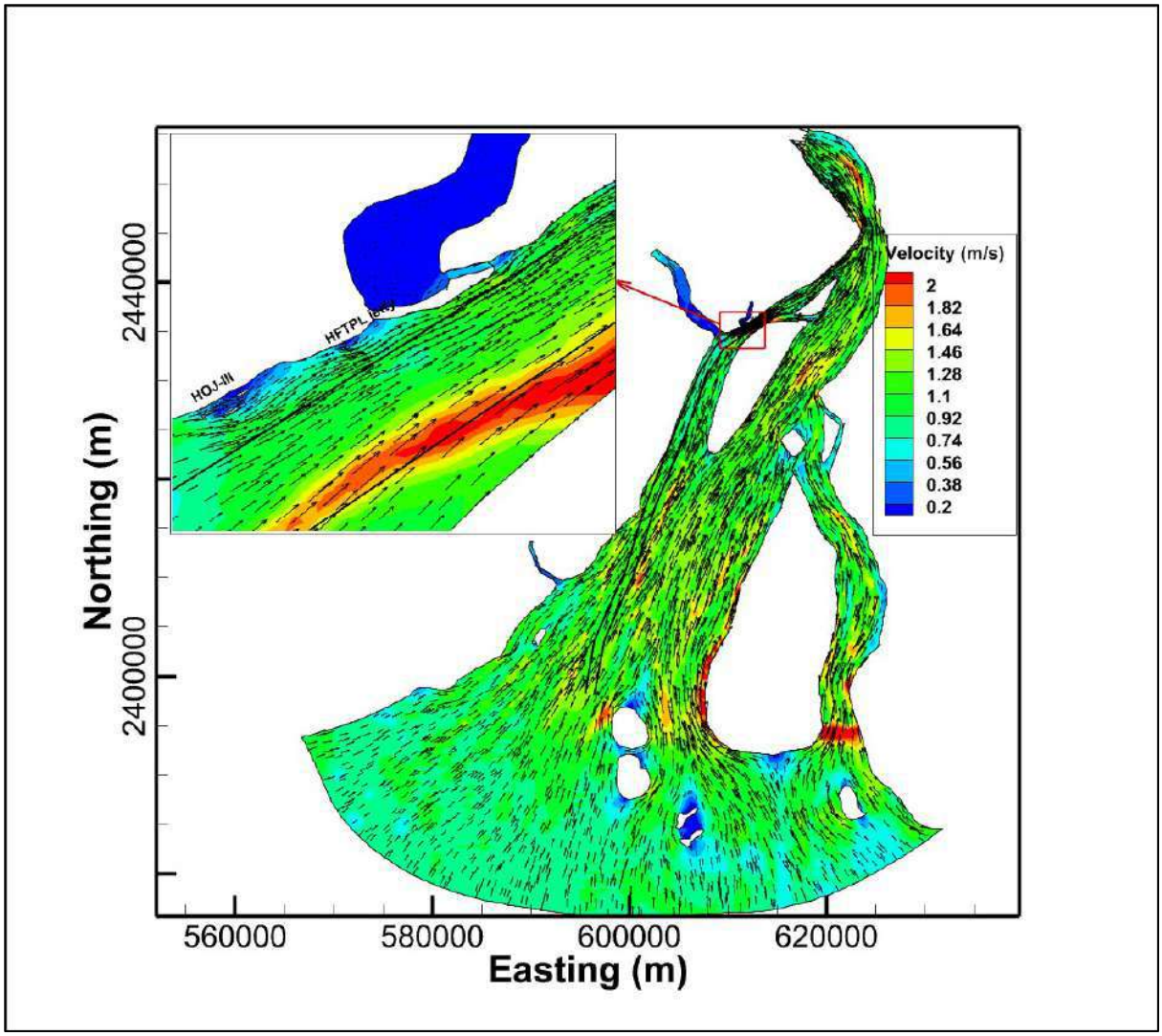


Figure 20 Typical Velocity vectors and contour plots during flooding at 12.4hrs in Hooghly estuary at the navigational channels of the HDC (Case-1)

4.4.3 Hydrodynamic Modelling in HDC channel regions for proposed condition (Case-2)

The current tidal hydrodynamic conditions at the site are characterized primarily by varying flow patterns in various areas of the domain. Typical time instances at which flow patterns have been extracted are shown in **Figure 21**. The starting point is at mean sea level.

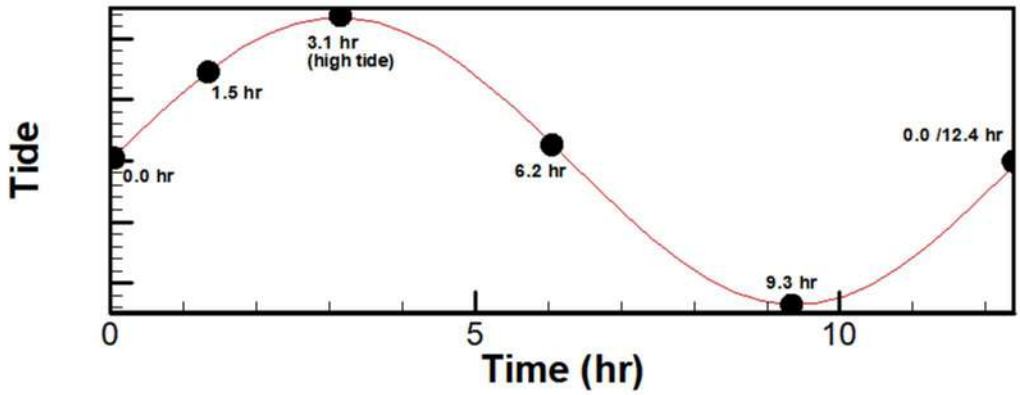


Figure 21 Time of the tide at which the result is plotted

Flooding

The flooding and ebbing phase of the tide is characterized by the flow in the north-south direction. The flow patterns during flooding conditions in navigation channels enroute to the HDC are shown in **Figure 22, 23 and 24**. The figures show a typical flow situation during the rising tide (at about 0 hr.) from which, the magnitudes of current at various locations in the study area can be deduced. With the presence of proposed multipurpose berth outside HDC Lock between HOJ-III and HFTPL jetty, the velocity contours are extracted and projected. With the presence of proposed development, no drastic changes in flow features are observed. The same phenomenon happens in the reversal direction during ebb tide. The flow features appear to be undisturbed much with the presence of proposed development.

During flooding, the direction of flow is towards the estuary from the open ocean. The velocity around the navigation channel region from the Eden channel to HDC has an average current velocity of 0.8-1.4 m/s and a maximum current velocity of 1.8 m/s besides, during the high tide condition the maximum current value in that channel is reduced to average value of 0.2 m/s (**Figure 24**). During high tide, when the domain is devoid of strong currents siltation is expected to take place. In front of the HOJ-III and proposed berth, during flooding, the maximum velocity reaches up to 1.29 m/s with the flow in North-East direction. In the subsequent high tide, reversal of currents takes place and the velocity reduces drastically in the deeper parts.

Ebbing

During the ebbing phase of the tide, which is followed by the occurrence of high tide, the tidal flow starts to retreat towards the open ocean. The flow patterns during the ebbing condition in navigation channels enroute to the HDC are is shown in **Figure 25 and 26**. The figure shows

a typical flow situation during the falling tide (at about 6.2 hr.) from which, the magnitudes of current at various locations in the study area can be deduced.

The average current velocity along the channel is 0.5 m/s and a maximum of 1.4 m/s. The ebbing flow event is followed by the emergence of flooding event shown in **Figure 25**. The current magnitude in the channels during the flooding flow condition is slightly higher when compared to the ebbing flow condition. No major eddies are found to be formed in the study area. During low tide the current magnitude drops drastically to 0.2-0.3 m/s in the channels (**Figure 26**). In front of the HOJ-III and proposed berth, during the ebb tide the flow velocity again picks up pace and reaches the magnitude of about 0.81 m/s in the South-West direction. In low tide these flow current changes direction with the deeper depths devoid of currents.

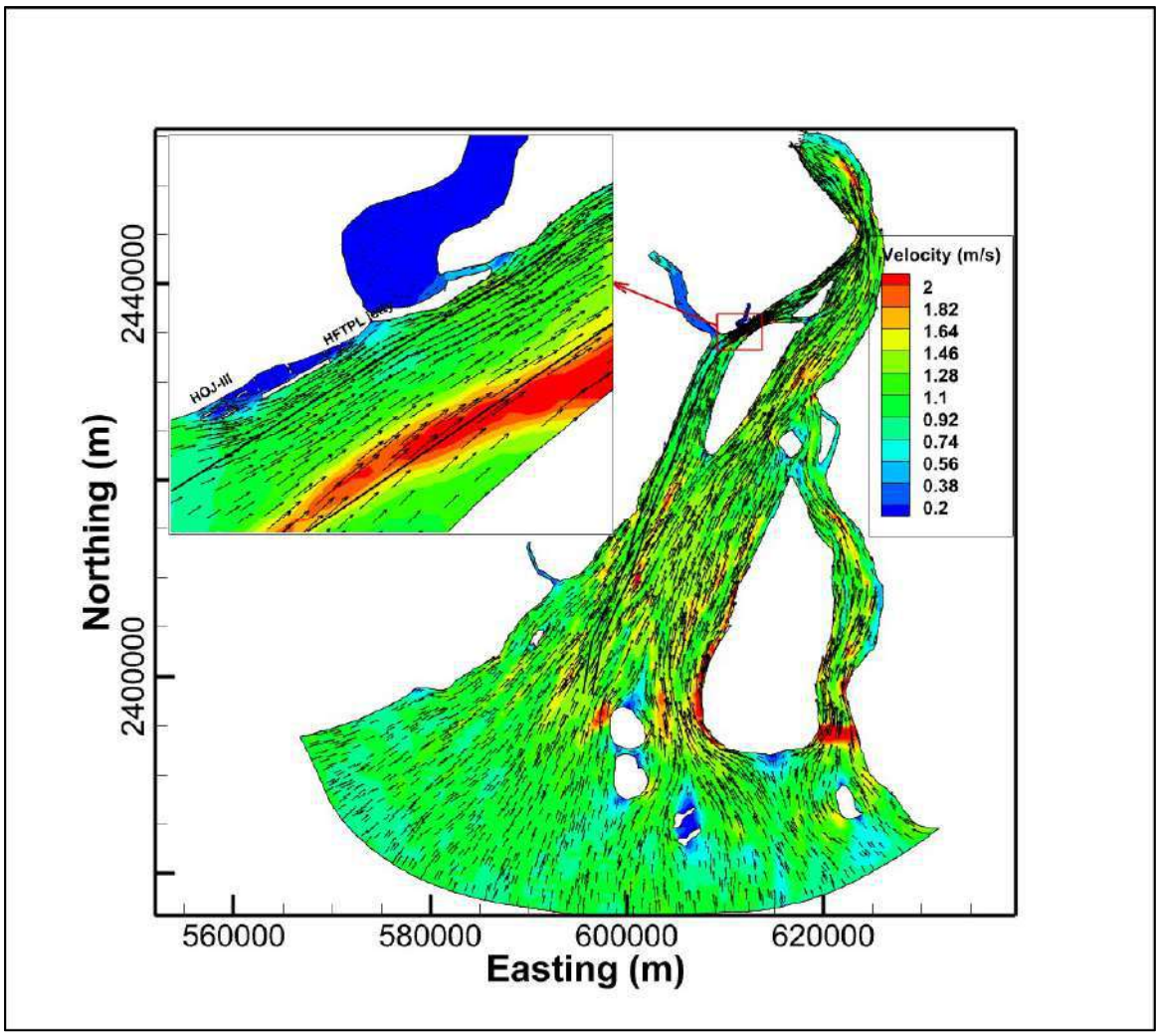


Figure 22 Typical Velocity vectors and contour plots during flooding phase of the tide at 0.0hrs in Hooghly estuary at the navigational channels of the HDC with proposed berth (Case-2)

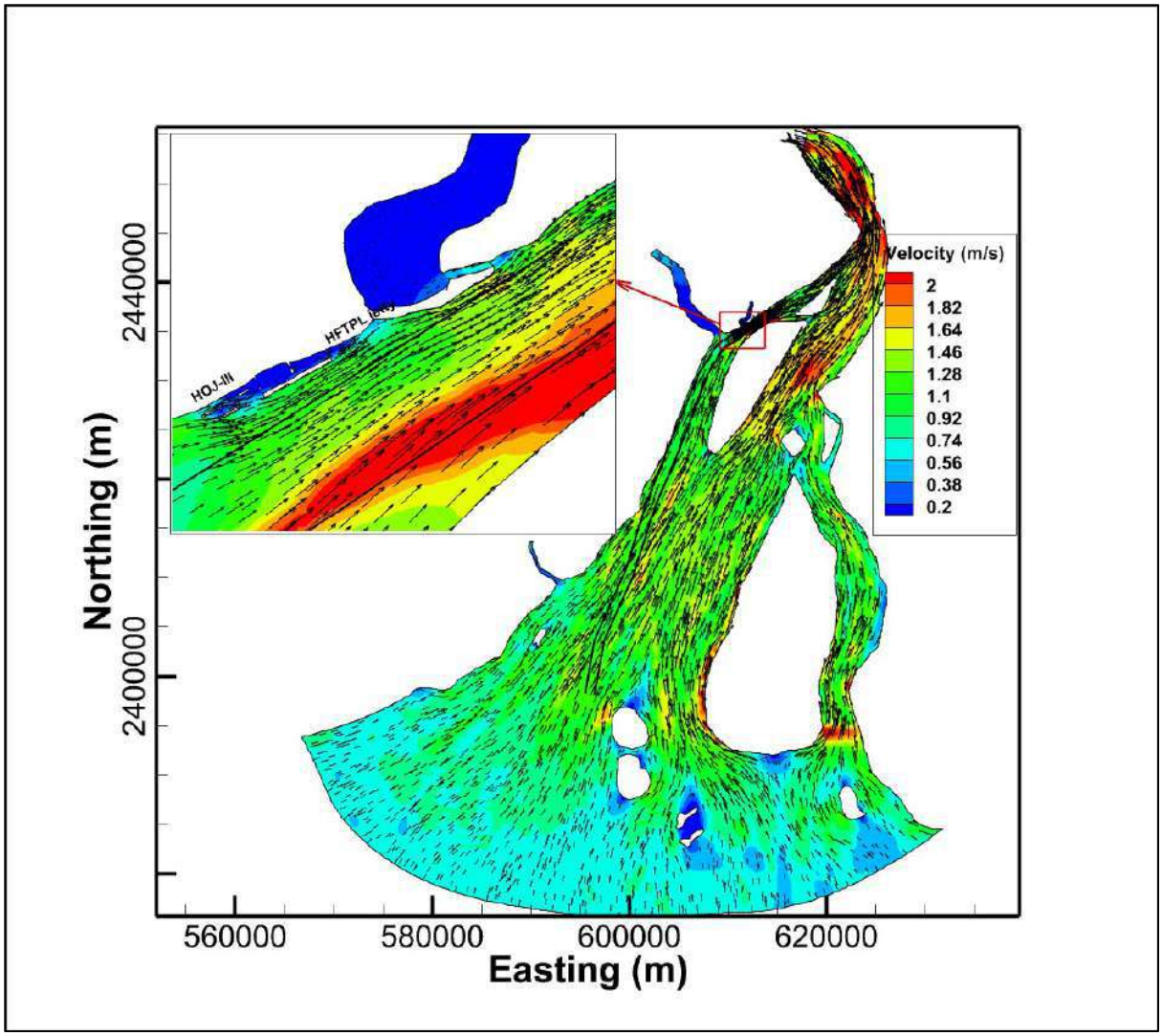


Figure 23 Typical Velocity vectors and contour plots during flooding phase of the tide at 1.5hrs in Hooghly estuary at the navigational channels of the HDC with proposed berth (Case-2)

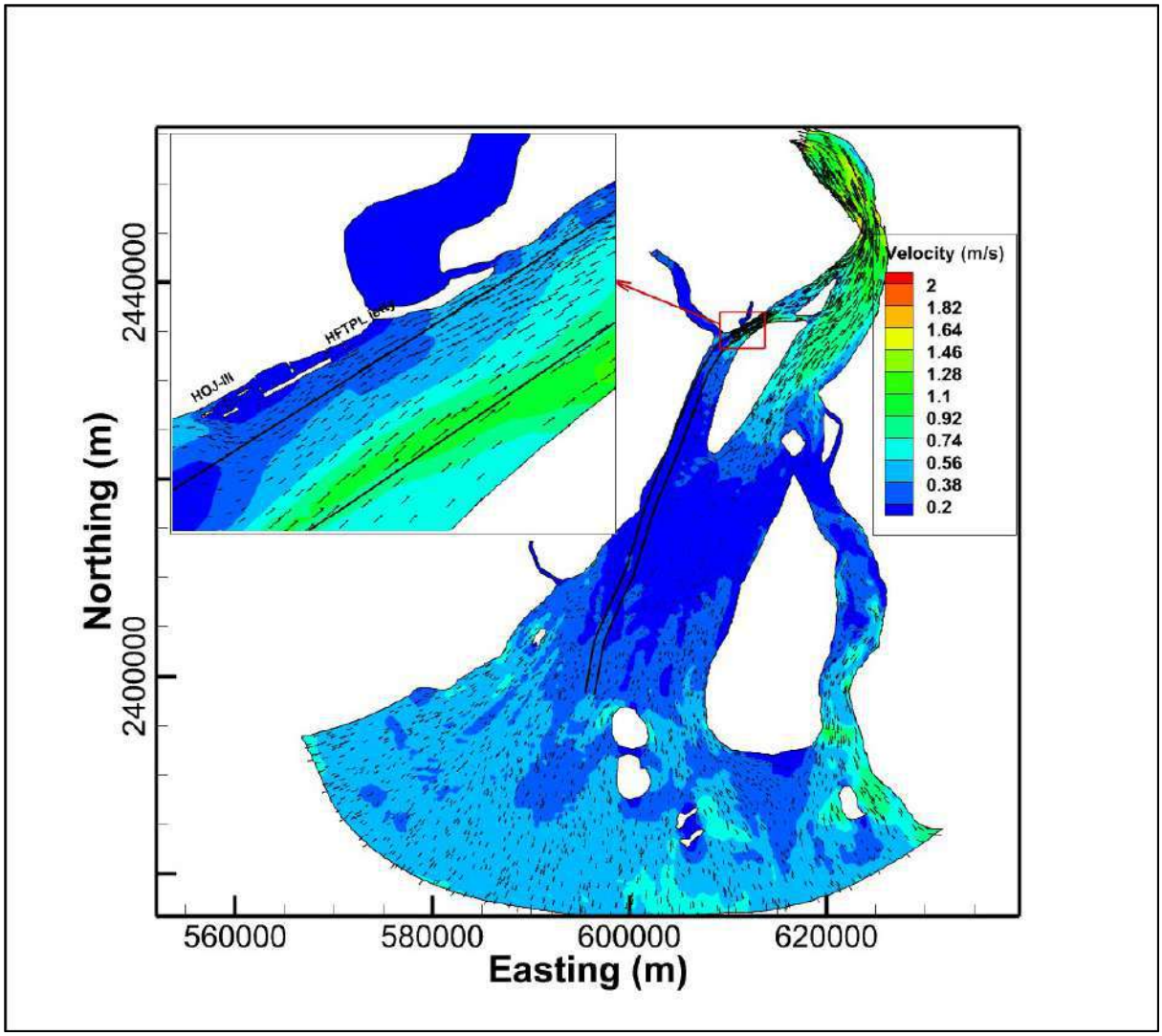


Figure 24 Typical Velocity vectors and contour plots during high tide at 3.1hrs in Hooghly estuary at the navigational channels of the HDC with proposed berth (Case-2)

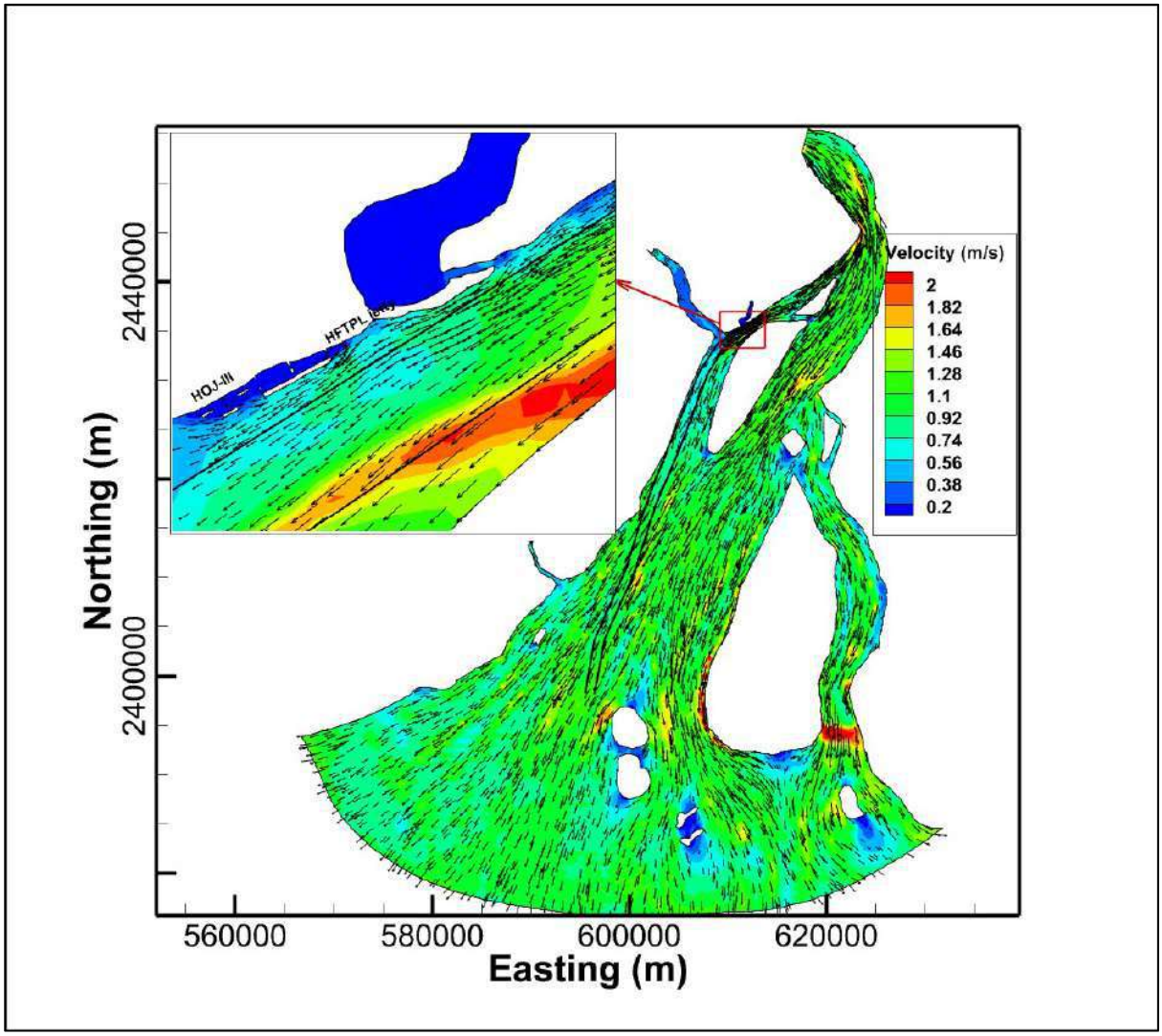


Figure 25 Typical Velocity vectors and contour plots during ebbing at 6.2 hrs in Hooghly estuary at the navigational channels of the HDC with proposed berth (Case-2)

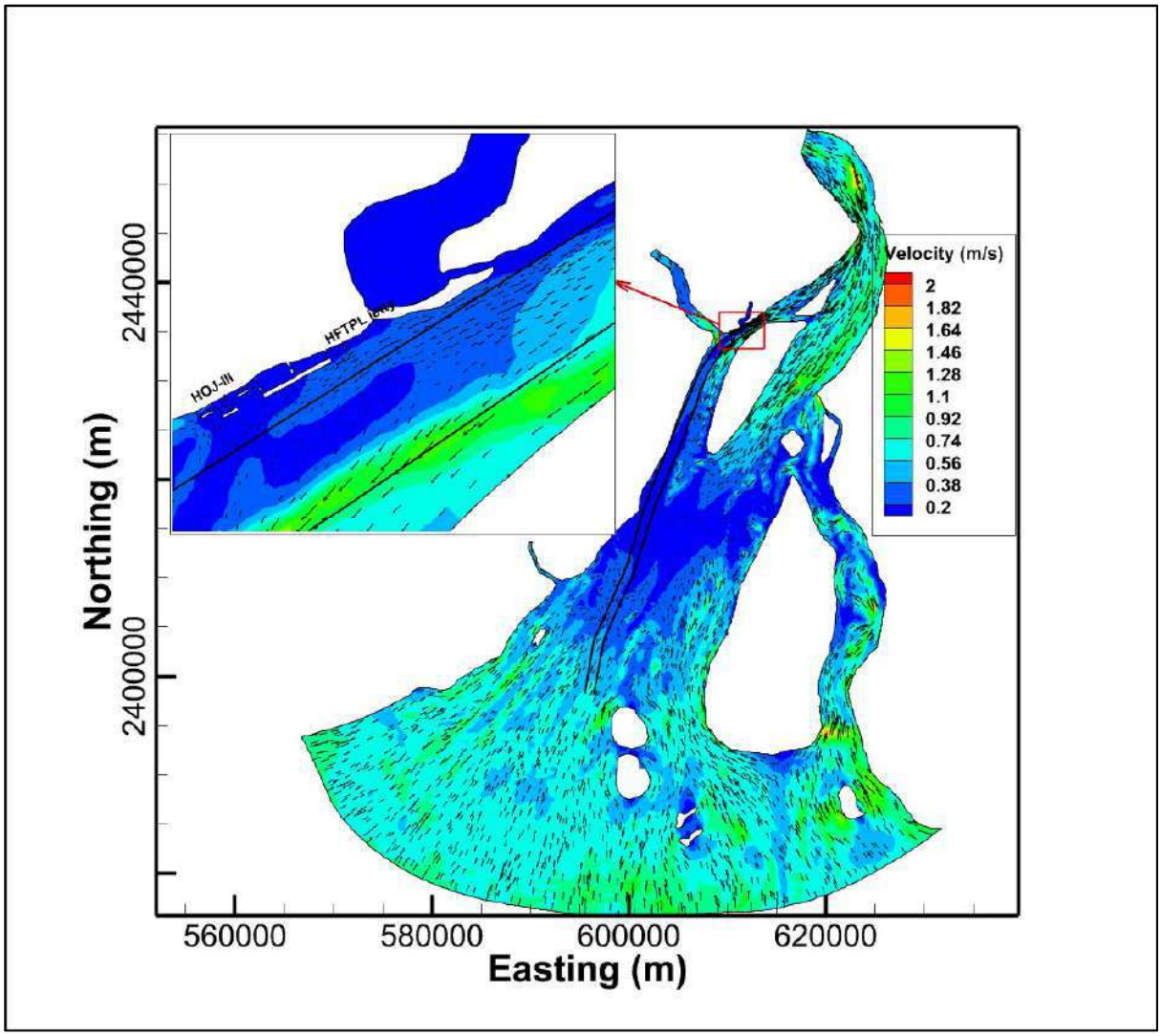


Figure 26 Typical Velocity vectors and contour plots during low tide at 9.3hrs in Hooghly estuary at the navigational channels of the HDC with proposed berth (Case-2)

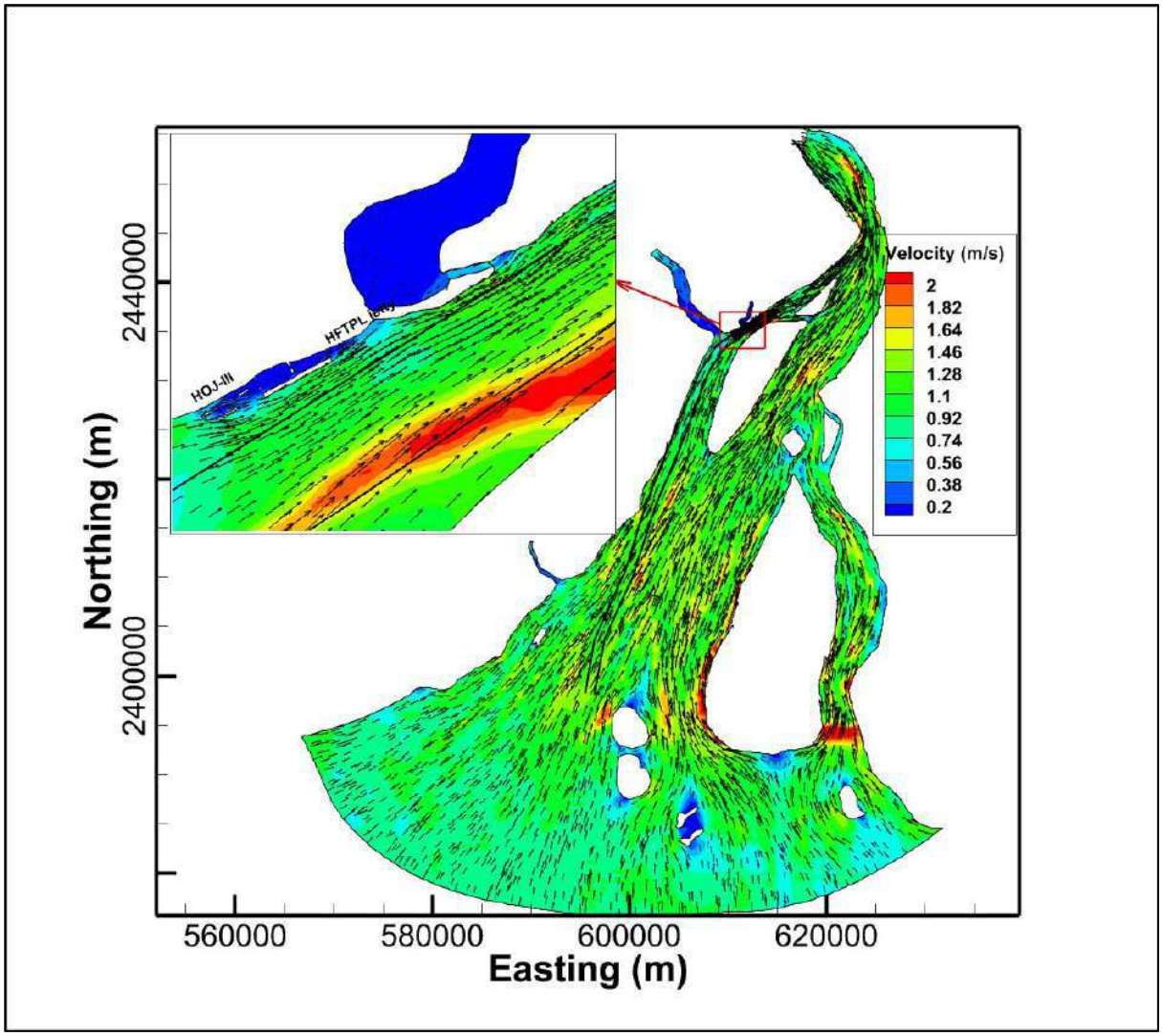


Figure 27 Typical Velocity vectors and contour plots during flooding at 12.4hrs in Hooghly estuary at the navigational channels of the HDC with proposed berth (Case-2)

4.4.4 Hydrodynamic Modelling in HDC channel regions for proposed condition (Case-3)

The current tidal hydrodynamic conditions at the site are characterized primarily by varying flow patterns in various areas of the domain. Typical time instances at which flow patterns have been extracted are shown in **Figure 28**. The starting point is at mean sea level.

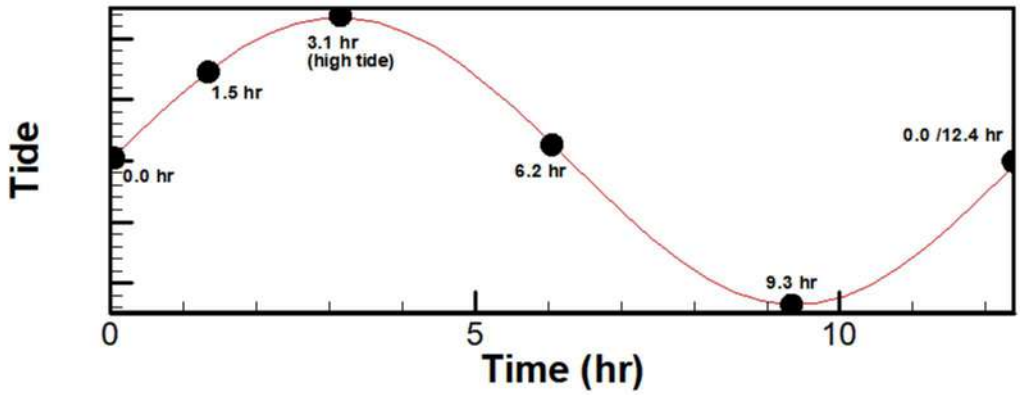


Figure 28 Time of the tide at which the result is plotted

Flooding

The flooding and ebbing phase of the tide is characterized by the flow in the north-south direction. The flow patterns during flooding conditions in navigation channels enroute to the HDC are shown in **Figure 29, 30 and 31**. The figures show a typical flow situation during the rising tide (at about 0 hr.) from which, the magnitudes of current at various locations in the study area can be deduced. With the presence of proposed multipurpose berth outside HDC Lock between HOJ-III and HFTPL jetty, the velocity contours are extracted and projected. With the presence of proposed development, no drastic changes in flow features are observed. The same phenomenon happens in the reversal direction during ebb tide. The flow features appear to be undisturbed much with the presence of proposed development.

During flooding, the direction of flow is towards the estuary from the open ocean. The velocity around the navigation channel region from the Eden channel to HDC has an average current velocity of 0.8-1.4 m/s and a maximum current velocity of 1.8 m/s besides, during the high tide condition the maximum current value in that channel is reduced to average value of 0.2 m/s (**Figure 31**). During high tide, when the domain is devoid of strong currents siltation is expected to take place. In front of the HOJ-III and proposed berth, during flooding, the maximum velocity reaches up to 1.29 m/s with the flow in North-East direction. In the subsequent high tide, reversal of currents takes place and the velocity reduces drastically in the deeper parts.

Ebbing

During the ebbing phase of the tide, which is followed by the occurrence of high tide, the tidal flow starts to retreat towards the open ocean. The flow patterns during the ebbing condition in navigation channels enroute to the HDC are is shown in **Figure 32 and 33**. The figure shows

a typical flow situation during the falling tide (at about 6.2 hr.) from which, the magnitudes of current at various locations in the study area can be deduced.

The average current velocity along the channel is 0.5 m/s and a maximum of 1.4 m/s. The ebbing flow event is followed by the emergence of flooding event shown in **Figure 32**. The current magnitude in the channels during the flooding flow condition is slightly higher when compared to the ebbing flow condition. No major eddies are found to be formed in the study area. During low tide the current magnitude drops drastically to 0.2-0.3 m/s in the channels (**Figure 33**). In front of the HOJ-III and proposed berth, during the ebb tide the flow velocity again picks up pace and reaches the magnitude of about 0.81 m/s in the South-West direction. In low tide these flow current changes direction with the deeper depths devoid of currents.

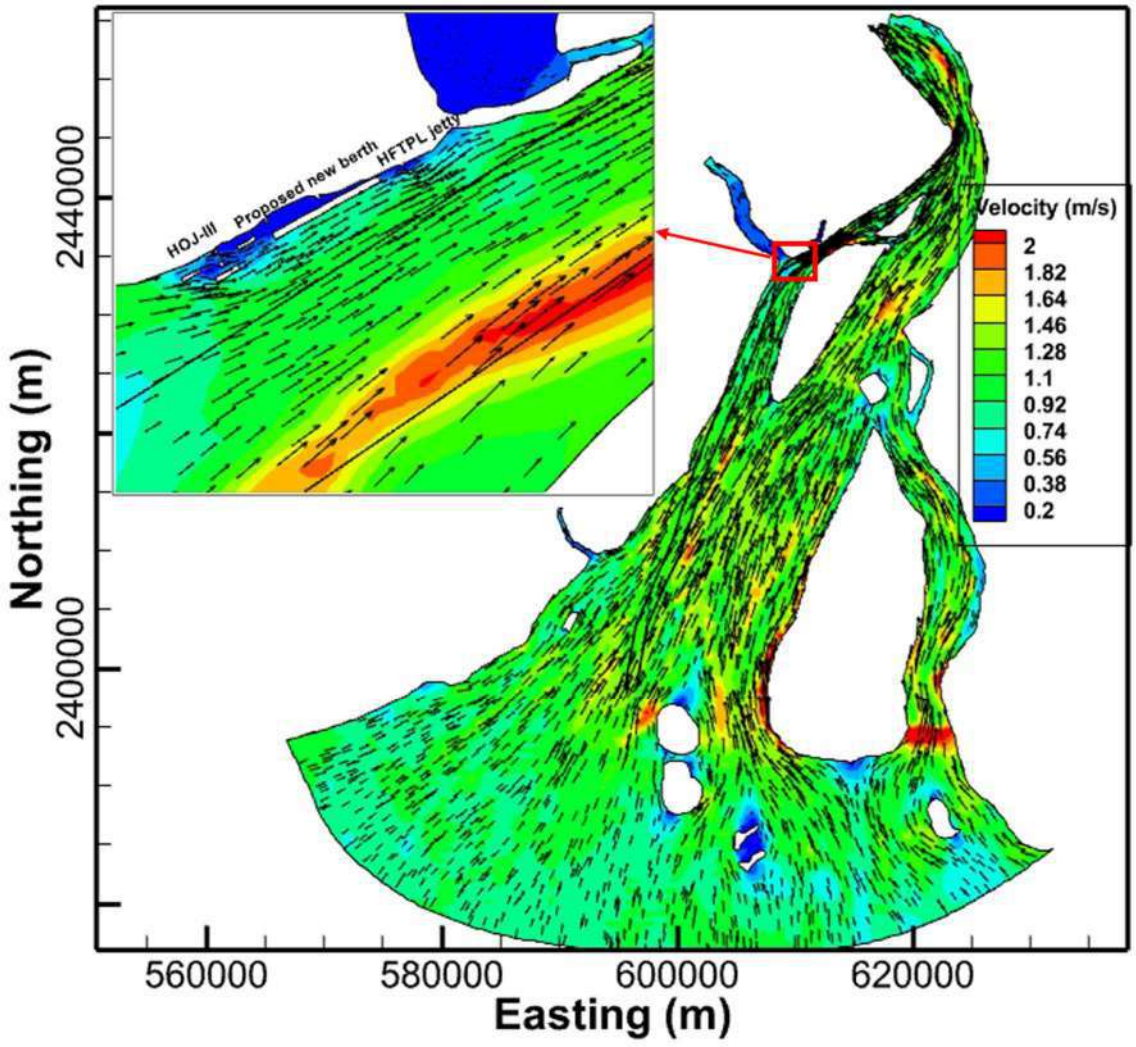


Figure 29 Typical Velocity vectors and contour plots during flooding phase of the tide at 0.0hrs in Hooghly estuary at the navigational channels of the HDC with proposed berth (Case-3)

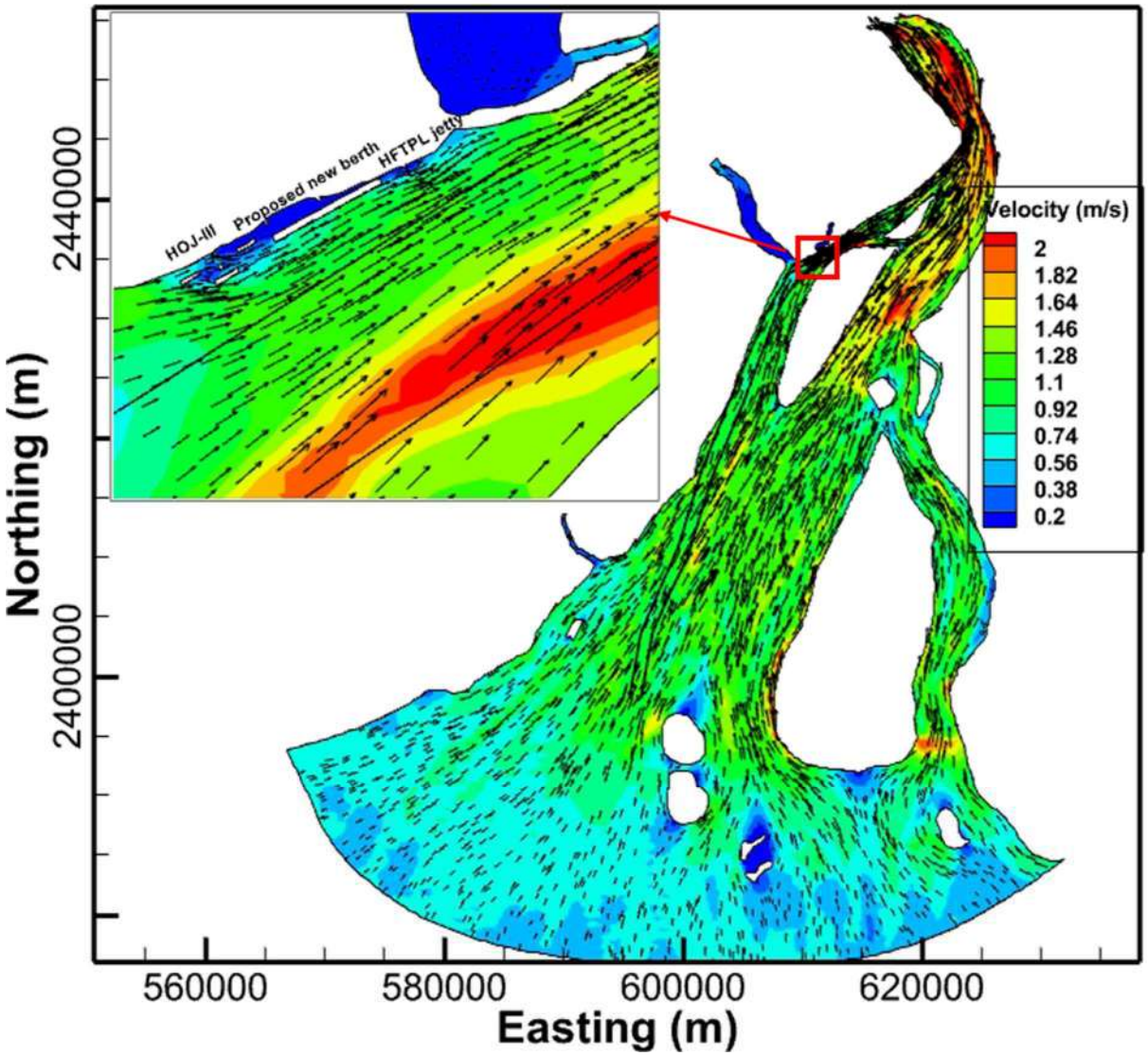


Figure 30 Typical Velocity vectors and contour plots during flooding phase of the tide at 1.5hrs in Hooghly estuary at the navigational channels of the HDC with proposed berth (Case-3)

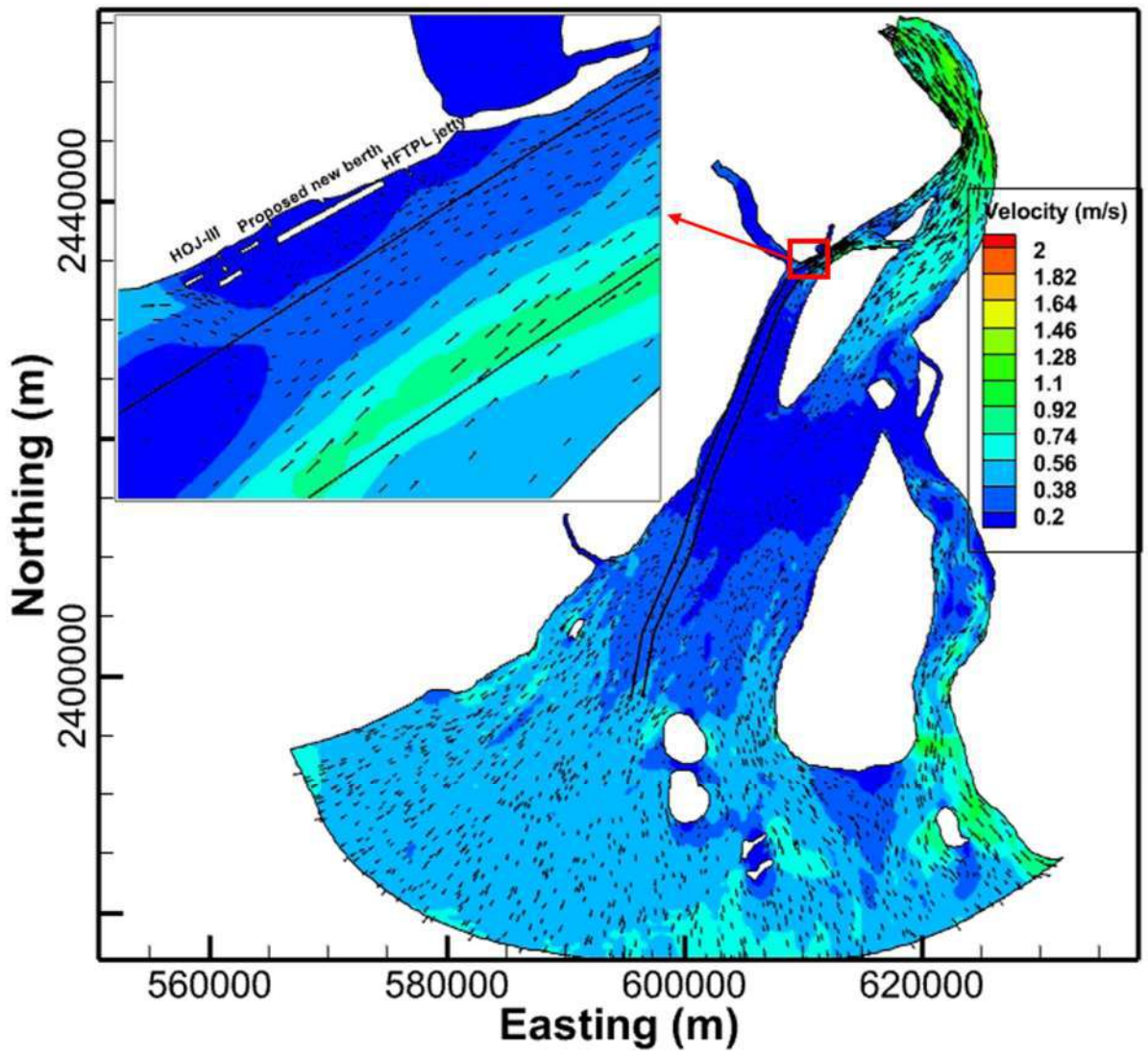


Figure 31 Typical Velocity vectors and contour plots during high tide at 3.1hrs in Hooghly estuary at the navigational channels of the HDC with proposed berth (Case-3)

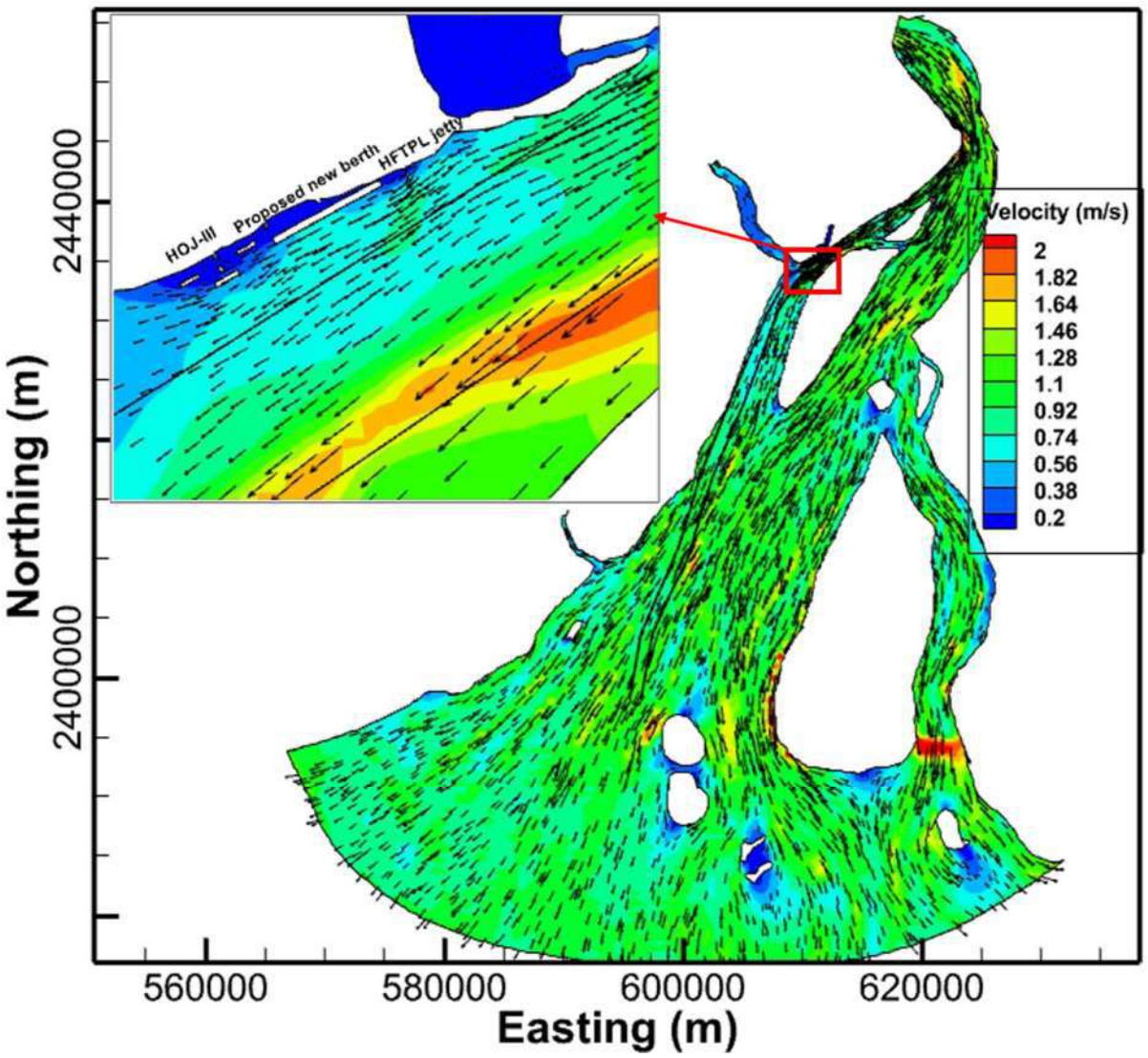


Figure 32 Typical Velocity vectors and contour plots during ebbing at 6.2 hrs in Hooghly estuary at the navigational channels of the HDC with proposed berth (Case-3)

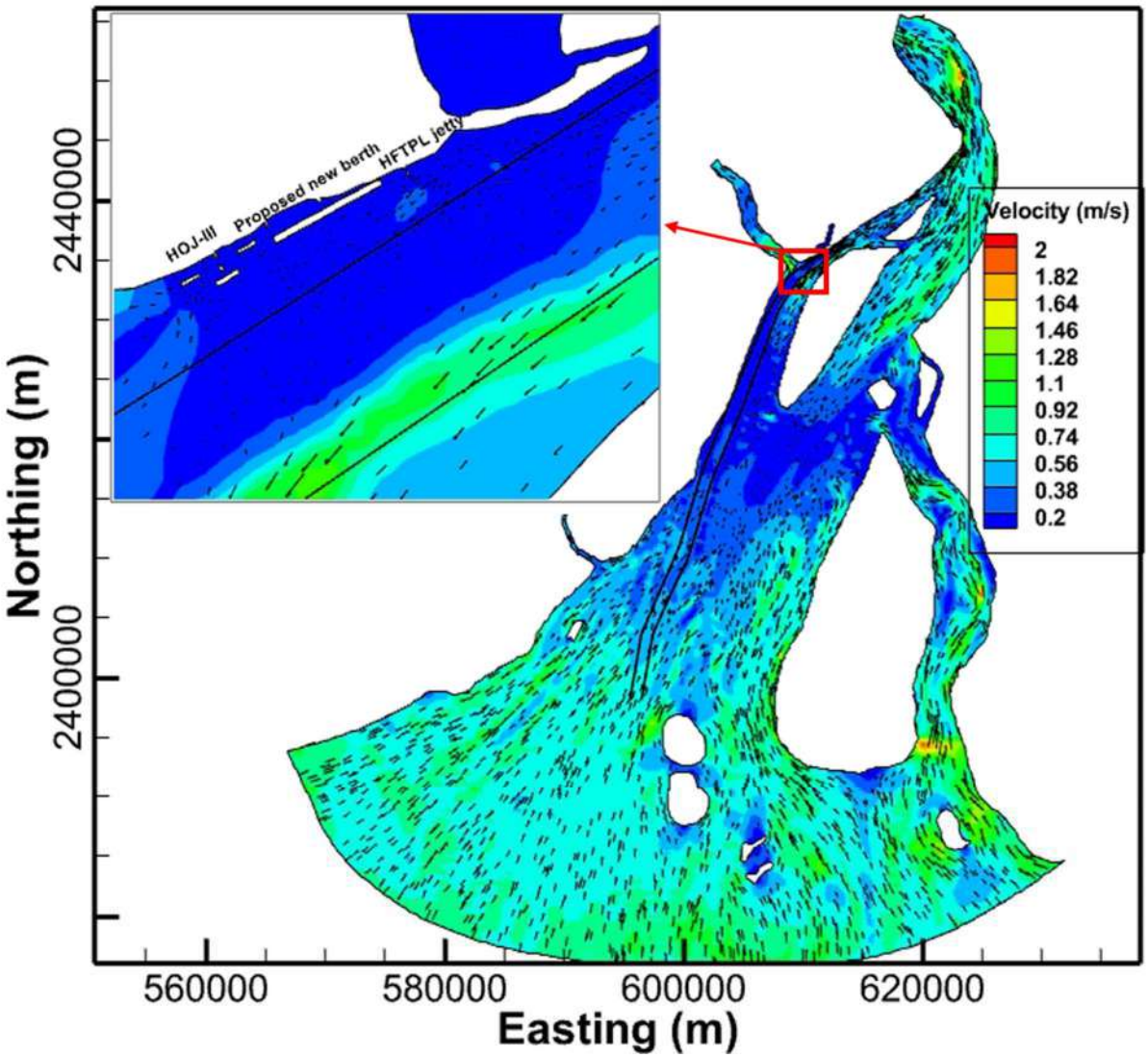


Figure 33 Typical Velocity vectors and contour plots during low tide at 9.3hrs in Hooghly estuary at the navigational channels of the HDC with proposed berth (Case-3)

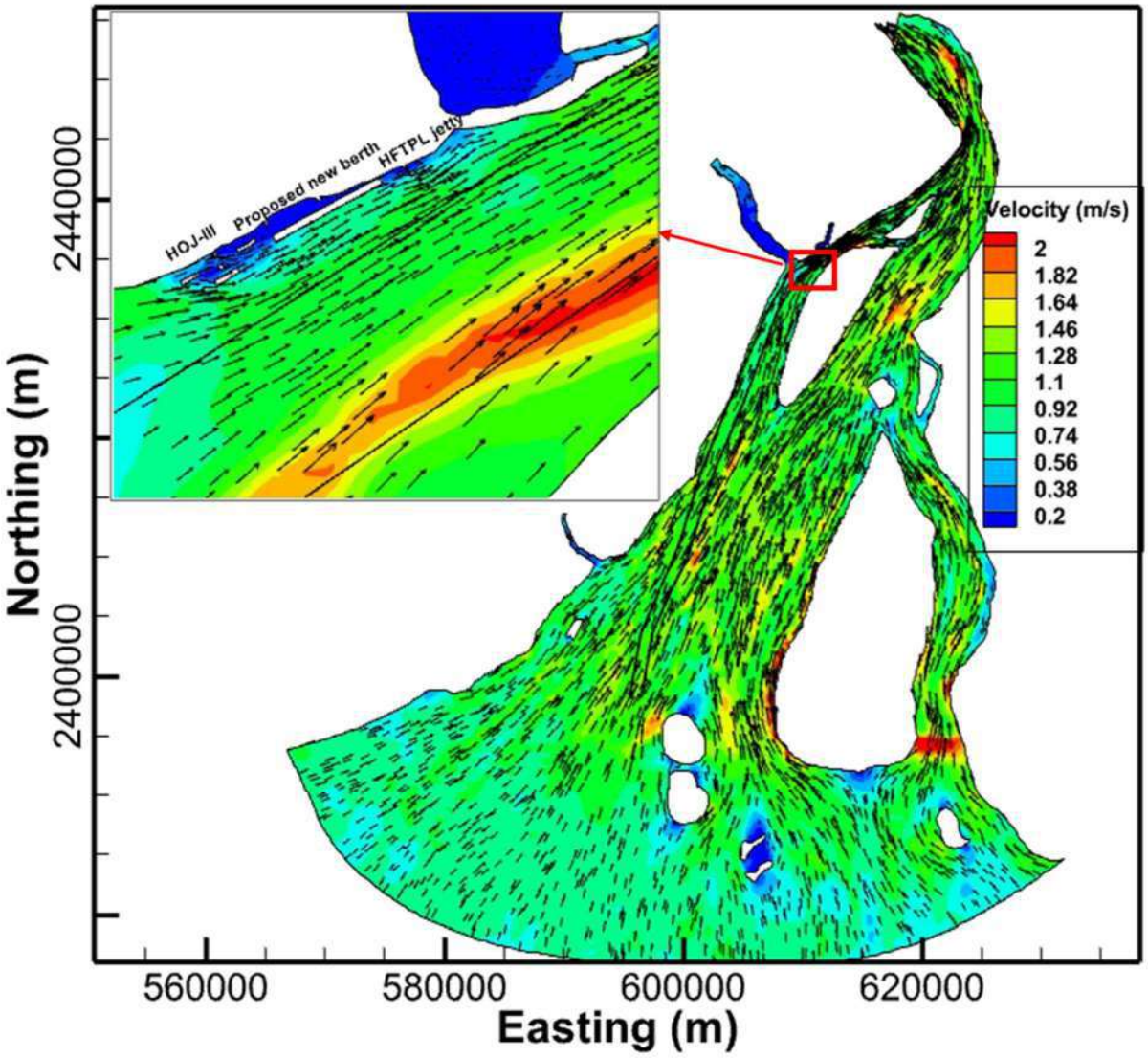


Figure 34 Typical Velocity vectors and contour plots during flooding at 12.4hrs in Hooghly estuary at the navigational channels of the HDC with proposed berth (Case-3)

4.4.5 Comparison of currents and its characteristics

Analysis of current patterns in various locations reveals variations in both direction and magnitude, particularly in the study area compared to nearby open sea regions. Notably, in Location A, currents exhibit multidirectional flow, with a pronounced emphasis on the South-East and South-West directions. However, under the proposed conditions, for Case- 2 there is a significant shift in the predominant flow direction towards the North-West, alongside

sustained flow towards the South-East where as in Case- 3 flow exhibits notable movement in all directions, with a more prominent north-westward current. Due to the proposed development for both Case- 2 and Case- 3, there are distinct directional alterations at Location B, particularly evident behind the proposed jetty to the south, where velocity diminishes and directional characteristics undergo slight adjustments. Moreover, in Location D, the proposed condition particularly Case- 2 result in a noteworthy decrease in current velocity from 0.8 m/s to 0.2 m/s. Similarly, in Location E, the proposed structure alignment in Case- 2 lead to a substantial reduction in velocity by 0.2 m/s from the existing 0.8 m/s, while directional features remain largely unchanged. In Case- 3, at locations D and E, the proposed structure alignment results in a significant reduction in current velocity, decreasing from 0.8 m/s to 0.2 m/s. Additionally, the flow direction exhibits changes compared to Cases 1 and 2, with noticeable flow now primarily occurring in the North-East direction.

At Locations C and H, particularly in front of HOJ-III and the floating jetty, a slight variation in current direction is observed due to the proposed jetty, as seen in Case- 2. However, in Case- 3, no significant changes in either the direction or velocity of the current are noted. For Locations F, G, J, K, L, and I the presence of the proposed jetty does not induce significant alterations in either current direction or magnitude, mirroring a consistent pattern observed across other locations within the area of interest. This uniformity is depicted in current rose diagrams plotted for twelve distinct locations (**Figure 35**), representing both existing (Case- 1) and proposed conditions (Case- 2 and Case- 3) in **Figure 36**-**Figure 39**. Detailed location information is provided in **Table 2**, while current characteristics for both scenarios are outlined in **Table 3**.

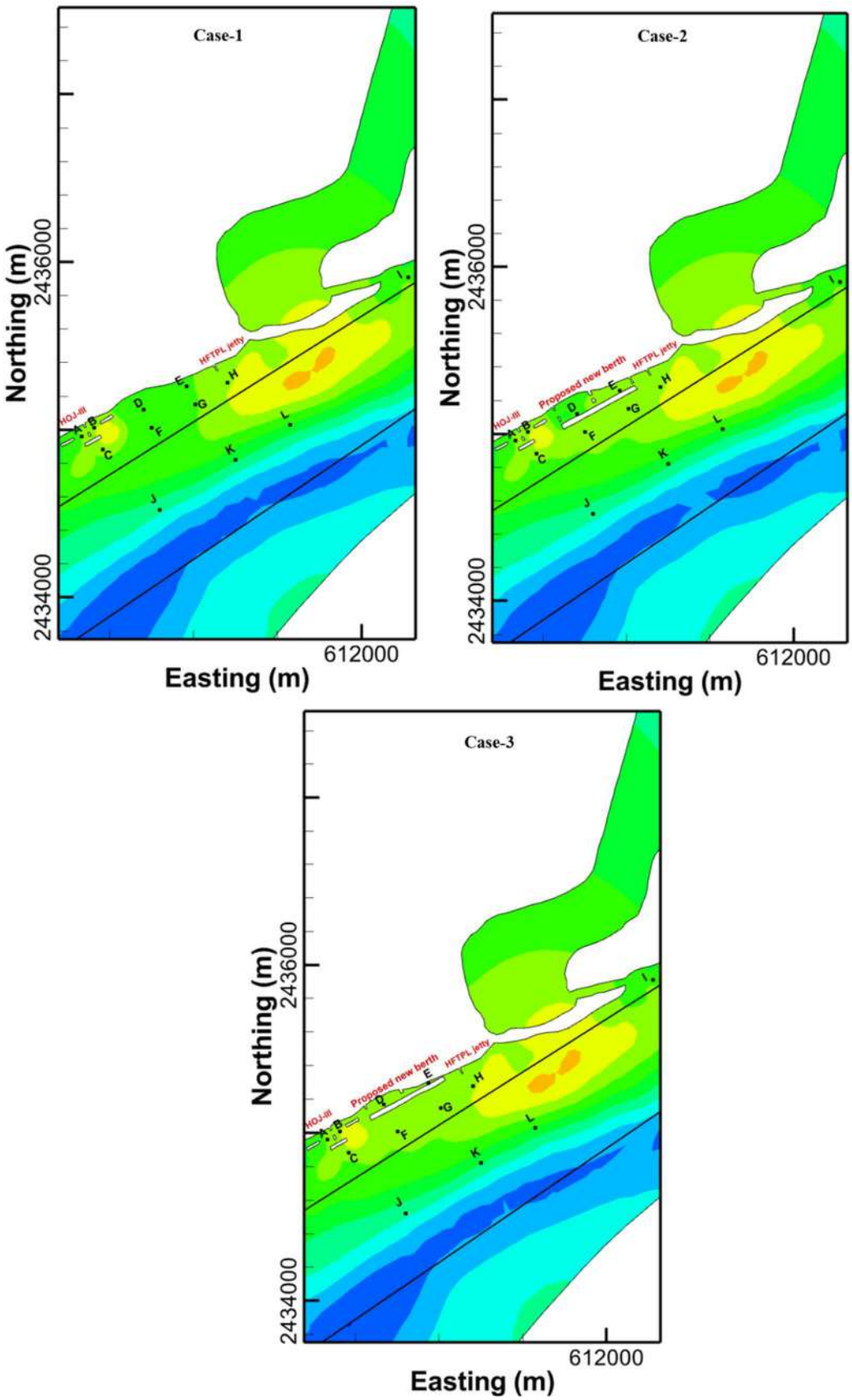


Figure 35 Current rose diagrams location for Case 1, Case 2 and Case- 3 conditions

Table 2 Detailed location information

Area demarcated in the domain	Location
Location A	South of Oil Jetty III
Location B	North of Oil Jetty III
Location C	In front of Oil Jetty III
Location D	Behind proposed jetty (South)
Location E	Behind proposed jetty (North)
Location F	In front of proposed jetty (South)
Location G	In front of proposed jetty (North)
Location H	In front of floating jetty
Location I	In front of Haldia lock entrance
Location J	Middle of navigational channel
Location K	Middle of navigational channel
Location L	Middle of navigational channel

Table 3 Location and its Current characteristics

Location	Current characteristics		
	Case-1	Case-2	Case-3
Location A	There is notable flow in all directions among which flow towards South-East and South-West are more significant with the 0.05-0.4 m/s velocity.	The direction of the current towards North-West is more significant with the maximum velocity of 0.05-0 2 m/s. Also there is notable flow in the South-East direction with the 0.05-0.4 m/s velocity.	The flow exhibits notable movement in all directions, with a more prominent north-westward current reaching velocities between 0.05 and 0.2 m/s. Similarly, significant flow is observed in the south-east direction, where velocities range from 0.05 to 0.4 m/s.
Location B	The flow direction towards North-East is more significant with maximum velocity of 0.4 m/s and there is notable flow in the	The direction of the current towards North-West is more significant with the maximum velocity of 0 2 m/s. In addition, there is notable	There is notable flow in North-West and North-East direction with the 0.05-0.4 m/s velocity.

	South-West direction with the 0.05-0.2 m/s velocity.	flow in the North-East direction with the 0.05-0.4 m/s velocity.	
Location C	The flow direction towards South-West is more significant with maximum velocity of 0.8 m/s and there is notable flow in the North-East direction with the 0.05-1 m/s velocity.	The flow direction towards North-East is more significant with maximum velocity of 0.6 m/s and there is notable flow in the South-West direction with the 0.05-0.6 m/s velocity.	Significant flow is observed in the north-west and north-east directions, with velocities ranging from 0.05 to 0.4 m/s. Additionally, there is considerable flow in the south-west direction with velocities between 0.05 and 0.6 m/s, while the north-east direction also experiences notable flow, reaching velocities of 0.1 to 1 m/s.
Location D	The direction of the current towards North-East is more significant with maximum velocity of 0.8 m/s and there is notable flow in the South-West direction with the 0.05-0.6 m/s velocity.	Due to the proposed structure there is a considerable reduction in the current velocity with a magnitude of 0.2 m/s with slight change in directional features when compared with the existing condition	The proposed structure results in a significant reduction in current velocity, with a decrease of approximately 0.2 m/s, along with minor changes in directional patterns when compared to Cases 1 and 2.
Location E	The flow direction towards South-West is more significant with maximum velocity of 0.6 m/s and there is notable flow in the North-East direction with the 0.05-1 m/s velocity.	Due to the proposed structure there is a considerable reduction in the current velocity with a magnitude of 0.2 m/s with no considerable change in directional features when compared with the existing condition	The introduction of the proposed structure leads to a notable reduction in current velocity by approximately 0.2 m/s, accompanied by slight alterations in directional flow patterns when compared to Cases 1 and 2.
Location F	The direction of the current towards North-East is more significant with maximum velocity of 1.2 m/s and there is notable flow in the South-West direction with the 0.05-0.8 m/s velocity.	In front of proposed development there is no drastic change in current velocity and direction. The flow direction towards South-West is more significant with maximum velocity of 0.8 m/s and there is notable flow in the North-East direction with the 0.05-1.2 m/s velocity.	In front of the proposed development, there is no significant change in current velocity or flow direction. The south-westward flow exhibits a velocity of 0.8 m/s, while the north-eastward flow shows notable activity with velocities ranging from 0.05 to 1.2 m/s.

Location G	The direction of the current towards South-West is more significant with maximum velocity of 0.8 m/s and there is notable flow in the North-East direction with the 0.05-1.2 m/s velocity.	The flow direction towards North-East and South-West is more significant with maximum velocity of 1.2 m/s	The flow in the north-east and south-west directions is particularly prominent, reaching a maximum velocity of 1.2 m/s.
Location H	The direction of the current towards South-West is more significant with maximum velocity of 0.8 m/s and there is notable flow in the North-East direction with the 0.05-1.2 m/s velocity.	The direction of the current towards South-West is more significant with maximum velocity of 0.8 m/s and there is notable flow in the North-East direction with the 0.05-1.2 m/s velocity.	The south-westward current is more pronounced, with a maximum velocity of 0.8 m/s, while the north-eastward flow is also notable, exhibiting velocities in the range of 0.05 to 1.2 m/s.
Location I	The flow direction towards North-East and South-West is more significant with maximum velocity of 1.2 m/s	The flow direction towards North-East and South-West is more significant with maximum velocity of 1.2 m/s	The flow in the north-east and south-west directions is particularly prominent, with velocities reaching up to 1.2 m/s.
Location J	The flow direction towards North-East and South-West is more significant with maximum velocity of 1.4 m/s	The flow direction towards North-East and South-West is more significant with maximum velocity of 1.4 m/s	The flow in the north-east and south-west directions is more prominent, with velocities reaching a maximum of 1.4 m/s.
Location K	The flow direction towards North-East and South-West is more significant with maximum velocity of 1.6 m/s	The flow direction towards North-East and South-West is more significant with maximum velocity of 1.6 m/s	The flow in the north-east and south-west directions is particularly pronounced, with velocities reaching a maximum of 1.6 m/s.
Location L	The flow direction towards North-East and South-West is more significant with maximum velocity of 1.6 m/s	The flow direction towards North-East and South-West is more significant with maximum velocity of 1.6 m/s	The flow in the north-east and south-west directions is particularly dominant, with peak velocities reaching 1.6 m/s.

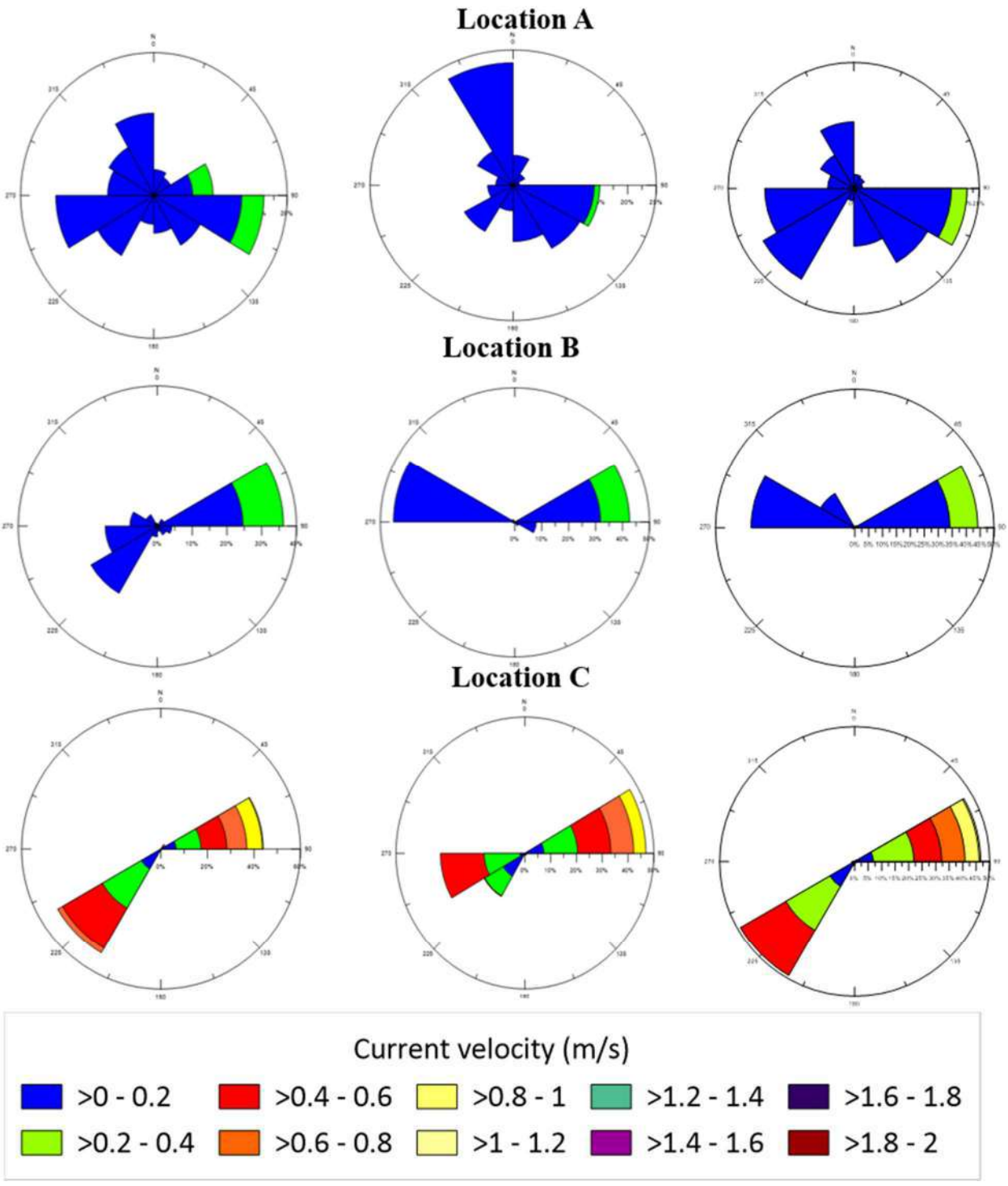


Figure 36 Current Rose plots at locations A to C in the vicinity of HOJ-III for existing (first column) and proposed conditions Case-2 and Case-3 (second and third column respectively)

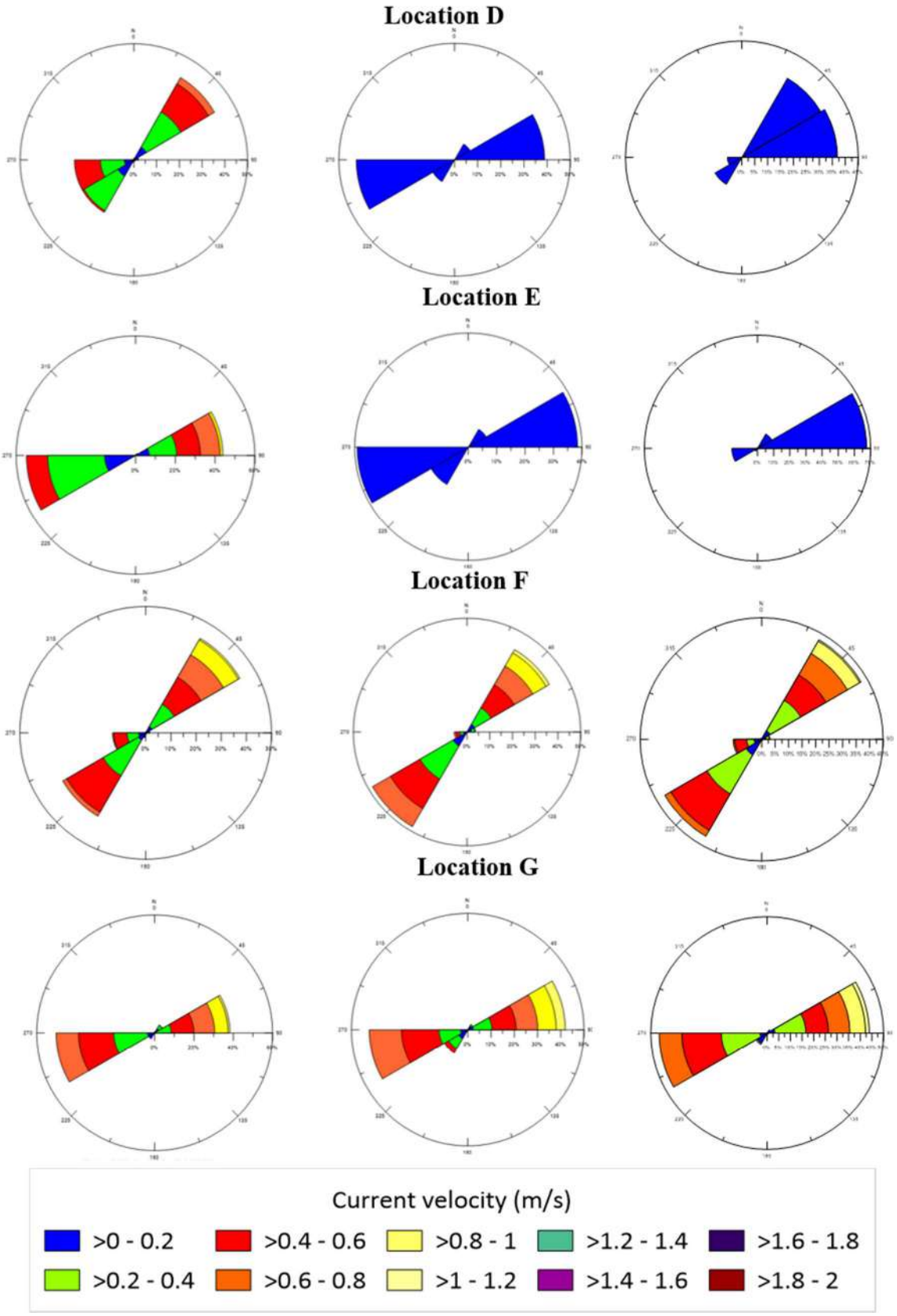


Figure 37 Current Rose plots at locations D to G in the vicinity of the proposed berth area for existing (first column) and proposed Case-2 and Case-3 (second and third column respectively)

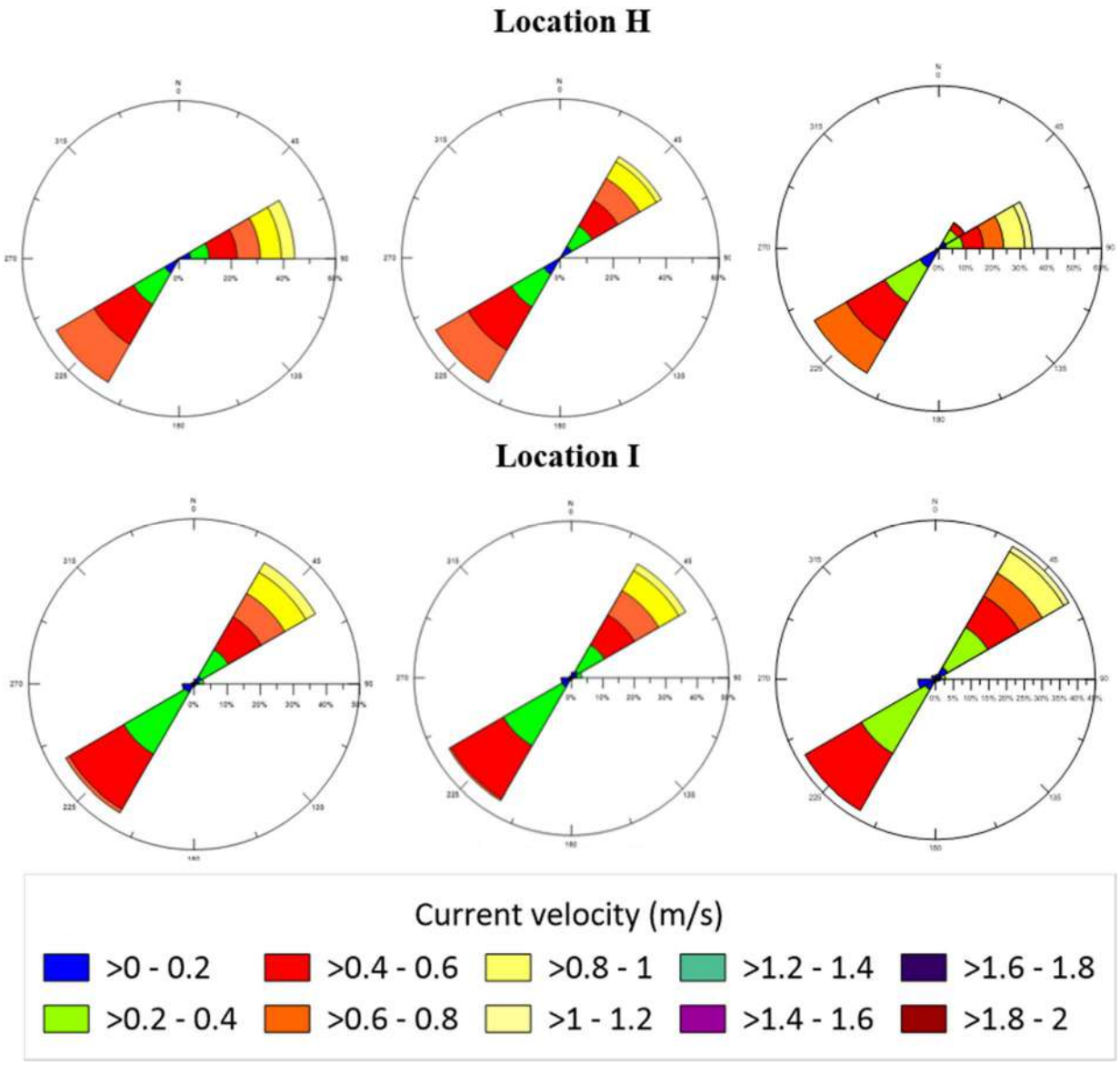


Figure 38 Current Rose plots at locations H and I in the vicinity of floating jetty and lock gate for existing (first column) and proposed conditions Case-2 and Case-3 (second and third column respectively)

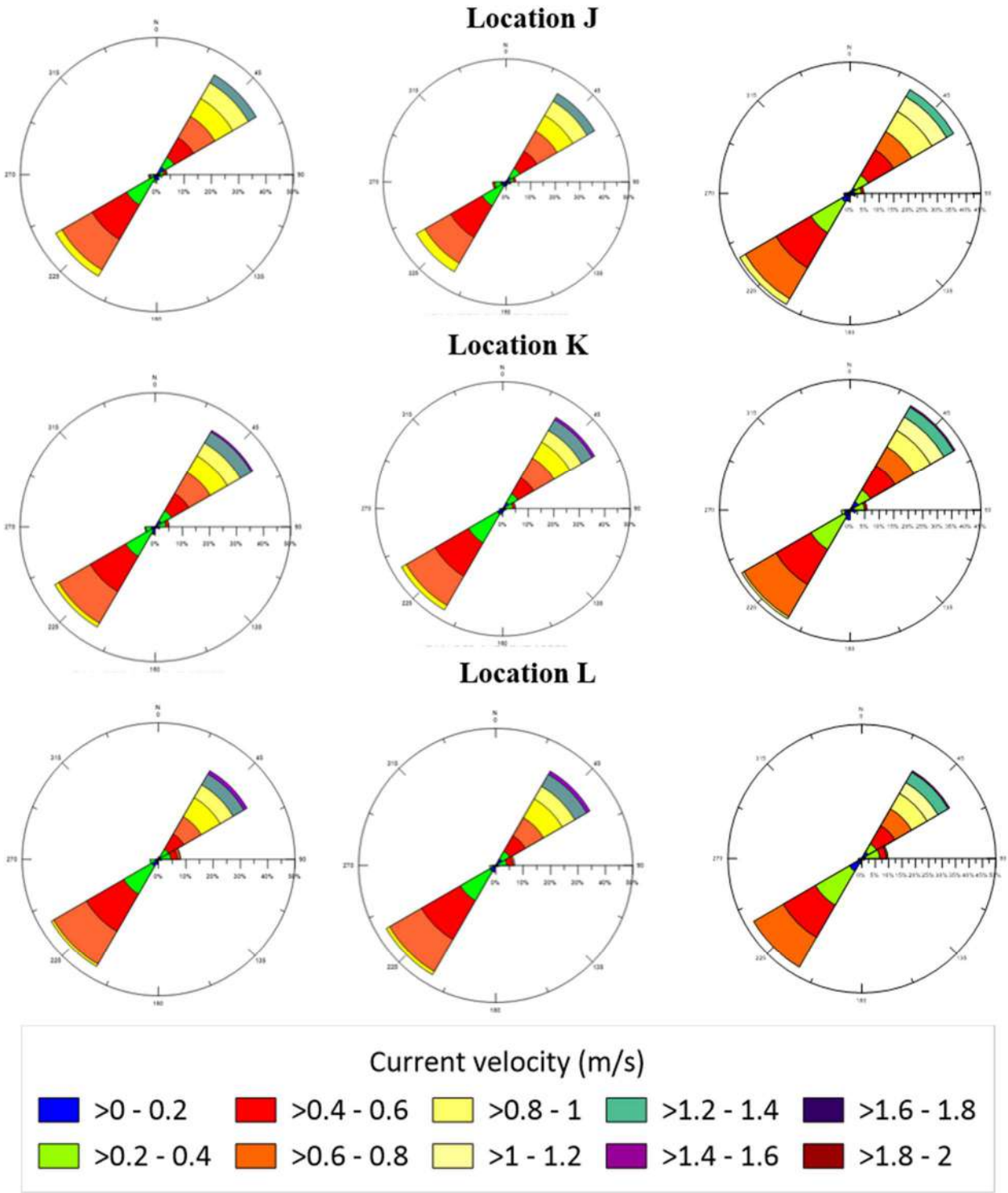


Figure 39 Current Rose plots at locations J to L in the navigational channel area infront of proposed jetty for existing (first column) and proposed conditions Case-2 and Case-3 (second and third column respectively)

4.5 Morphodynamic modelling in HDC channel regions for existing condition and proposed development which is being developed in terms of siltation/stability and dredging requirements

The present study is focused on analysing the circulation features and their effect on morphodynamic changes in the Hooghly navigation channels. This morphodynamic model used is the one which is used for the earlier study in Hooghly estuary and hence the model is calibrated to match the best, of field data. The existing Oil Jetty 1, 2 &3 (HOJ-I, II&III) are included for the simulation and their effect on siltation pattern and the magnitude of siltation rate is analysed. Morphodynamic simulation was carried out for the existing and proposed development options both Case- 2 and Case- 3, specifically in terms of siltation and dredging needs. The aim is to predict the volume of silt in the navigational channel and quantify the variations in dredged volume and siltation rate between the existing and proposed conditions. The siltation is occurring during the high and low tides when the magnitude of the currents is relatively weaker. Based on the siltation study the siltation rate near channels is predicted for 15 days of simulation. The rate of siltation and siltation pattern are studied for any adverse effect on the navigational channel and surrounding area due to the proposed development and additional dredging requirement if any. The results are extracted after one neap to neap cycle (N-N) simulation. Detailed numerical model studies have been carried out to investigate the hydrodynamics of tides as explained in the previous section. With flow pattern and current velocity, the sediment transport model is simulated and the silt that gets settled in patches all over the domain for the existing and proposed condition is modelled.

4.5.1.1 Results and discussion

Based on model predictions the average siltation rate is around 0.05 m/N-Ncycle is observed in all the regions of HDC navigational channels for the existing condition and with the presence of proposed development the rate of siltation is around 0.065 m/N-N cycle for Case- 2 and around 0.07 m/N-N cycle for Case- 3. For the existing condition, in front of the HOJ-III and HFTPL jetty, the rate of siltation is 0.17 m/N-N cycle. The siltation infront of the proposed jetty for existing condition is around 0.05-0.1m/N-N cycle in the berthing area for Case- 2 and for Case- 3 0.05-0.2 m/N-N cycle. Increase in siltation is observed behind the proposed jetty due to the presence of proposed development from 0.14 m/N-N cycle to 0.2 m/N-N cycle in both Case- 2 and Case- 3. With the presence of proposed development, a slight increase in siltation is observed in the navigational channel and Haldia anchorage area enroute to HDC. In

Case- 3, a slight increase of 0.02 m per N-N cycle in siltation is observed in front of the proposed berth, while a minor decrease in siltation is noted near HOJ-III when compared to Case- 2. Additionally, in the Haldia Anchorage area, there is a slight increase in siltation in Case- 3 compared to Case- 2. No other significant changes in the siltation pattern are observed between Case- 2 and Case- 3. The navigation channel is not subjected to any adverse effects with the presence of the proposed container cum multipurpose berths outside HDC Lock between HOJ-III and HFTPL jetty. Typical bed level changes at the end of N-N simulation in Hooghly estuary at the navigational channels of the HDC for Case- 1, Case- 2 and Case- 3 are shown in **Figure 40, Figure 41** and **Figure 42**. Comparison of bed level changes in Hooghly estuary at the navigational channels of the HDC for Case-1, Case- 2 and Case- 3is shown in **Figure 43.**

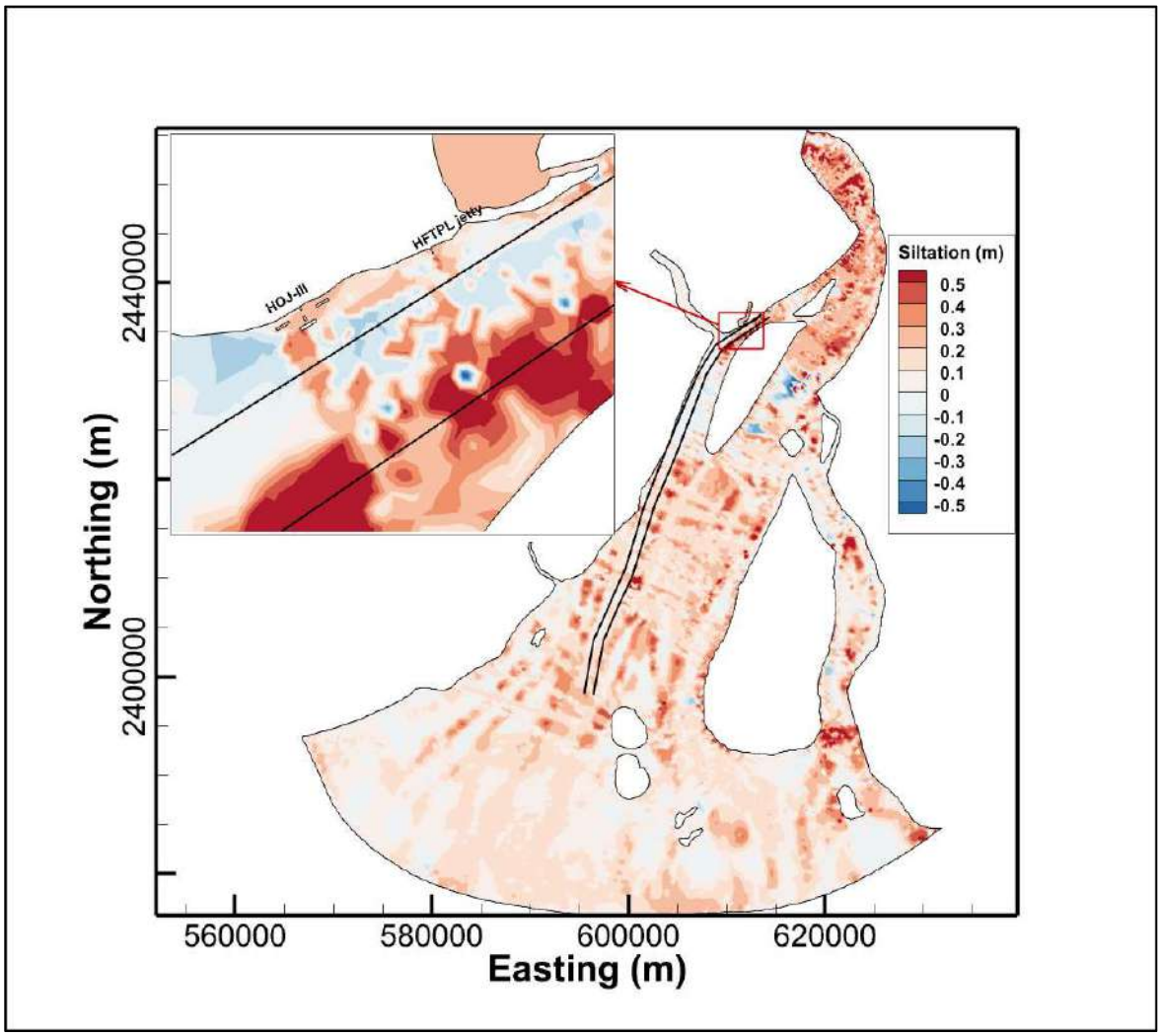


Figure 40 Typical bed level changes in Hooghly estuary at the navigational channels of the HDC with proposed berth (2023) (Case-1)

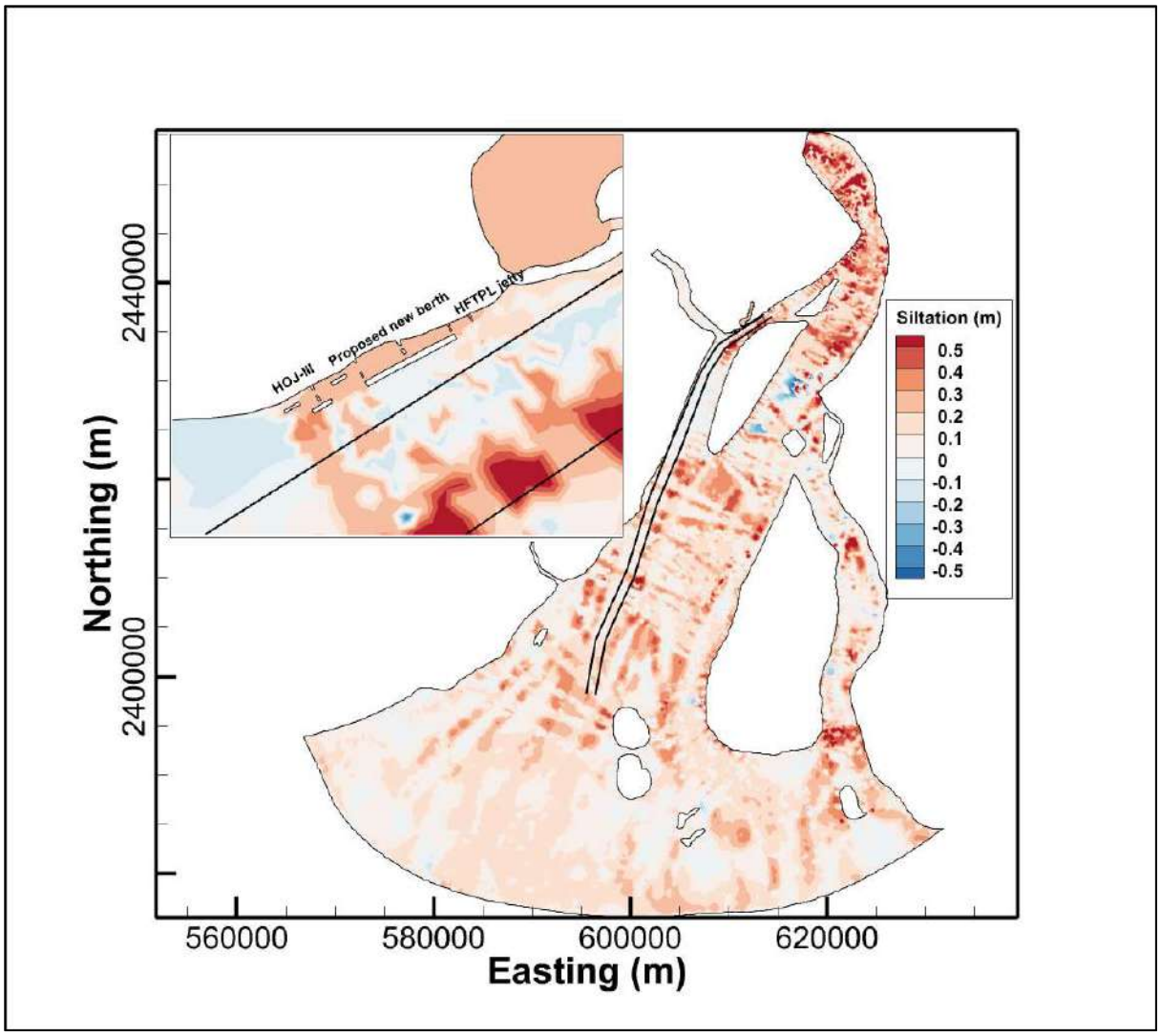


Figure 41 Typical bed level changes in Hooghly estuary at the navigational channels of the HDC with proposed berth (Case-2)

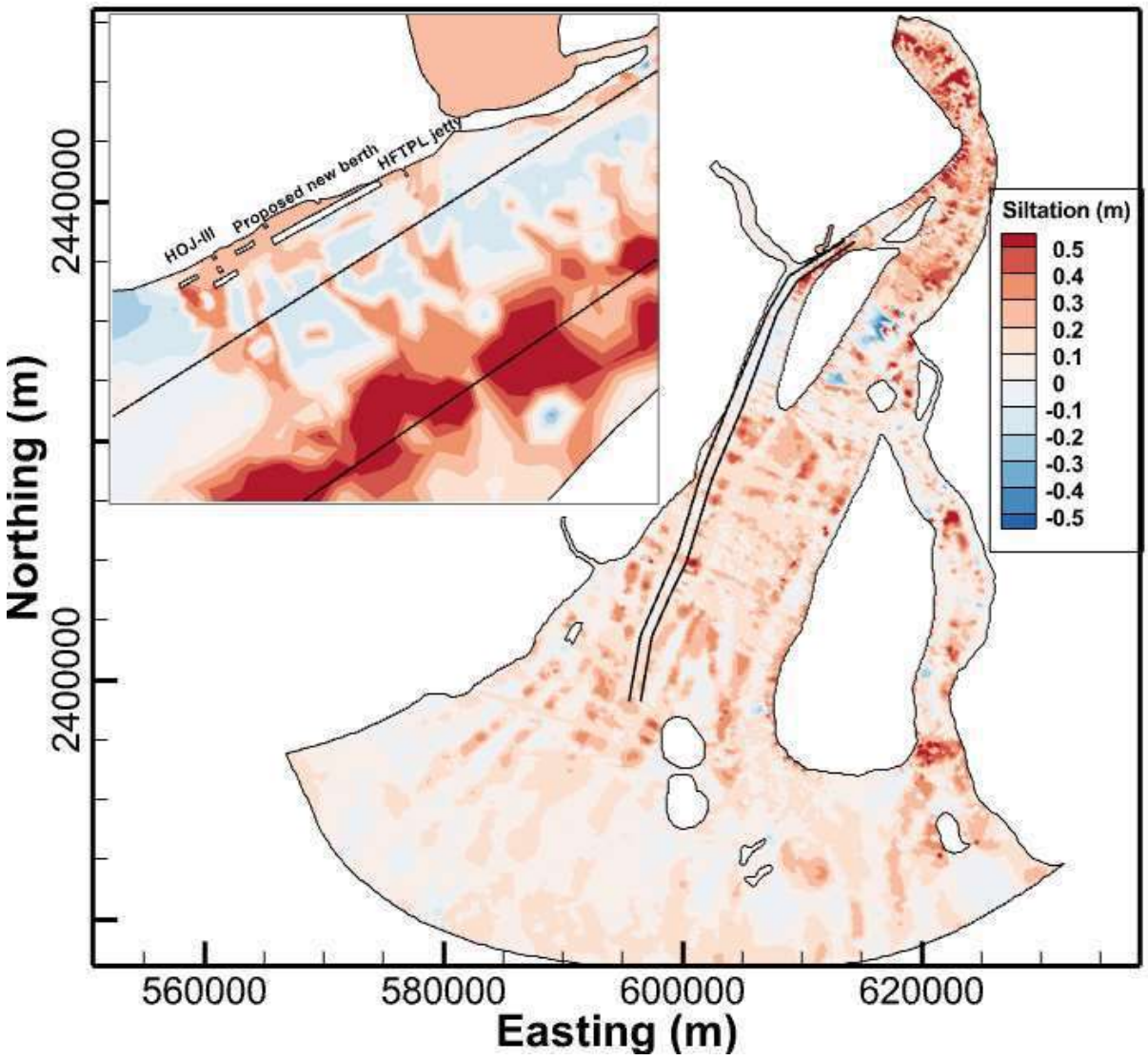


Figure 42 Typical bed level changes in Hooghly estuary at the navigational channels of the HDC with proposed berth (Case-3)

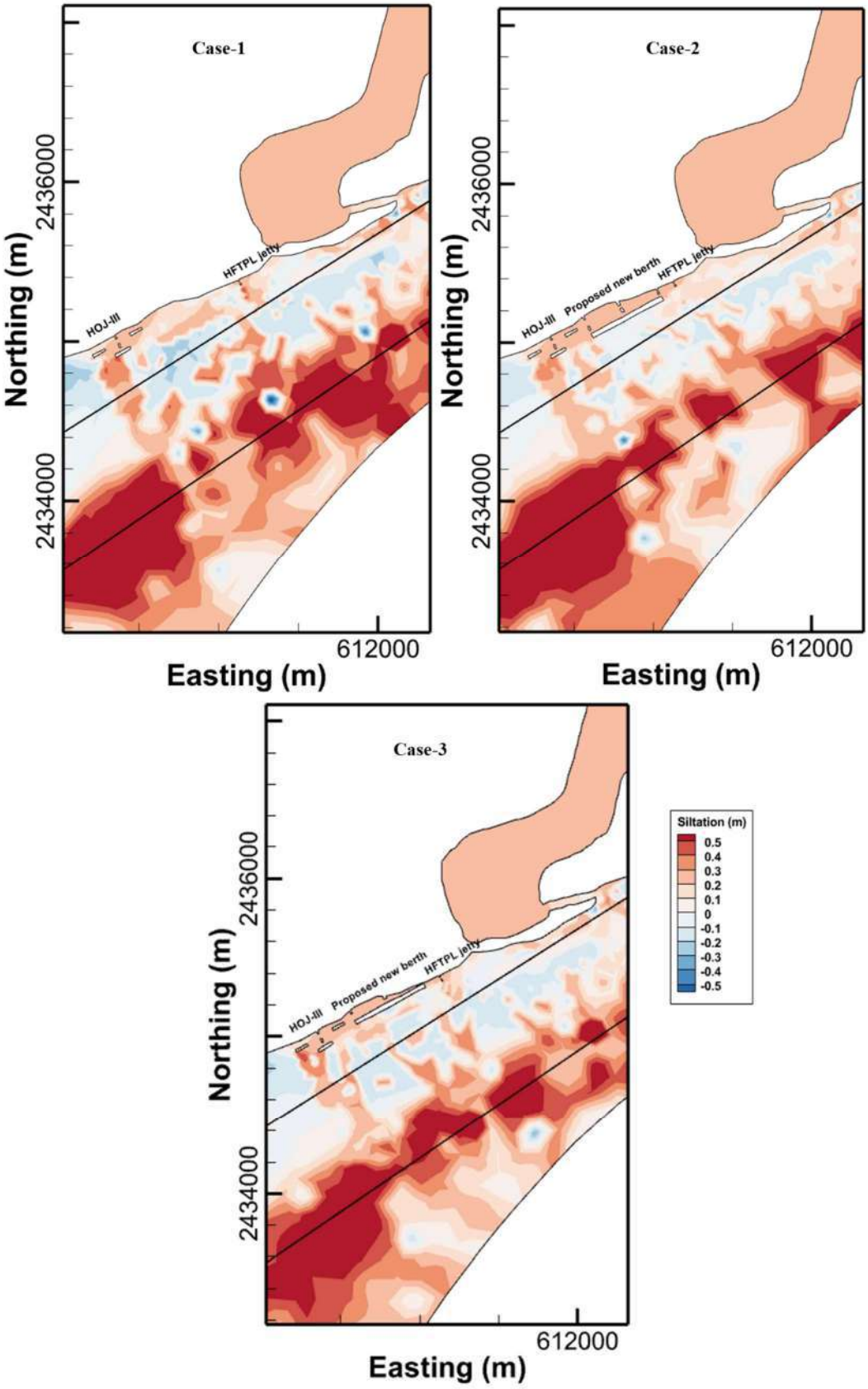


Figure 43 Comparison of bed level changes in the vicinity of Oil jetty and Haldia anchorage area in the navigational channels of the HDC for Case-1, Case-2 and Case-3

4.6 Dredge quantity estimation

Shipping channels are of equal importance to our road and rail networks and, like these networks, need to be maintained and developed as trade grows. Dredging of shipping channels is an essential part of port operation globally. Although shipping channels are declared in naturally deep-water areas, thus enabling the safe passage of shipping, dredging will always be required.

4.6.1 Estimation of maintenance dredging quantity

Estimation of maintenance dredging is carried out to maintain the required depth in navigational channels. Area considered for dredge will be covering the entire length of the Jellingham, Haldia Anchorage, Upper Eden and Lower Eden bar navigational channels. The maintenance dredge estimation is listed in **Table 4** with respect to the siltation patterns and levels presented in the **Figure 40, Figure 41** and **Figure 42**.

Table 4 Maintenance dredge estimate based on morphodynamic simulation

Location	Dredging area predicted in Model (m^2)	Predicted Volume of Dredging (Mm^3/yr.) for existing condition (2023) (Case- 1)	Predicted Volume of Dredging (Mm^3/yr.) for proposed condition (Case- 2)	Predicted Volume of Dredging (Mm3/yr.) for proposed condition (Case- 3)
Jellingham	2622000	5.20	5.42	5.42
Upper Eden Bar	3600000	0.70	0.70	0.70
Haldia Anchorage + Haldia Reach	880000	2.12 +1.00	2.45 + 1.60	2.30 + 1.60
Lower Eden Bar	912500	1.33	1.44	1.44
Total		**9.35-10.35**	**10.01-11.61**	**9.86-11.46**

5 RECOMMENDATION FOR CONTAINER TERMINAL

The proposal of a PPP project for a new container terminal has strong merit. However, there are limitations in navigational space in the Haldia reach/anchorage. There is also encroachment of Nayachara into the navigational space. Further, the time window available for doing berthing operations of arriving vessels do not permit 2 new berths to be created in the river.

It is proposed that the 2 berths are made one in the river and the second one in the turning basin area of Haldia dock. This option circumvents the question on available time window and availability of manoeuvring space. Moreover, they can still share the Container yard and form a single container terminal. If required some readjustments of container yard could be carried out. Further, this also minimises the changes to the hydro-morphological situation in the river and reduced quantum of dredging requirements.

Figure 44 projects the tentative layout of the two new berths. Both berths are of 250m in length. The new OT3 will be one berth with 250m length. Additionally, the new berth in the turning basin is inside the locked water and will become Berth 13 of the dock. Thus, the project cost and revenue only marginally change.

The reconfigured layout ensures optimal utilization of available space, improving cargo handling efficiency and reducing transit times. This reformulated proposal presents a balanced solution that enhances safety, operational performance, and environmental sustainability, making it the most viable option for the project. Proposed configuration of two berths for Container terminal is shown in **Figure 44**



Figure 44 Proposed configuration of two berths for Container terminal

6 FINANCIAL VIABILITY AND SENSITIVITY ANALYSIS

The project Cost estimate has been updated considering the modifications proposed. The overall project cost works out to be 917.07 crores. The details are listed hereunder in Table 6.1

Table 6.1 Summary of Block cost estimate

Sl. no.	Description	Cost (INR in crores)
1.	Civil	475.80
2.	Mechanical	367.41
3.	Electrical	12.69
4.	IT & Misc	61.16
5.	Total block cost	917.06

The Financial viability of the project is analysed considering 30 years' life period from the date of starting of the construction. For arriving at FIRR, the assumptions as indicated in the earlier report alongwith modified construction pattern and tugs for operations has been considered. The model is prepared on considering cost would increase by 5% and tariff would increase by 3% (60% of inflation). Hence, the overall cost works out to be 972.66 crores.

Sensitivity analysis has also been carried out to gauge the impact of increase in cost and reduction of revenue earnings on the viability of the proposal. The results of the financial viability are presented in Table 6.1.

Table 6.2 Sensitive Analysis

S.No.	Description	IRR (%)
1	Base case	25.58
2	Capital Cost up by 10%	23.56
3	Revenue down by 10%	21.16
4	Combined effect of Sl. no. 2 & 3	19.36

From the above, it is evident that the Project IRR at Base case is 25.58% and in the least case of sensitivity gives 19.36% and hence the Project is financially viable for taking up through Internal Resource (IR).

The total project cost works out to Rs.972.66 crores. With the same assumptions as per the earlier report, the Viability analysis statement is given at Table 5.2.

Table 6.2 Project IRR

Yr	Financial year			Cap-Ex incl IDC	Depriciation	O&M Cost	Total Cash Outflow	Total Revenue	Net Cash Flows Base Case	Sensitivity Analysis: Cap Ex increase +10%	Sensitivity Analysis: Revenue decrease -10%	Sensitivity Analysis: Combined Effect
1	2026	-	2027	183.351		-	183.35		-183.35	-201.69	-183.35	-201.69
2	2027	-	2028	385.032		-	385.03		-385.03	-423.54	-385.03	-423.54
3	2028	-	2029	404.287		-	404.29	-	-404.29	-444.72	-404.29	-444.72
4	2029	-	2030		40.46	198.15	270.05	513.89	293.95	293.95	242.56	242.56
5	2030	-	2031		40.46	207.83	271.74	535.52	300.86	300.86	247.31	247.31
6	2031	-	2032		40.46	216.09	272.01	551.58	304.67	304.67	249.51	249.51
7	2032	-	2033		40.46	239.42	287.35	568.13	297.57	297.57	240.75	240.75
8	2033	-	2034		40.46	249.26	289.20	585.17	300.93	300.93	242.41	242.41
9	2034	-	2035		40.46	259.58	291.53	602.73	304.32	304.32	244.04	244.04
10	2035	-	2036		40.46	270.43	294.40	620.81	307.70	307.70	245.62	245.62
11	2036	-	2037		40.46	281.81	297.79	639.44	311.09	311.09	247.15	247.15
12	2037	-	2038		40.46	293.76	301.75	658.62	314.47	314.47	248.61	248.61
13	2038	-	2039	22.79	40.46	306.29	329.08	678.38	295.06	292.78	227.22	224.94
14	2039	-	2040		41.35	320.35	320.35	698.73	323.43	323.43	253.56	253.56
15	2040	-	2041		41.35	334.17	334.17	719.69	328.75	328.75	256.78	256.78
16	2041	-	2042		41.35	348.68	348.68	741.28	334.02	334.02	259.89	259.89
17	2042	-	2043		41.35	363.92	363.92	763.52	339.24	339.24	262.89	262.89
18	2043	-	2044	413.7	41.35	379.91	793.61	786.42	-69.31	-110.68	-147.95	-189.32
19	2044	-	2045		60.66	416.01	416.01	810.02	354.32	354.32	273.32	273.32
20	2045	-	2046		60.66	433.63	433.63	834.32	359.30	359.30	275.86	275.86
21	2046	-	2047		60.66	452.14	452.14	859.35	364.15	364.15	278.21	278.21
22	2047	-	2048		60.66	471.57	471.57	885.13	368.88	368.88	280.37	280.37
23	2048	-	2049	37.12	60.66	491.97	529.09	911.68	336.33	332.62	245.16	241.45
24	2049	-	2050		63.20	515.91	515.91	939.03	378.52	378.52	284.62	284.62
25	2050	-	2051		63.20	538.39	538.39	967.20	382.75	382.75	286.03	286.03
26	2051	-	2052		63.20	561.99	561.99	996.22	386.78	386.78	287.16	287.16
27	2052	-	2053		63.20	586.77	586.77	1,026.11	390.58	390.58	287.97	287.97
28	2053	-	2054		63.20	612.79	612.79	1,056.89	394.11	394.11	288.42	288.42
29	2054	-	2055		63.20	640.09	640.09	1,088.60	397.39	397.39	288.53	288.53
30	2055	-	2056		63.20	668.77	668.77	1,121.25	400.32	400.32	288.20	288.20
31	2056	-	2057		31.60	352.42	352.42	577.45	198.49	198.49	140.74	140.74
	Total			**1,446.28**		**11,012.12**	**12,817.89**	**21,737.16**	**8,025.98**	**7,881.35**	**5,852.26**	**5,707.64**
						12,458.40		IRR=	25.58%	23.56%	21.16%	19.36%

7 CONCLUSION

The conclusions are made with reference to the following scenarios. Therefore, Table 1 is reproduced below to highlight the scenarios.

Table 3 Details of cases considered for the study

Cases	Site conditions
Case- 1	Existing condition with most recent bathymetry
Case- 2	Proposed 500 m long jetty is updated in the model with the most recent bathymetry
Case- 3	Proposed jetty is relocated 45 m closer to bank

1) With the presence of multipurpose berth outside HDC Lock between HOJ-III and HFTPL jetty and for the existing condition, the velocity contours are extracted and projected in the hydrodynamic modeling section. With the presence of proposed development both Case- 2 and Case- 3, no drastic changes in flow features are observed in the navigational channel enroute to HDC. The same phenomenon happens in the reversal direction during ebb tide.
2) The proposed development initiatives may result in alterations in directional features of currents along the northern vicinity of Oil Jetty III when compared with the existing conditions. Notably, behind the proposed jetty to the south, there is a reduction in velocity accompanied by slight modifications in directional characteristics owing to the jetty's presence. Specifically, current velocity diminishes from 0.8 m/s to 0.2 m/s for both the proposed options.
3) In Case- 2, behind the proposed jetty to the north, there is a significant decrease in current velocity of 0.2 m/s, from the existing 0.8 m/s, with no notable changes in the directional characteristics. This reduction is attributed to the introduction of the proposed structure. In Case- 3, the flow direction shows changes compared to Cases 1 and 2, with the flow predominantly occurring in the North-East direction.
4) Across other locations, the presence of the proposed jetty does not induce drastic changes in either current direction or magnitude, reflecting a consistent pattern observed throughout the area of interest. This consistent trend is observed in various locations within the study area, signifying the broader impact of proposed developments on current dynamics.

5) The existing Oil Jetty I, II &III (HOJ-I, II&III) are included for the simulation and their effect on siltation pattern and the magnitude of siltation rate is analysed.

6) Based on model predictions the average siltation rate is around 0.05 m/N-Ncycle is observed in all the regions of HDC navigational channels in the existing conditions, and with the presence of proposed development the rate of siltation is around 0.06 m/N-N cycle for Case- 2 and 0.055 m/N-N cycle for Case- 3.

7) For the existing condition, in front of the HOJ-III and HFTPL jetty, the rate of siltation is 0.10 m/N-N cycle. The siltation infront of the proposed jetty and the berthing area is around 0.11m/N-N cycle for Case- 2 and for Case- 3 0.10 m/N-N cycle.

8) Increase in siltation is observed behind the proposed jetty due to the presence of proposed development from 0.10 m/N-N cycle to 0.2 m/N-N cycle in both Case- 2 and Case- 3.

9) With the presence of proposed development, a slight increase in siltation is observed in the navigational channel and Haldia anchorage area enroute to HDC.

10) The navigation channel is not subjected to any adverse effects with the presence of the proposed container cum multipurpose berths outside HDC Lock between HOJ-III and HFTPL jetty as per both cases.

11) Relocating the proposed berth closer to the bank (Case 3) will not result in any adverse effects, as it does not impose navigational constraints and shows no significant impact on flow or siltation compared to the existing scenario.

12) To maintain the necessary depth in navigational channels, maintenance dredging requirements are updated. In the total estimated volume of dredging for the channel section is about 9.35-10.35 Mm^3/yr. for Case- 1 and with the presence of proposed jetty the total estimated volume of dredging for the channel section is about 10.01-11.61Mm^3/yr. for Case- 2 and 9.86-11.46Mm^3/yr. for Case- 3.

13) However, the overall dredging requirement is not changed drastically. While planning the usual allowance of 25% shall be kept to accommodate uncertainties in data and sediment transport formulations.

14) The following further recommendations must also be observed for successful implementation of the new Container Terminal with 2 Berths.

(i) **Reduction of Jetty Length and Relocation**:

- The originally proposed 500 m container cum bulk cargo handling jetty between HOJ-III and HFTPL is suggested to be reduced to 250 m.
- Relocating the jetty 45 m closer to the bank will significantly reduce hydro-morphological impacts and dredging requirements. This change minimizes environmental impact and eases navigational challenges in the area.

(ii) **Proposal for Two Berths:**

- Two berths are deemed necessary for viability of the proposal, growth of the port and needs of trade. The first berth will be the modified 250 m jetty located closer to the bank, will be OT3.
- The second berth is proposed to be constructed within the unutilized lock area of the turning basin. This location provides sufficient space and operational convenience for a 250 m jetty. This jetty will be Berth 13 of HDC.

(iii) **Common or Extended Yard Approach:**

- To ensure seamless operations, the layout facilitates a shared yard approach for both berths.
- Alternatively, the yard may be adjusted to be more towards the HDC turning basin to optimize storage and handling efficiency.

(iv) **Cost-Benefit Analysis Highlights:**

- The reduction in dredging costs offsets the expense of relocating and modifying the jetty, resulting in overall comparable project costs.
- Navigation issues are addressed with the modified layout, enhancing both safety and operational efficiency without increasing costs disproportionately.

(v) **Navigational Enhancements:**

- To further improve navigation, additional measures are recommended, including upgraded navigation aids and operational adjustments.
- The provision of two dedicated tugboats for OT3 is critical for ensuring smooth and safe vessel movements in the modified layout.

(vi) **Management of Sedimentation at Nayachara:**

- Continuous dredging is recommended on the east bank to control sediment accumulation caused by the growth of Nayachara.
- Training structures may be constructed to stabilize the bank and enhance natural sediment flow and maintain navigable depths in the channel.

Annexure – A

Details of Hydrodynamic and Morphodynamic model (Ocirc)

The hydrodynamic and morphological modeling is to be carried out using Ocirc (Ocean circulation model). In this model the hydrodynamic equations governing the ocean flow field are the vertically integrated form of Shallow Water Equations (SWE) (Chitra et al., 1996). Finite Volume Method (FVM) is used to discretize the SWE. The FVM is chosen for the SWE as it will better conserve the mass and momentum in the truncated solution domain. Rigorous validation of the model Ocirc 1.0 has been performed in the past (Murali et al., 2002). Accurate simulation of the tidal hydrodynamics at Hooghly estuary depends on the kind of computational mesh generated for the simulations. An unstructured meshing scheme was selected in order to accurately capture the shoreline. The unstructured meshing scheme is capable of resolving all the boundary and bathymetry details in the study area. This typical computational mesh depicts the ability of the meshing algorithm to exactly discretize the study area. The hydrodynamic model has to be calibrated for the purpose of ascertaining that the model parameters chosen are valid for the present estuary. The main model parameters in the present formulation are Horizontal Eddy Viscosity coefficient (ε) and Bottom friction coefficient K_b. Several simulations were conducted to determine the proper range of these parameters. Usually, where bed is smooth with alluvial sediments, the value of K_b could be of the order of $10^{-3.}$ In the present case, the value of K_b and the value of ε is made spatially and temporally varying.

A1. Governing Equations

A1.1 Model formulation

Navier-Stokes equations (N-S equations) are the fundamental mathematical framework for any fluid dynamics process. In the context of tides, the N-S equations simplify to the well-known "vertically integrated shallow water equations (SWE)" that govern the ocean flow field with main momentum transport occurring in the horizontal directions only. The SWE in a Cartesian co-ordinate frame fixed to the rotating earth and without lateral turbulent diffusion are,

$$q_{x,x} + q_{y,y} + \eta_{,t} = 0$$

$$q_{x,t} + \frac{q_x}{H} q_{x,x} + \frac{q_y}{H} q_{x,y} - f q_y = -\rho^{-1} H p_{a,x} - gH\eta_{,x} + \rho^{-1}\left(\tau_{ax} - \tau_{bx}\right)$$

$$q_{y,t} + \frac{q_y}{H} q_{y,z} + \frac{q_y}{H} q_{y,y} + f q_x = -\rho^{-1} H p_{a,y} - gH\eta_{,y} + \rho^{-1}\left(\tau_{ay} - \tau_{by}\right)$$

Here, the origin of the co-ordinate system is chosen at the undisturbed sea surface with '*z*' measured positive upwards. *(qx, qy)* is the volume transport vector in the *(x, y)* plane and t is the time. The suffixes preceded by ',' indicate partial derivatives. $H = h + \eta$ is the total depth of water, h is the undisturbed depth of water at $z=0$, η is the sea surface elevation measured from the undisturbed sea surface, f is the Coriolis parameter, ρ is the density of water and g is the acceleration due to gravity. *(τax, τay) and (τbx, τby)* are the stresses at air-water interface and bottom surface respectively. They are evaluated using the conventional quadratic law as follows:

$$\tau_a = K_a \rho_a |W| W, \qquad \tau_b = K_b \rho H^{-2} |q| q$$

where *Ka* and *Kb* are the wind and bottom stress coefficients respectively, ρa is the air density, *W* is the wind velocity measured 10m above the sea level and the volume transport $q \equiv (qx, qy)$. The effects of lateral eddy viscosity are added to the model for the purpose accounts for energy dissipation in lateral direction through standard eddy diffusivity term and using an Eddy viscosity formulation. Appropriate water levels and wind velocities have to be specified for this equation for simulation of tides. It has been observed (Chitra, 1998) that in long wave simulation studies, the initial conditions do not affect the numerical solution. Hence, the usual practice in tide simulation studies, is to assume the ocean to be initially at rest, before the introduction of the free surface perturbation or wind stress at the ocean free surface, i.e. $\eta, qx, qy = 0 \quad for \quad t \leq 0$. The conventional impermeable vertical side wall assumption may be made along the coastal boundary.

A2. Ocirc 1.0

IIT Madras has developed an in-house computer code to implement the above equations. ***Ocirc 1.0*** has been used in several projects in the past for investigating tidal hydrodynamics and siltation, specifically to Cochin, Kandla, and Paradeep ports and to study Storm surge and Tsunami hydrodynamics for DoAE, MES, and DRDO etc. The model has also been applied in high tidal range basins such as Gulf of Kutch and Gulf of Khambat. The model uses an unstructured mesh generation technique and solves the shallow water equations using a Finite Volume – Finite Element based method. The convective fluxes are estimated using Godunov's approach.

A2.1 Finite Volume Discretization

The FVM is chosen for the SWE as it will better conserve the mass and momentum in the truncated solution domain. To obtain a basic idea of the FVM, the reader is referred to Roache (1998). And for a detailed description of the method one should read Ashford (1996). The FVM involves partitioning the domain into a set of non-overlapping control volumes. On each control volume, the integral form of the equations is required to hold. The solution unknowns are taken to be the cell-average quantities that interact through fluxes at the boundaries of the control volumes. Using the integral form of the equations guarantees that any discontinuities that arise in the solution will have the proper strengths (and speeds in an unsteady calculation). Several possible choices exist for the control volumes on an unstructured mesh. In this work, a cell-vertex method is used in which the unknowns are associated with the mesh vertices and the control volumes are taken to be the cells of the median dual mesh. The fluxes through the boundaries of the control volumes are computed using an upwind procedure based on Godunov's (Godonov, 1959) method.

A2.2 Time Stepping

With the spatial discretisation complete, the PDE reduce to a coupled system of ordinary differential equations that can be written as

$$\frac{dU}{dt} = R(U)$$

$U(0) = U_0$

Where U is the global conserved state vector containing all the unknowns, R (U) is an operator representing the spatial discretisation and U_0 is the initial condition. A widely used explicit method for the above equations is the multistage scheme, where m is the stage, is

$$U^{(0)} = U^n$$

$$U^{(k)} = U^n + \alpha_k dt R\left(U^{(k-1)}\right), k = 1,2,\dots,m$$

$$U^{(n+1)} = U^{(m)}$$

Where (n) and (n+1) refer to recent and new time levels respectively and α_k are the stage coefficients. We have implemented a 1 and a 2 stage scheme with α_0 = 1.0 for the 1 stage scheme and α_0=0.5 andα_1=1.0 for the 2 stage scheme.

A2.3 Initial condition

Generally, in coastal hydrodynamic modeling, the initial conditions do not play any crucial role. Hence the usual practice is to assume the ocean to be initially at rest, before the introduction of boundary conditions on lateral boundaries and on the sea surface, i.e., ζ, qx, qy = 0; t≤0.

A2.4 Boundary conditions

The current solver could work with tide elevation boundary conditions alone. When elevation is provided at boundaries, velocity Somerfield radiation condition is satisfied at these boundaries. In cases, where velocity boundary condition shall be used, the solver would use the Somerfield condition to estimate the elevation at the boundary. It is also possible to run the model with Elevation and Velocity boundary conditions in case measurements are available.

A2.5 Mesh Generation

An unstructured mesh generation technique has been incorporated in the present model to produce high quality meshes suitable for shallow water equations. The mesh generation process begins with the construction of the boundary mesh. In this process, the domain boundaries are discretized considering a courant number criteria (C-criteria). The discretisation mainly aims at keeping the overall mesh courant number, required by the user, constant while it will also try to model the geometry as close as possible. This will produce high quality meshes in the estuary.

A2.6 Morphodynamics Model

The mass balance of sediments at a given control volume and resulting change in volume of sediments is used to estimate change in bed level. This is same as MIKE21 ST module of MIKE 21 software. The bed level (h) equation as provided below is used to compute the siltation rates.

$$\frac{\partial h}{\partial t}+\frac{1}{1-n}\nabla_h \bullet (q_x, q_y)=0$$

In the above, n is the porosity and q is the total sediment transport rate. The above approximation assumes that, under a balanced condition, the sediment entrainment and deposition rates are at equilibrium (Tambroni et al., 2010). In order to smooth out the bed level changes, a diffusion term could be added to the above equation. However, quantifying the diffusion coefficient will require lot of data. Hence, a laplacian smoothing of the bed levels is carried out, with 3 cycles, for the purpose of mimicking the location specific diffusion of bed levels.

In order to compute the sediment fluxes, Ocirc employs the following approaches.

Ackers and White formula: This formula is the most suitable one for the present situation as it directly computes the total load of sediment transport. It works very well when the flow conditions mostly shallow water, as that of the present case. It is applicable for a wide range of sediment size and water depths. Hence, this formula is expected to give more appropriate estimate of the sediment load.

Van Rijn formula: This formula is another favoured formula in field by many engineers for total load estimates. However, the limitations of this approach (flow depth, h>1.0 m and D_{50}>0.5 mm) is making this formula unusable for the present application.

Bed & Suspended load estimates: Traditionally, the sediment transport has been considered to be of mainly 2 forms: Bed load and Suspended load. In this approach the load estimates will be combined to give the total load. It is usually observed that *(Coastal Engineering, 2004)* this formula will give the lower bounds of the total load.

A2.7 Estimation of Total Load

According to Ackers and White formula, the sediment transport is related to,

$$G_{gr} = \frac{q_t}{UD}\left[\frac{u_*}{U}\right]^n$$

$$G_{gr} = C\left[\left(\frac{F_{gr}}{A_{gr}}\right)-1\right]^m$$

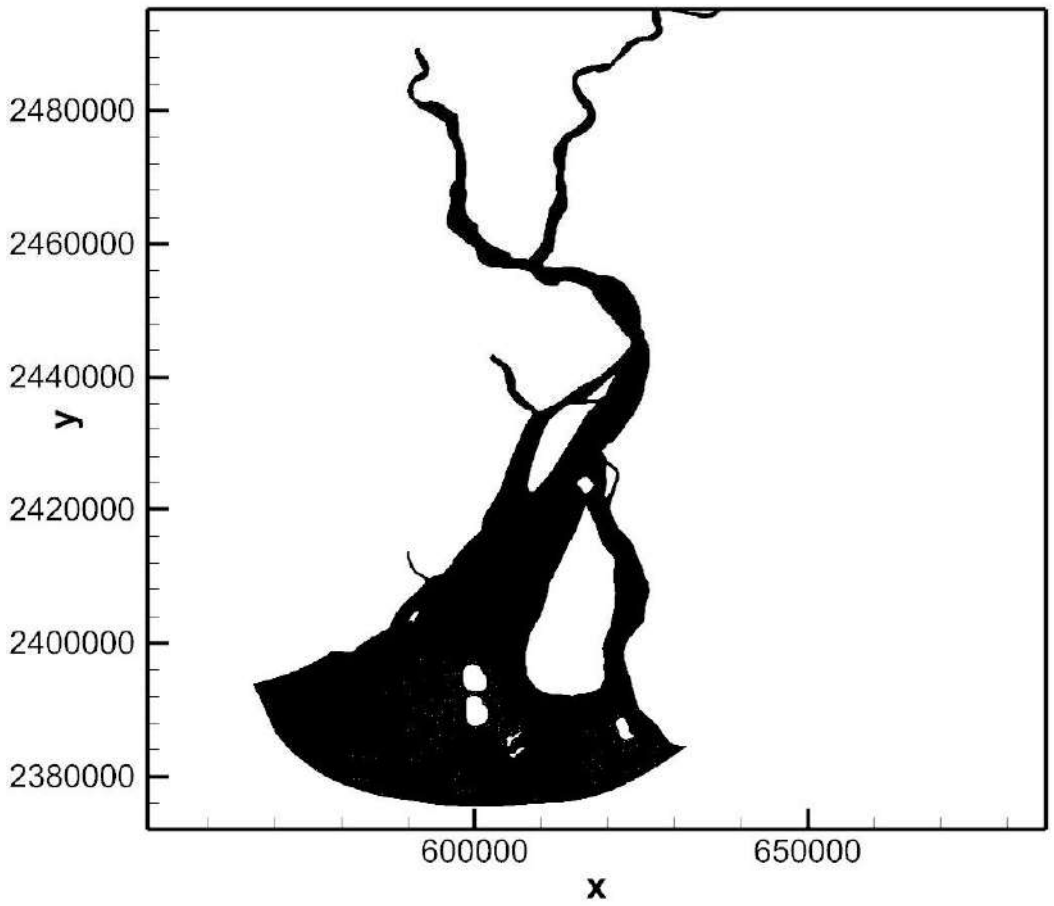
The above relationship is used to estimate q_t (m^3/m/s) from U (Mean flow), D (D35), u* (friction velocity), C (Chezy coefficient) and parameters n, m, Agr and Fgr. More information can be found in *Coastal Engineering (*2004*)*. The transport equation governing the

bed level change is coupled with the hydrodynamic equation to estimate the rate of sedimentation in the estuary.

In the present study, the hydrodynamics and morphodynamics modules are coupled in time domain to provide the most sophisticated estimates of bed level change. After each hydrodynamic solution, the sediment rates are resolved in each cell and converted into siltation. The computed siltation is added to the bathymetry to provide a direct feedback of bed change to velocity computation. Thus the balance between sediment mobilizing and stabilizing stresses are continuously maintained during the computations.

A3 Modeling the study area

The Hooghly estuary is a complex dynamic estuary facing dredging maintenance and navigation related problems due to the high rate of sediment load brought in by the Hooghly River. Based on the similar studies carried out for the Hooghly domain in order to investigate the stability of navigation channel (Haldia Dock Complex (HDC)), this study can be channelized to find solutions to the objective of this study. The domain of the study will be represented by a number of bodies representing exterior coastal lines and interior islands. This is basically the geometric configuration of the coastal boundaries in Hooghly estuary. The computational mesh and bathymetry used for simulation are shown in **Fig.A-3.1 and Fig.A-3.2** respectively. The final mesh has fine elements near the coastlines and shallower water depths. The average mesh size is about 20-100m which is very fine for a simulation such as the present problem. The mesh is coarser near the offshore boundaries, where the water depths are greater. The interpolated bathymetry on the mesh represent the contours at regular intervals. Detailed numerical model studies have been carried out earlier to investigate the hydrodynamics of tide induced flow features and the tidal boundary conditions employed is shown in **Fig.A-3.3**. It is to be noted that, considering such a time series for the 15 days period covers the spring-neap variations of the astronomical tide and addresses all variations in the astronomical tides. Along with the tidal elevation current speed components u and v are also provided in the open boundary for driving the tidal currents in this tide dominated domain. The typical time series validation of the model extracted from previous studies are projected in **Figs.A-3.4.**



A-3.1 Typical meshing of the domain considered for simulation

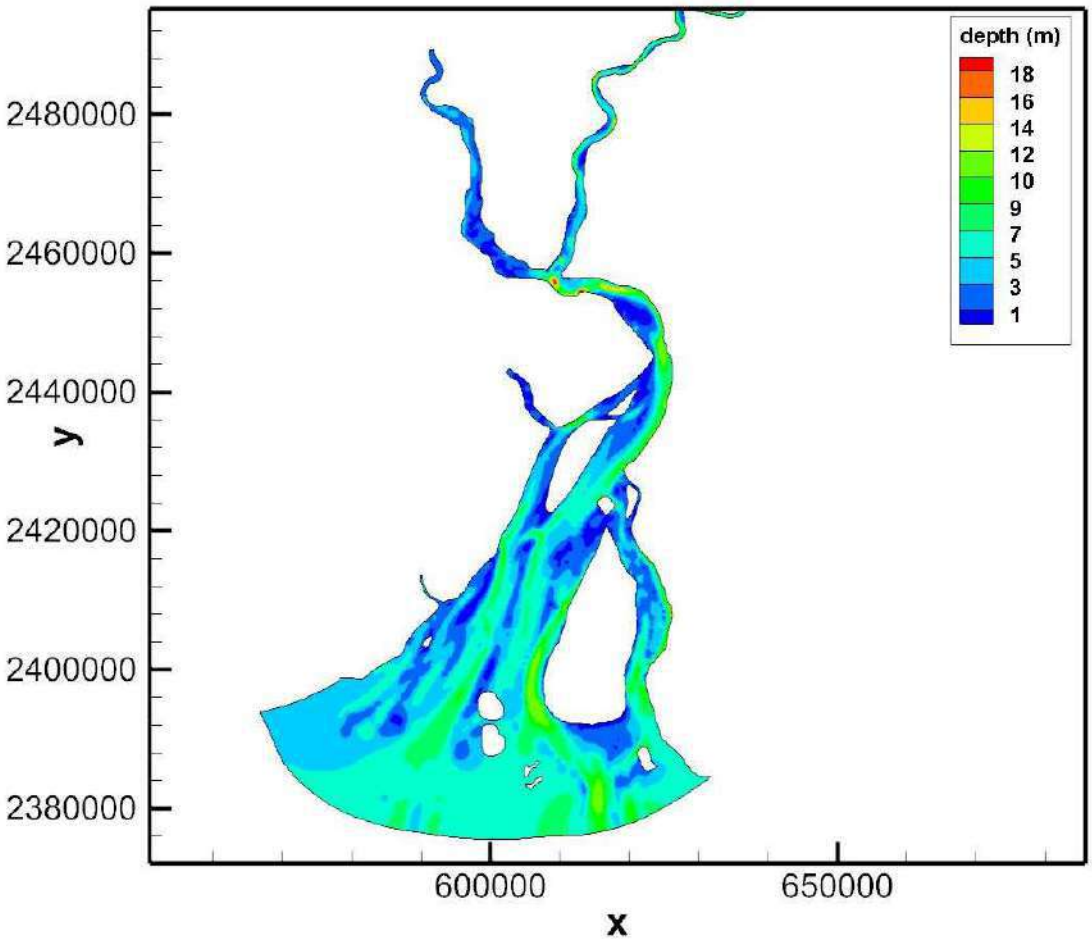


Fig.A-3.2 Bathymetry of the domain used for simulation

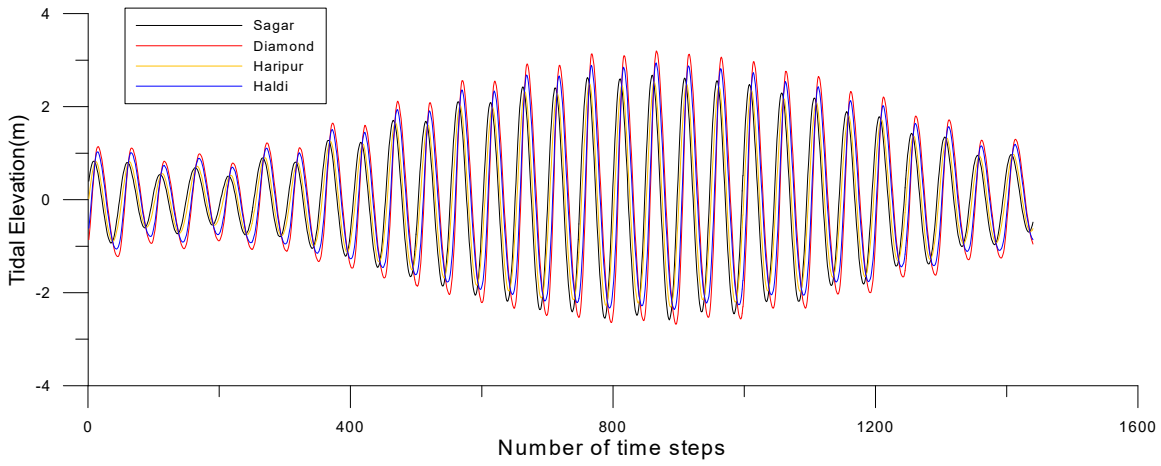


Fig.A-3.3 Open boundary conditions used for the study

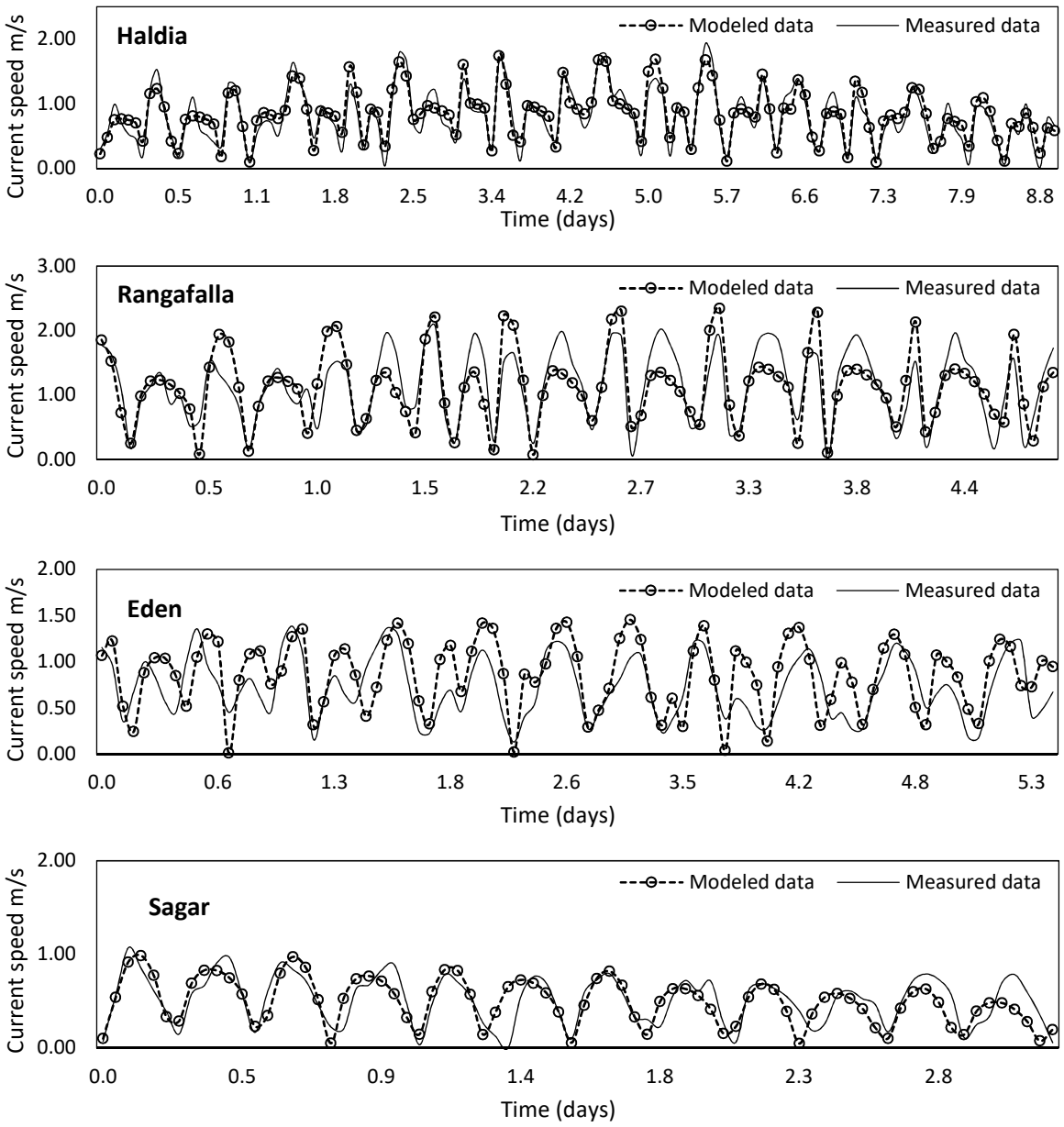


Fig.A-3.4 Time series plots of measured current speed at different locations compared with modeled results of Hooghly domain

BERTHWISE CARGO TRAFFIC HANDLED AT HALDIA DURING THE YEAR 2020-21

Annexure VIII

Sl. No	Commodity	B/1	B/5	B/9	B/14	**MHC Berth Total**	B/4	B/13	B/10	B/11	B/12
1	Coking Coal	15,81,246	6,45,584	16,34,357	9,74,543	**48,35,731**	24,67,573	-	91,220	-	-
2	Non Coking Coal	12,22,991	7,46,096	14,36,497	6,57,743	**40,63,327**	2,53,854	-	-	-	-
3	Met. Coke	49,014	1,09,682	14,709	64,941	**2,38,346**	-	-	-	-	-
4	R. P. Coke	-	-	54,304	-	**54,304**	-	-	-	-	-
5	Coke Breeze	-	13,414	9,247	25,995	**48,656**	-	-	-	-	-
6	Lime Stone	10,65,384	2,87,851	1,91,120	-	**15,44,355**	-	8,19,623	-	-	-
7	Rock Phosphate	9,451	45,600	-	1,45,289	**2,00,340**	-	-	51,900	-	-
8	Sulphur	-	13,000	-	11,171	**24,171**	-	-	46,900	-	-
9	Fertilizer (F)	-	62,313	-	93,632	**1,55,945**	-	20,907	21,121	-	-
10	Manganese Ore	52,105	4,70,581	2,68,646	3,44,896	**11,36,228**	-	-	2,60,720	-	-
11	Pyroxinite	1,36,341	-	31,915	-	**1,68,256**	-	88,307	-	-	-
12	Dolomite	97,032	17,000	29,926	27,260	**1,71,218**	-	75,959	-	-	-
13	Soda Ash	10,005	-	-	22,000	**32,005**	-	-	-	-	-
14	Pig Iron	-	14,139	-	-	**14,139**	-	15,008	5,262	-	-
15	Cement	-	85,721	-	1,54,668	**2,40,389**	-	-	-	-	-
16	Sand	28,604	-	-	18,135	**46,739**	-	30,154	-	-	-
17	Iron Ore	5,90,727	10,46,894	3,84,881	10,66,621	**30,89,123**	-	-	4,93,730	-	-
18	Gypsum	24,700	27,000	53,500	-	**1,05,200**	-	-	-	-	-
19	Sugar	-	57,666	-	53,648	**1,11,314**	-	-	21,831	-	-
20	Iron & Steel	-	-	-	-	**-**	-	8,23,119	4,75,072	-	-
21	Rice	-	-	-	-	**-**	-	-	41,317	-	-
22	Wood Pulp	-	-	-	-	**-**	-	-	10,807	-	-
23	Machinery & spare parts	-	-	-	-	**-**	-	2,501	113	-	-
24	P. Cargo	-	-	-	-	**-**	-	1,509	-	-	320
25	Container Cargo	-	-	-	-	**-**	-	-	-	11,00,488	18,26,508
	Container TEUs	-	-	-	-	**-**	-	-	-	55,505	93,974
	TOTAL	**48,67,600**	**36,42,542**	**41,09,102**	**36,60,542**	**1,62,79,786**	**27,21,427**	**18,77,088**	**15,19,993**	**11,55,993**	**19,20,802**

BERTHWISE CARGO TRAFFIC HANDLED AT HALDIA DURING THE YEAR 2021-22

Sl. No	Commodity	B/1	B/5	B/9	B/14	MHC Berth Total	B/4	B/10	B/13	B/11	B/12
1	Coking Coal	19,28,270	6,41,249	17,56,118	5,12,051	**48,37,688**	28,49,476	-	-	-	-
2	Non Coking Coal	6,65,802	3,79,769	6,86,622	6,84,741	**24,16,934**	3,81,978	16,586	-	-	-
3	Coke Breeze	11,133	-	-	-	**11,133**	-	-	-	-	-
4	Met. Coke	-	70,002	77,316	63,356	**2,10,674**	-	-	-	-	-
5	R. P. Coke	10,508	6,500	25,997	37,887	**80,892**	-	-	-	-	-
6	Lime Stone	8,30,209	3,32,217	3,73,133	25,309	**15,60,868**	-	-	10,28,913	-	-
7	Rock Phosphate	-	1,75,481	-	97,100	**2,72,581**	-	31,019	-	-	-
8	Sulphur	-	29,499	-	-	**29,499**	-	27,098	-	-	-
9	Fertilizer (F)	-	20,000	-	68,145	**88,145**	-	-	93,007	-	-
10	Manganese Ore	1,06,639	9,36,370	2,41,351	10,46,314	**23,30,674**	-	30,600	-	-	-
11	Pyroxinite	-	-	-	44,934	**44,934**	-	-	1,19,770	-	-
12	Dolomite	29,976	66,302	-	-	**96,278**	-	-	1,04,570	-	-
13	Soda Ash	-	10,000	-	-	**10,000**	-	-	-	-	-
14	Sand	-	-	-	20,000	**20,000**	-	-	29,501	-	-
15	Iron Ore	2,22,012	2,13,017	1,03,314	2,21,029	**7,59,372**	-	1,89,260	-	-	-
16	Pig Iron	-	-	-	-	**-**	-	9,501	15,700	-	-
17	Maize	-	-	-	-	**-**	-	2,644	-	-	-
18	Wheat	-	-	-	-	**-**	-	5,116	-	-	-
19	Iron & Steel	-	-	-	-	**-**	-	2,07,229	6,14,006	-	-
20	Sponge Iron	-	-	-	-	**-**	-	1,496	-	-	-
21	Rice	-	-	-	-	**-**	-	30,483	-	-	-
22	Sugar	-	-	-	-	**-**	-	76,498	-	-	-
23	Wood Pulp	-	-	-	-	**-**	-	43,005	-	-	-
24	P. Cargo	-	-	-	-	**-**	-	2,305	3,174	-	-
25	Purified Terephthalic Acid	-	-	-	-	**-**	-	46,218	-	-	-
26	Container Cargo	-	-	-	-	**-**	-	-	-	13,92,675	19,60,243
	Container TEUs	-	-	-	-	**-**	-	-	-	68,662	96,750
	TOTAL	**38,04,549**	**28,80,407**	**32,63,851**	**28,20,866**	**1,27,69,672**	**32,31,454**	**7,19,058**	**20,08,641**	**14,61,337**	**20,56,993**

BERTHWISE CARGO TRAFFIC HANDLED AT HALDIA DURING THE YEAR 2022-23

Sl. No	Commodity	B/1	B/5	B/9	B/14	MHC Berth Total	B/4	B/10	B/13	B/11	B/12
1	Coking Coal	18,83,213	8,25,025	23,31,409	8,94,203	**59,33,850**	31,74,582	97,400	-	-	-
2	Non Coking Coal	8,87,606	18,71,528	11,61,970	15,39,151	**54,60,255**	1,66,573	1,91,442	-	-	-
3	Coke Breeze	47,927	14,400	-	11,671	**73,998**	-	11,150	-	-	-
4	Cement Clinkers	-	57,902	-	22,386	**80,288**	-	5,642	-	-	-
5	Met. Coke	1,62,012	1,20,375	75,863	1,35,780	**4,94,030**	-	9,650	-	-	-
6	R. P. Coke	40,250	44,080	17,301	26,497	**1,28,128**	-	25,673	-	-	-
7	Lime Stone	10,60,934	1,28,377	6,74,369	1,21,169	**19,84,849**	-	47,118	15,25,678	-	-
8	Rock Phosphate	-	1,03,524	-	1,87,025	**2,90,549**	-	32,723	-	-	-
9	Sulphur	-	-	-	17,002	**17,002**	-	16,500	10,000	-	-
10	Fertilizer (F)	-	-	-	-	**-**	-	-	54,816	-	-
11	Manganese Ore	1,46,983	4,89,529	1,63,590	6,72,031	**14,72,133**	-	4,47,434	-	-	-
12	Pyroxinite	-	-	15,612	10,000	**25,612**	-	12,300	3,13,143	-	-
13	Dolomite	-	-	42,369	-	**42,369**	-	-	1,04,440	-	-
14	Soda Ash	-	-	-	-	**-**	-	15,000	-	-	-
15	Sand	-	-	-	13,600	**13,600**	-	-	-	-	-
16	Gypsum	51,000	1,05,986	23,500	89,450	**2,69,936**	-	-	28,309	-	-
17	Pig Iron	-	-	-	-	**-**	-	-	-	-	-
18	Iron & Steel Scrap	-	-	-	-	**-**	-	22,758	-	-	-
19	Iron Ore	65,219	2,57,695	-	2,16,114	**5,39,028**	-	3,59,443	1,951	-	-
20	Rice	-	-	-	-	**-**	-	5,824	-	-	-
21	Iron & Steel	-	-	-	-	**-**	-	10,860	2,16,957	-	-
22	Wood Pulp	-	-	-	-	**-**	-	59,301	-	4,615	2,480
23	Zeolite in Bags	-	-	-	-	**-**	-	1,517	-	-	-
24	P. Cargo	-	-	-	-	**-**	-	4,039	415	-	-
25	Purified Terephthalic Acid		-	-	-	**-**	-	31,994	-	3,283	-
26	Container Cargo	-	-	-	-	**-**	-	-	-	8,09,007	12,57,790
	Container TEUs	-	-	-	-	**-**	-	-	-	40,233	66,949
	TOTAL	**43,45,144**	**40,18,421**	**45,05,983**	**39,56,079**	**1,68,25,627**	**33,41,155**	**14,07,769**	**22,55,709**	**8,57,137**	**13,27,219**

BERTHWISE CARGO TRAFFIC HANDLED AT HALDIA DURING THE YEAR 2023-24

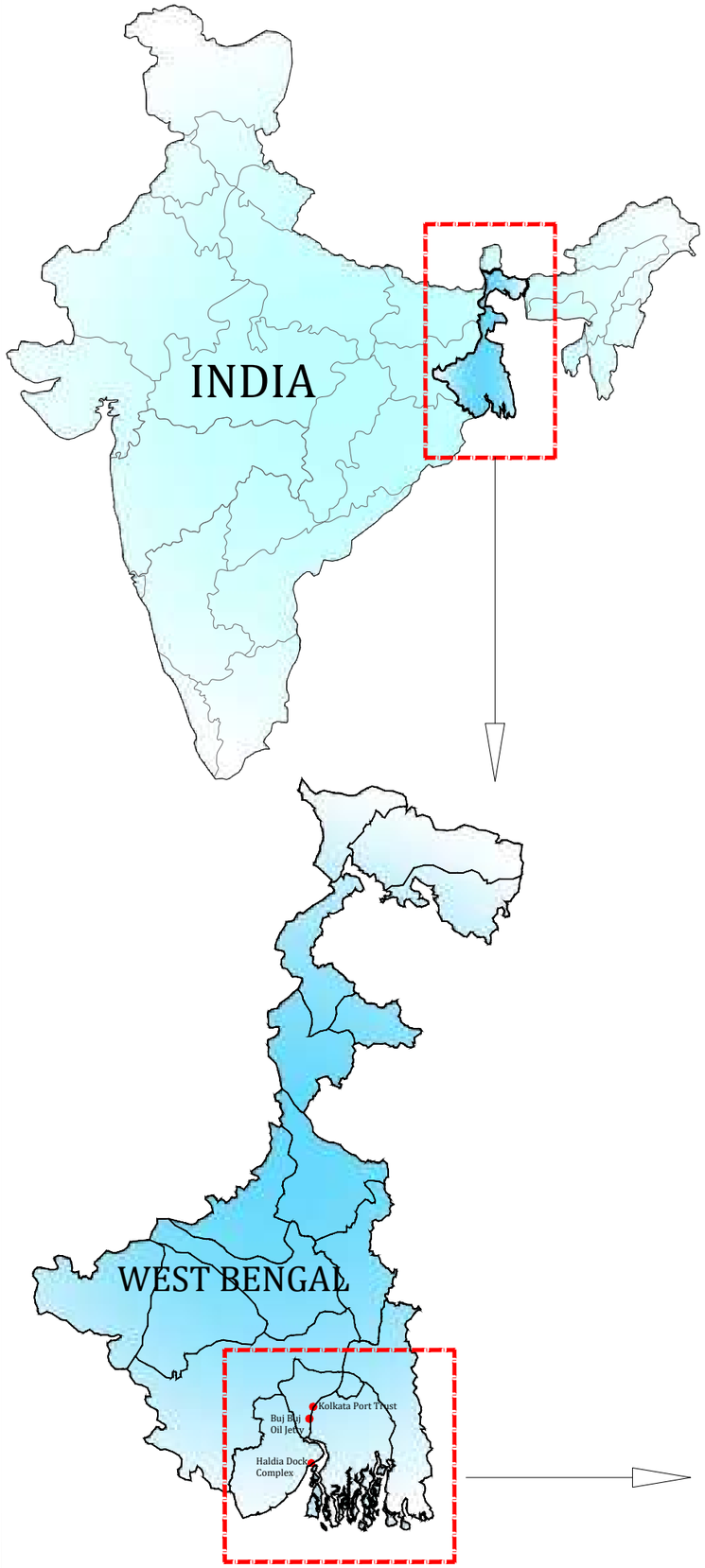
Sl. No	Commodity	B/1	B/5	B/9	B/14	MHC Berth Total	B/4	B/10	B/13	B/11	B/12
1	Coking Coal	24,41,970	8,86,927	21,66,283	6,84,370	**61,79,550**	28,82,733	47,235	-	-	-
2	Non Coking Coal	14,73,524	15,19,568	15,19,892	15,13,027	**60,26,011**	1,31,000	1,29,329	-	-	-
3	Coke Breeze	20,546	62,071	60,966	17,095	**1,60,678**	-	-	-	-	-
4	Met. Coke	1,59,971	84,162	1,11,336	2,02,039	**5,57,508**	-	15,700	-	-	-
5	R. P. Coke	16,000	40,920	22,000	45,566	**1,24,486**	-	-	-	-	-
6	Lime Stone	6,60,126	1,32,228	5,99,897	71,513	**14,63,764**	-	-	10,41,510	-	-
7	Rock Phosphate	11,700	92,866	-	1,65,198	**2,69,764**	-	35,100	9,868	-	-
8	Ammonium Sulphate	-	-	15,800	-	**15,800**	-	-	8,400	-	-
9	Sulphur	-	18,700	-	-	**18,700**	-	7,000	29,801	-	-
10	Fertilizer (F)	-	-	-	-	**-**	-	-	94,983	-	-
11	Manganese Ore	3,77,609	6,72,371	2,57,975	7,73,444	**20,81,400**	-	4,00,857	-	-	-
12	Pyroxinite	-	-	30,000	30,106	**60,106**	-	-	5,87,860	-	-
13	Dolomite	-	-	-	-	**-**	-	-	1,46,494	-	-
14	Soda Ash	-	-	-	-	**-**	-	38,000	-	-	-
15	Sugar	-	-	-	1,91,671	**1,91,671**	-	71,105	-	6,450	60,532
16	Gypsum	-	1,33,661	34,280	62,293	**2,30,234**	-	-	35,384	-	-
17	Pig Iron	-	-	-	-	**-**	-	33,504	-	-	-
18	Iron & Steel Scrap	-	-	-	-	**-**	-	51,341	-	-	-
19	Iron Ore	19,500	3,96,771	27,000	3,78,949	**8,22,220**	-	6,06,910	-	-	17,260
20	Iron & Steel	-	-	-	-	**-**	-	-	7,497	-	-
21	Wood Pulp	-	-	-	-	**-**	-	66,248	8,484	-	-
22	Iron & Steel	-	-	-	-	**-**	-	-	4,05,983	-	-
23	P. Cargo	-	-	-	-	**-**	-	-	2,717	-	-
24	Container Cargo	-	-	-	-	**-**	-	-	-	9,09,785	11,51,224
	Container TEUs	-	-	-	-	**-**	-	-	-	49,466	61,141
	TOTAL	**51,80,947**	**40,40,245**	**48,45,429**	**41,35,272**	**1,82,01,892**	**30,13,733**	**15,02,329**	**23,78,981**	**9,16,234**	**12,29,016**

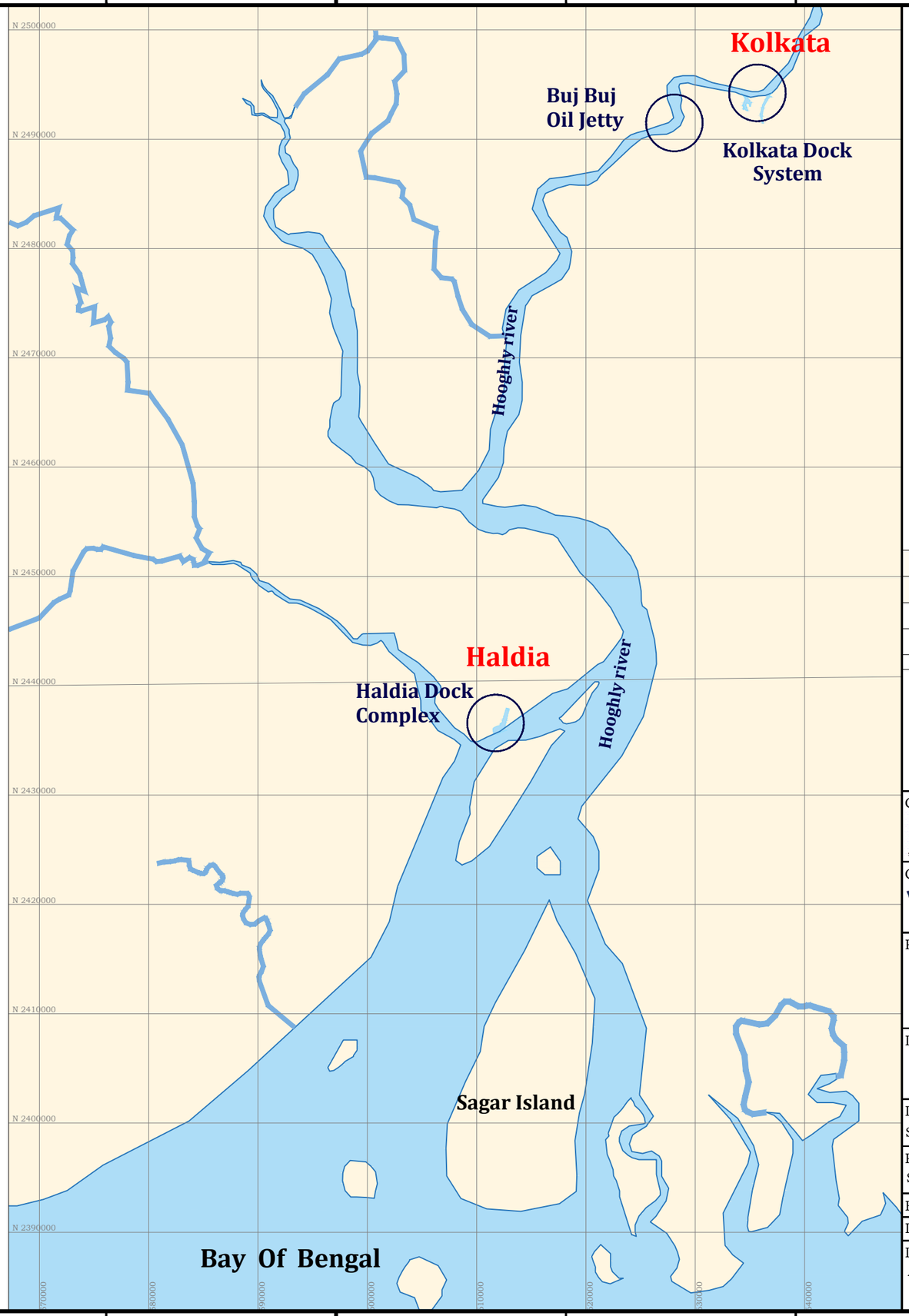
BERTHWISE CARGO TRAFFIC HANDLED AT HALDIA DURING THE YEAR 2024-25											
Sl. No	**Commodity**	**B/1**	**B/5**	**B/9**	**B/14**	**MHC Berth Total**	**B/4**	**B/10**	**B/13**	**B/11**	**B/12**
1	Coking Coal	18,15,231	11,02,493	18,10,308	5,94,440	**53,22,471**	19,19,786	59,060	-	-	-
2	Other Coal	11,81,957	6,85,332	9,07,588	10,85,357	**38,60,233**	5,67,087	1,32,454	-	-	-
3	Coke Breeze	16,646	-	-	-	**16,646**	-	-	-	-	-
4	Dolomite	17,281	79,061	-	12,987	**1,09,329**	-	-	57,278	-	-
5	Hot Briquetted Iron	-	-	-	-	**-**	-	53,000	-	-	-
6	Calcite Chips	-	-	-	-	**-**	-	-	28,000	-	-
7	Ammonium Sulphate	-	19,600	-	52,637	**72,237**	-	-	-	-	-
8	Gypsum	58,430	-	25,027	41,677	**1,25,134**	-	1,000	-	-	-
9	Sami Coke	-	-	-	-	**-**	-	-	32,906	-	-
10	Limestone	6,95,809	3,25,704	7,98,554	2,90,121	**21,10,188**	-	50,179	5,87,435	-	-
11	Lentils	-	-	-	-	**-**	-	24,555	-	-	-
12	Maize	-	-	-	-	**-**	-	23,500	-	-	-
13	Murate Of Potash (Mop)	-	-	-	-	**-**	-	-	1,49,408	-	-
14	Manganese Ore	3,41,328	9,02,173	4,29,024	8,95,969	**25,68,495**	-	3,11,322	-	-	-
15	Metallurgical Coke	70,800	2,01,163	29,700	3,71,094	**6,72,757**	-	17,217	-	-	-
16	Pyroxenite	1,70,417	35,914	-	51,443	**2,57,774**	-	-	3,99,421	-	-
17	Raw Petroleum Coke	30,311	80,360	-	9,900	**1,20,572**	-	17,600	-	-	-
18	Rock Phosphate	-	95,945	-	1,85,766	**2,81,711**	-	-	36,700	-	-
19	Iron & Steel Scrap	-	-	-	-	**-**	-	89,747	-	-	-
20	Soda Ash	-	-	-	-	**-**	-	34,600	18,000	-	-
21	Sulphur	-	14,943	-	10,609	**25,552**	-	-	62,300	-	-
22	Iron Ore Fines	39,100	1,19,900	23,514	41,816	**2,24,330**	-	2,33,278	-	-	-
23	Iron & Steel Products	-	-	-	-	**-**	-	-	450	-	-
24	Project Cargo	-	-	-	-	**-**	-	505	183	-	-
25	Sugar	-	-	-	-	**-**	-	16,508	-	-	-
26	Rice	-	-	-	-	**-**	-	24,557	-	-	7,041
27	Iron & Steel Products	-	-	-	-	**-**	-	-	2,17,007	-	-
28	Woodpulp	-	-	-	-	**-**	-	47,901	8,080	5,207	-
29	Project Cargo	-	-	-	-	**-**	-	-	9,079	-	-
30	PTA	-	-	-	-	**-**	-	3,979	-	-	-
31	Container Cargo	-	-	-	-	-	-	-	-	14,24,053	17,27,140
	Container TEUs	-	-	-	-	-	-	-	-	84,101	95,993
	TOTAL	**44,37,310**	**36,62,588**	**40,23,715**	**36,43,816**	**1,57,67,428**	**24,86,873**	**11,40,961**	**16,06,248**	**14,29,260**	**17,34,180**

DRAWINGS

FINAL-DPR LIST OF DRAWINGS				
Sl. No.	**DRAWING TITLE**	**DRAWING NUMBER**	**DATE**	**REV**
1	Project Location Map	SMPK/PMS/2425-052/HDC/TEFR/0101	14-05-2025	R1
2	Location Map of Haldia Dock Complex	SMPK/PMS/2425-052/HDC/TEFR/0201	14-05-2025	R1
3	Backup Area of HDC Cct and Berth no. 11 & 12	SMPK/PMS/2425-052/HDC/TEFR/0202	22-01-2026	R2
4	Project Location & Backup Area of Outer Terminal	SMPK/PMS/2425-052/HDC/TEFR/0203	22-01-2026	R2
5	Project Location & Backup Area of Berth 11 & 12	SMPK/PMS/2425-052/HDC/TEFR/0204	22-01-2026	R2
6	Bathymetry layout of Outer Terminal	SMPK/PMS/2425-052/HDC/TEFR/0205	14-05-2025	R1
7	Bathymetry layout of Berth 11 &12	SMPK/PMS/2425-052/HDC/TEFR/0206	14-05-2025	R1
8	Existing Road and Railway Connectivity	SMPK/PMS/2425-052/HDC/TEFR/0207	22-01-2026	R2
9	Berth No.11 & 12 Plan And Cross Section Of Deck Slab	SMPK/PMS/2425-052/HDC/TEFR/0501	14-05-2025	R1
10	Mechanization Scheme - I (RMQC/MHC+RTG+RS+EH+TT)	SMPK/PMS/2425-052/HDC/TEFR/0601	14-05-2025	R1
11	Mechanization Scheme - II (RMQC/MHC+RS+EH+TT)	SMPK/PMS/2425-052/HDC/TEFR/0602	14-05-2025	R1
12	Mechanization Scheme - III (RMQC/MHC+RS+EH+TT)	SMPK/PMS/2425-052/HDC/TEFR/0603	14-05-2025	R1
13	Layout of Alternative-I of HDC Outer Container Terminal (RTG+RS+TT)	SMPK/PMS/2425-052/HDC/TEFR/0604(1 OF 2)	22-01-2026	R2
14	Layout of Alternative-I of HDC Berth 11 & 12 (RTG+RS+TT)	SMPK/PMS/2425-052/HDC/TEFR/0604(2 OF 2)	22-01-2026	R2
15	Layout of Alternative-II of HDC Outer Container Terminal (RS+TT)	SMPK/PMS/2425-052/HDC/TEFR/0605(1 OF 2)	22-01-2026	R2
16	Layout of Alternative-II of HDC Berth 11 & 12 (RS+TT)	SMPK/PMS/2425-052/HDC/TEFR/0605(2 OF 2)	22-01-2026	R2
17	Layout of Alternative-III of HDC Outer Container Terminal (SC+TT)	SMPK/PMS/2425-052/HDC/TEFR/0606(1 OF 2)	22-01-2026	R2
18	Layout of Alternative-III of HDC Berth 11 & 12 (SC+TT)	SMPK/PMS/2425-052/HDC/TEFR/0606(2 OF 2)	22-01-2026	R2
19	Overall layout Development Plan of Outer Terminal and Berth 11 &12	SMPK/PMS/2425-052/HDC/TEFR/0701	14-05-2025	R1
20	Development Plan of HDC Outer Terminal	SMPK/PMS/2425-052/HDC/TEFR/0702	22-01-2026	R2
21	Development Plan of Berth 11 & 12	SMPK/PMS/2425-052/HDC/TEFR/0703	22-01-2026	R2
22	Options Proposed for OCT Berths	SMPK/PMS/2425-052/HDC/TEFR/0704(1 OF 2)	14-05-2025	R1
23	Layout of Marine Side Facility	SMPK/PMS/2425-052/HDC/TEFR/0704(2 OF 2)	14-05-2025	R1
24	General arrangment of Proposed Outer Container Terminal	SMPK/PMS/2425-052/HDC/TEFR/0705	14-05-2025	R1

Sl. No.	DRAWING TITLE	DRAWING NUMBER	DATE	REV
25	Proposed Outer Terminal Layout & Cross section MHC Arrangement	SMPK/PMS/2425-052/HDC/TEFR/0706(1 OF 2)	14-05-2025	R1
26	Proposed Outer Terminal Layout & Cross section RMQC Arrangement	SMPK/PMS/2425-052/HDC/TEFR/0706(2 OF 2)	14-05-2025	R1
27	Option-I Railway Layout of HDC	SMPK/PMS/2425-052/HDC/TEFR/0707	14-05-2025	R1
28	Option-II Railway Layout of HDC	SMPK/PMS/2425-052/HDC/TEFR/0708	14-05-2025	R1
29	Typical cross section of HDC Outer Container Terminal	SMPK/PMS/2425-052/HDC/TEFR/0709	14-05-2025	R1
30	Typical cross section of Berth 11 & 12	SMPK/PMS/2425-052/HDC/TEFR/0710	14-05-2025	R1
31	Reefer Cross Section of HDC Outer Terminal	SMPK/PMS/2425-052/HDC/TEFR/0711	14-05-2025	R1
32	Reefer Cross Section of Berth 11 & 12	SMPK/PMS/2425-052/HDC/TEFR/0712	14-05-2025	R1
33	Pavement Layout and Pavement Details of Outer Container Terminal	SMPK/PMS/2425-052/HDC/TEFR/0713	14-05-2025	R1
34	Pavement Layout and Pavement Details of Berth 11 & 12	SMPK/PMS/2425-052/HDC/TEFR/0714	14-05-2025	R1
35	llumination Drawing of HDC Outer Terminal	SMPK/PMS/2425-052/HDC/TEFR/0715	14-05-2025	R1
36	llumination Drawing of Berth 11 & 12	SMPK/PMS/2425-052/HDC/TEFR/0716	14-05-2025	R1
37	HDC Oct and Berth 11 & 12 Traffic Flow plan	SMPK/PMS/2425-052/HDC/TEFR/0717	14-05-2025	R1
38	Berth Structural Layout of Plan & Cross Section	SMPK/PMS/2425-052/HDC/TEFR/0718	14-05-2025	R1
39	Approach Trestle-I Structural Layout - Plan and Cross Section	SMPK/PMS/2425-052/HDC/TEFR/0719(1 OF 2)	14-05-2025	R1
40	Approach Trestle-II Structural Layout - Plan and Cross Section	SMPK/PMS/2425-052/HDC/TEFR/0719(2 OF 2)	14-05-2025	R1
41	HDC OCT River Bank Protection Details	SMPK/PMS/2425-052/HDC/TEFR/0720	14-05-2025	R1





NOTES:

1. All dimensions in millimeters,unless otherwise specified.
2. Dimension shall not be scaled only written dimensions shall be followed.
3. This drawing shall not be used other than purpose marked issued.
4. The layout is marked as per Universal Transverse Mercator (UTM) coordinate system.

Location Coordinates

Location Point	Latitude (Easting)	Longitude (Nothing)
Kolkata Dock System	633554.89	2493395.35
Haldia Dock Complex	612133.91	2437760.28
Buj Buj Oil Jetty	621394.70	2487384.11

Client: **Syama Prasad Mookerjee Port, Kolkata**

Consultant: **Voyants Solutions Private Limited**

Project Title:

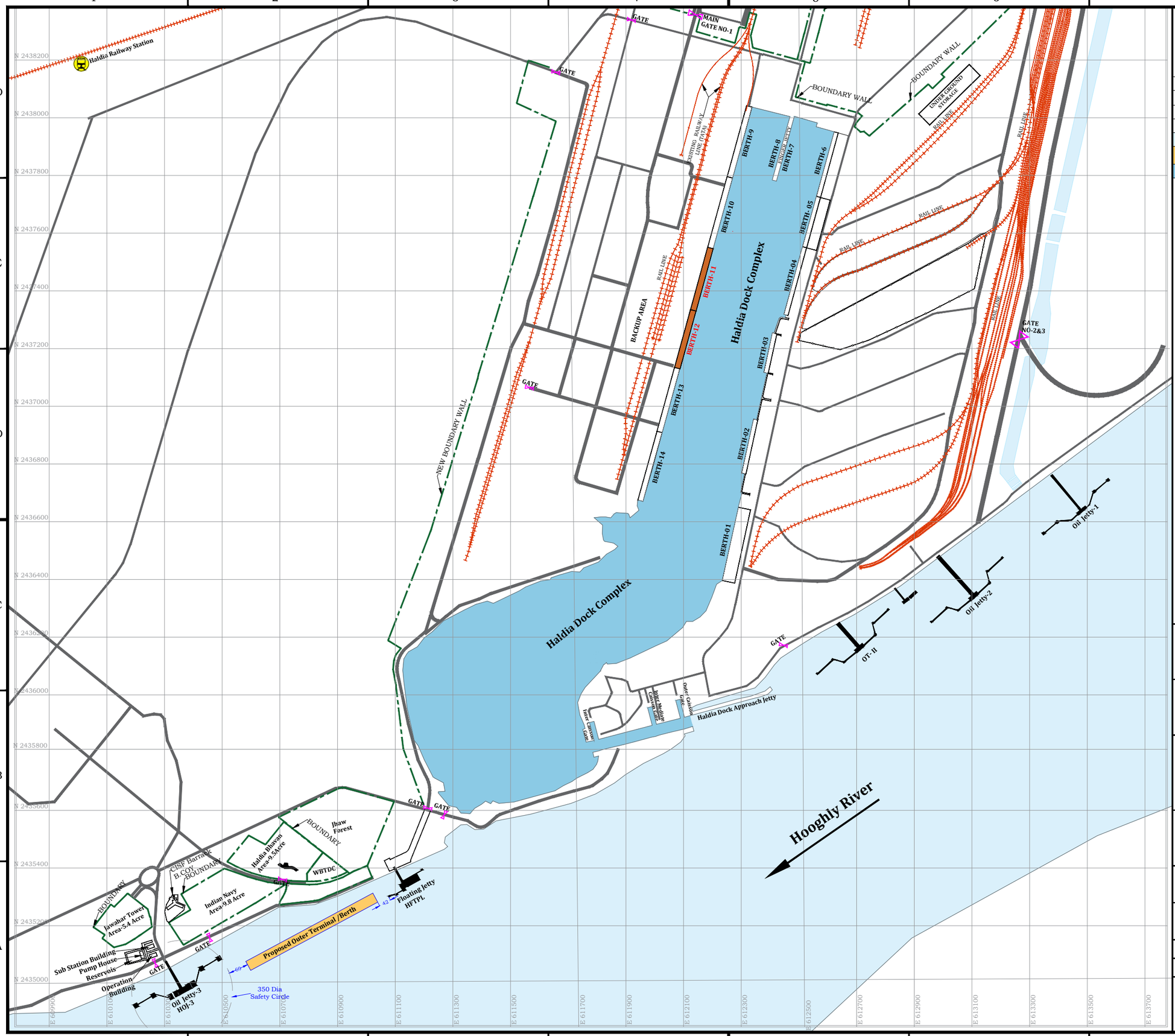
DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

Drawing Title:

LOCATION MAP OF SMPK

Drawing No.	Report No
SMPK/PMS/2425-036/HDC/TEFR/0101	RP001

Project No.		
SMPK-GUR/2425-052/PORTS		N / W E / S
Rev No. : R1	Sheet size : A3	
Date :14-05-2025	Scale : NTS	
Drawn by: ABR	Checked by: NBL	Approved by: SDC



NOTE:
1. All dimensions are in meters unless otherwise specified.
2. The Grid Line is marked as per Universal Transverse Mercator (UTM) Co-ordinate system.

Legends	
	Port Boundary
	Road
	Rail
	River
	Proposed Berth Location
	Dock Basin

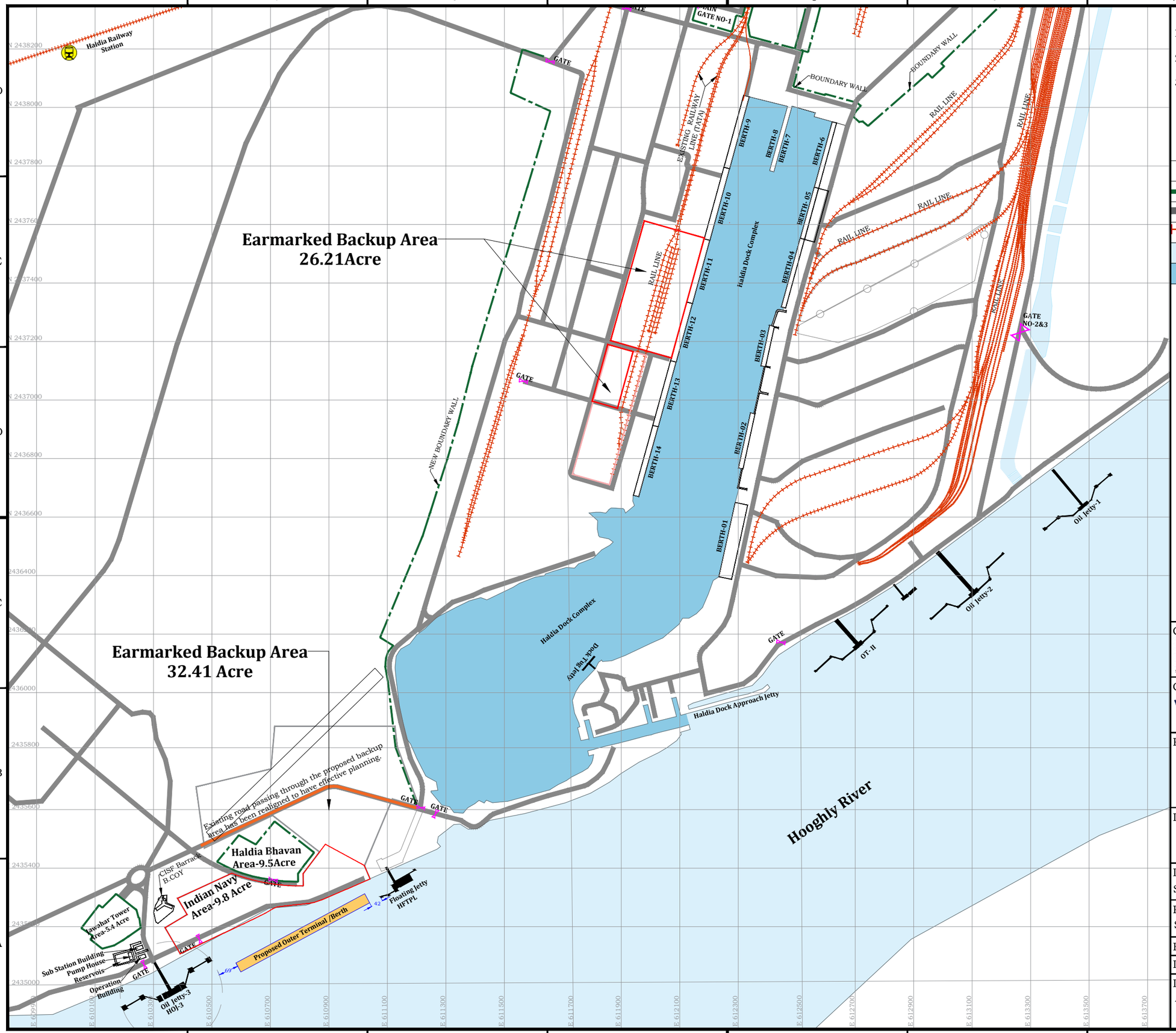
Client: **Syama Prasad Mookerjee Port, Kolkata**

Consultant: **Voyants Solutions Private Limited**

Project Title:
DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

Drawing Title:
LOCATION MAP OF HALDIA DOCK COMPLEX

Drawing No. SMPK/PMS/2425-052/HDC/TEFR/0201	Report No RP001
Project No. SMPK-GUR/2425-052/PORTS	
Rev No. : R1	Sheet size : A3
Date :14-05-2025	Scale : NTS
Drawn by: ABR	Checked by: NBL
Approved by: SDC	



1. All dimensions are in meters unless otherwise specified.
2. The Grid Line is marked as per Universal Transverse Mercator (UTM) Co-ordinate system.
3. The existing road of 3.7 m wide towards the Township passing through the proposed backup area has been realigned to have effective planning.

Legends

	Port Boundary
	Road
	Rail
	River
	Dock Basin

Client: **Syama Prasad Mookerjee Port, Kolkata**

Consultant: **Voyants Solutions Private Limited**

Project Title:

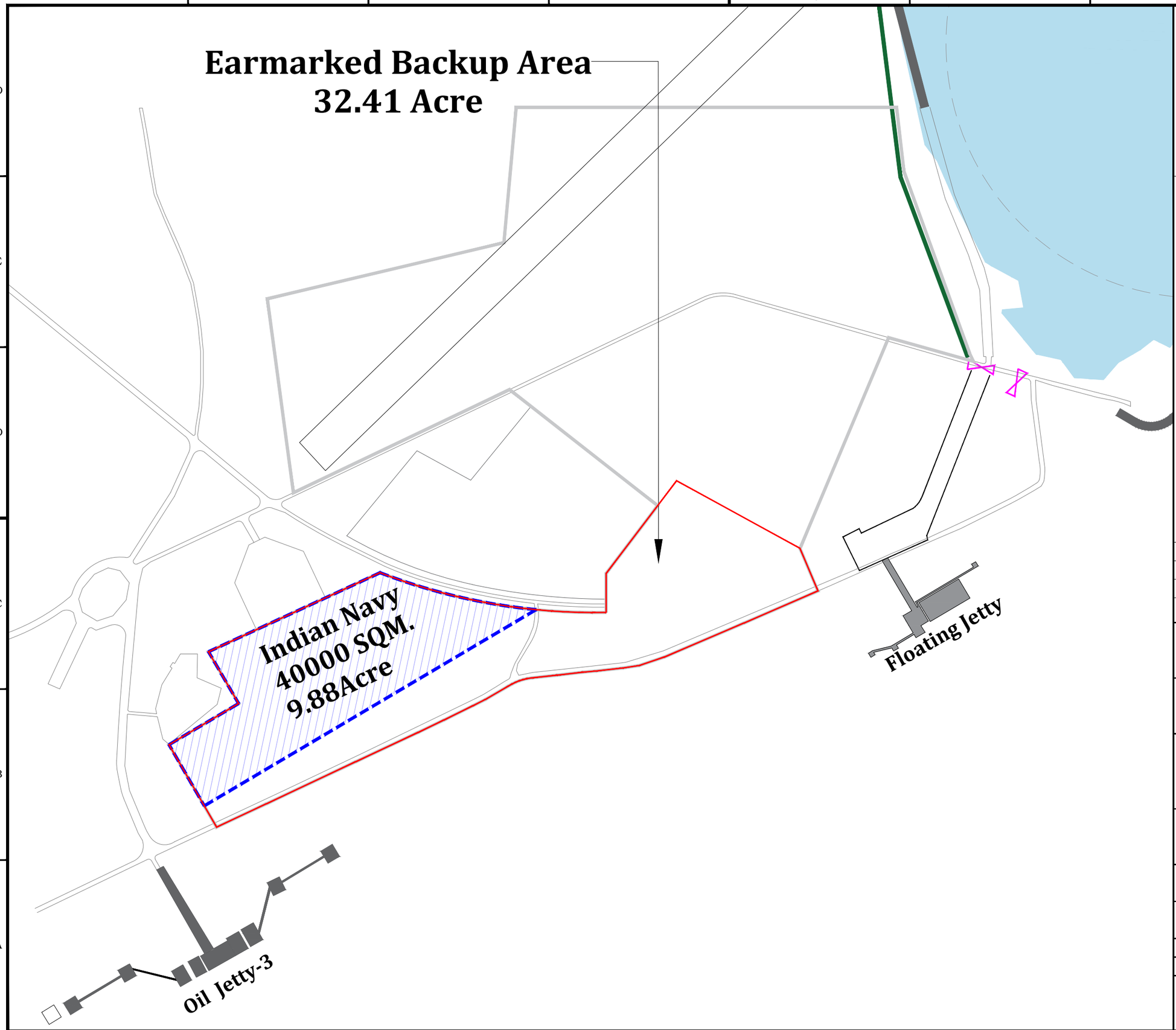
DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

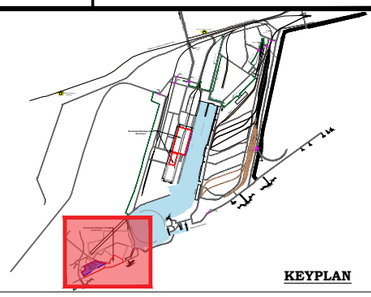
Drawing Title:

BACKUP AREA OF HDC OT AND BERTH NO. 11&12

Drawing No. SMPK/PMS/2425-052/HDC/TEFR/0202	Report No RP001
Project No. SMPK-GUR/2425-052/PORTS	
Rev No. : R2	Sheet size : A3
Date :22-01-2026	Scale : NTS
Drawn by: ABR	Checked by: BSK
	Approved by: SDC

Earmarked Backup Area
32.41 Acre





NOTES:

1. All dimensions in meters,unless otherwise specified.
2. Dimension shall not be scaled only written dimensions shall be followed.
3. This drawing shall not be used other than purpose marked issued.

No.	Stage/ Description	Drawn by	Checked by	Approved by	Date

Client: **Syama Prasad Mookerjee Port, Kolkata**

Consultant: **Voyants Solutions Private Limited**

Project Title:

DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

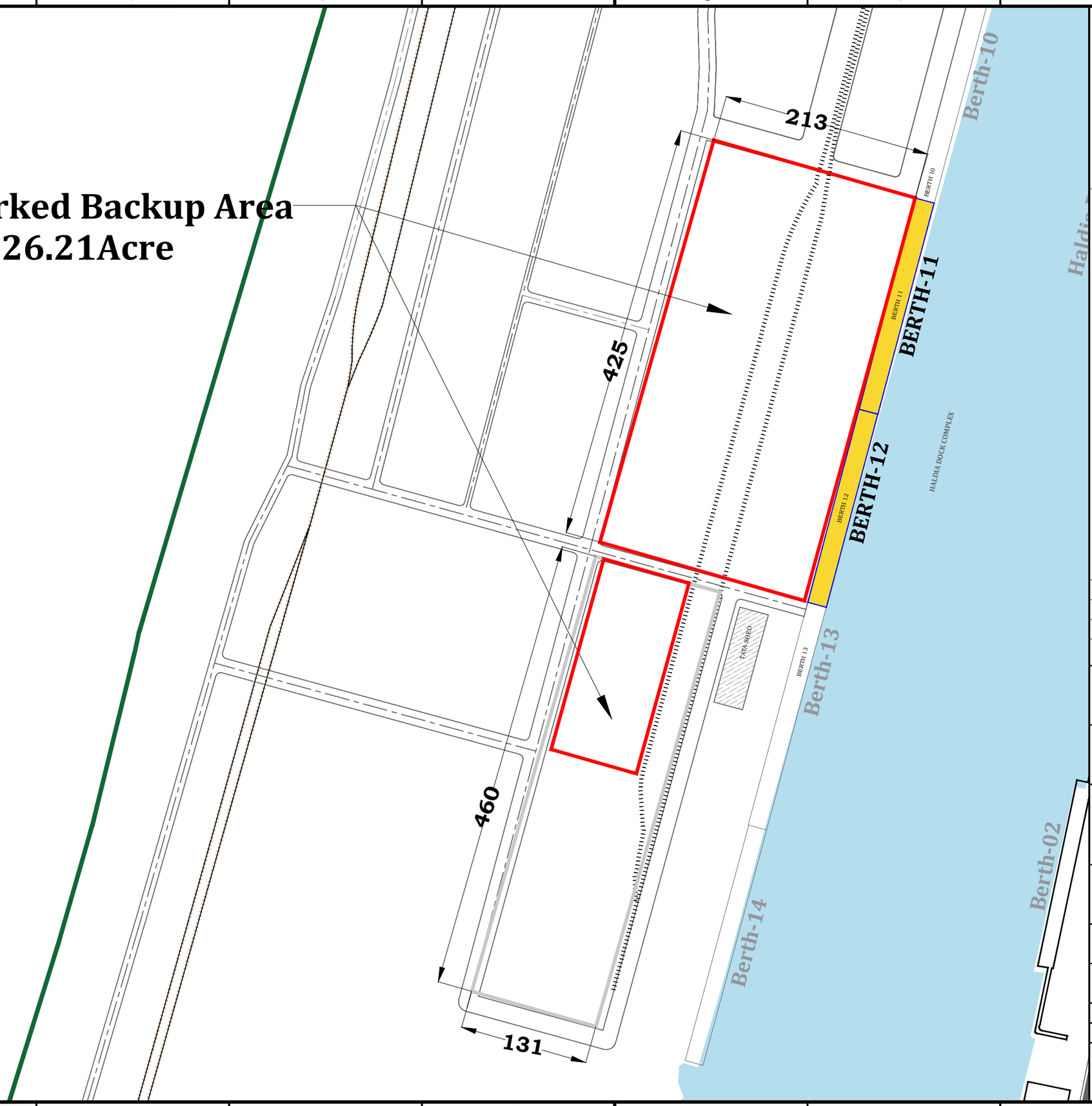
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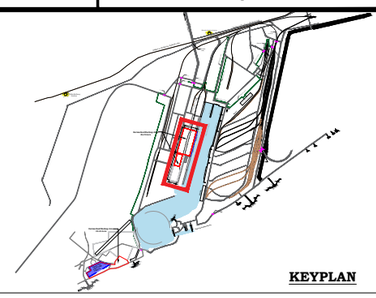
Project Location &
Backup Area of Berth OT

Drawing No. SMPK/PMS/2425-052/HDC/TEFR/0203	Report No RP001
Project No. SMPK-GUR/2425-052/PORTS	
Rev No. : R2	Sheet size : A3
Date :22-01-2026	Scale : NTS

Drawn by:	Checked by:	Approved by:
ABR	BSK	SDC

Earmarked Backup Area
26.21Acre





KEYPLAN

NOTES:

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2. Dimension shall not be scaled only written dimensions shall be followed.
3. This drawing shall not be used other than purpose marked issued.

No.	Stage/ Description	Drawn by	Checked by	Approved by	Date

Client: **Syama Prasad Mookerjee Port, Kolkata**

Consultant: **Voyants Solutions Private Limited**

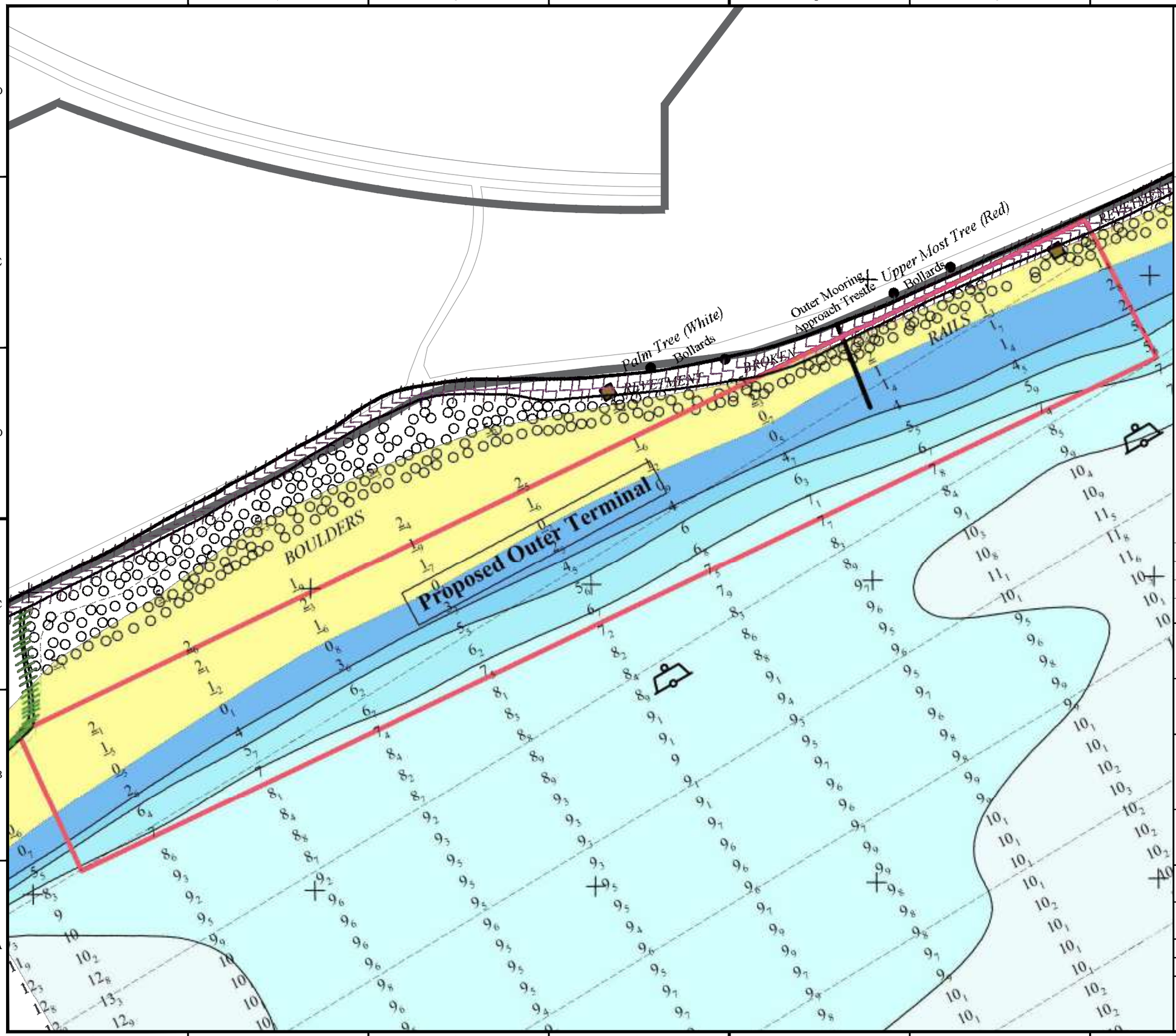
Project Title:

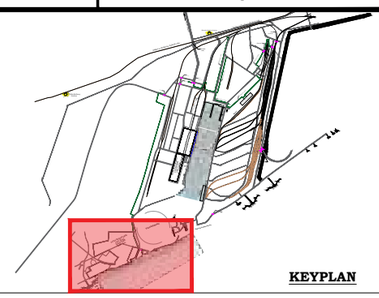
DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

Drawing Title:

Project Location & Backup Area of Berth 11 & 12

Drawing No. SMPK/PMS/2425-052/HDC/TEFR/0204	Report No RP001
Project No. SMPK-GUR/2425-052/PORTS	
Rev No. : R2	Sheet size : A3
Date :22-01-2026	Scale : NTS
Drawn by: ABR	Checked by: BSK / Approved by: SDC





NOTES:

1. All dimensions in meters,unless otherwise specified.
2. Dimension shall not be scaled only written dimensions shall be followed.
3. This drawing shall not be used other than purpose marked issued.

No.	Stage/ Description	Drawn by	Checked by	Approved by	Date

Client:

Syama Prasad Mookerjee Port, Kolkata

Consultant:

Voyants Solutions Private Limited

Project Title:

DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

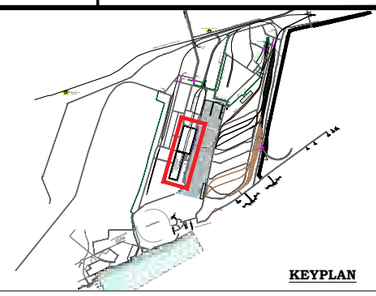
Drawing Title:

BATHYMETRY LAYOUT
OF BERTH OUTER TERMINAL

Drawing No. SMPK/PMS/2425-052/HDC/TEFR/0205	Report No RP001
Project No. SMPK-GUR/2425-052/PORTS	
Rev No. : R1	Sheet size : A3
Date :14-05-2025	Scale : NTS

Drawn by:	Checked by:	Approved by:
ABR	NBL	SDC





KEYPLAN

NOTES:

1. All dimensions in meters,unless otherwise specified.
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3. This drawing shall not be used other than purpose marked issued.

No.	Stage/ Description	Drawn by	Checked by	Approved by	Date

Client: **Syama Prasad Mookerjee Port, Kolkata**

Consultant: **Voyants Solutions Private Limited**

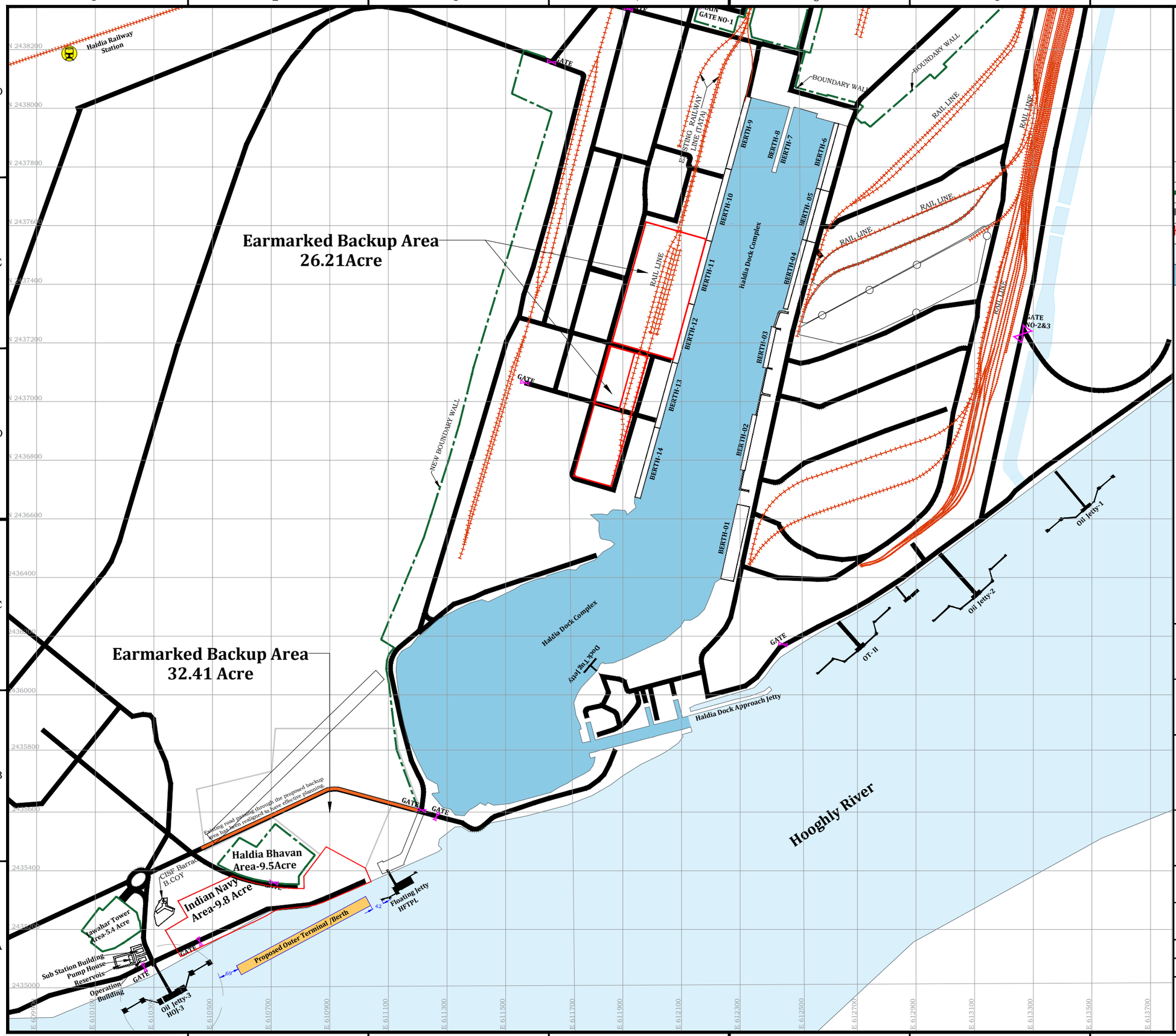
Project Title:

DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

Drawing Title:

BATHYMETRY LAYOUT OF BERTH 11 & 12

Drawing No. SMPK/PMS/2425-052/HDC/TEFR/0206	Report No RP001
Project No. SMPK-GUR/2425-052/PORTS	
Rev No. : R1	Sheet size : A3
Date :14-05-2025	Scale : NTS
Drawn by: ABR	Checked by: NBL
Approved by: SDC	



1. All dimensions are in meters unless otherwise specified.
2. The Grid Line is marked as per Universal Transverse Mercator (UTM) Co-ordinate system.
3. The existing road of 3.7 m wide towards the Township passing through the proposed backup area has been realigned to have effective planning.

Legends

	Port Boundary
	Road
	Rail
	River
	Dock Basin

Client: **Syama Prasad Mookerjee Port, Kolkata**

Consultant: **Voyants Solutions Private Limited**

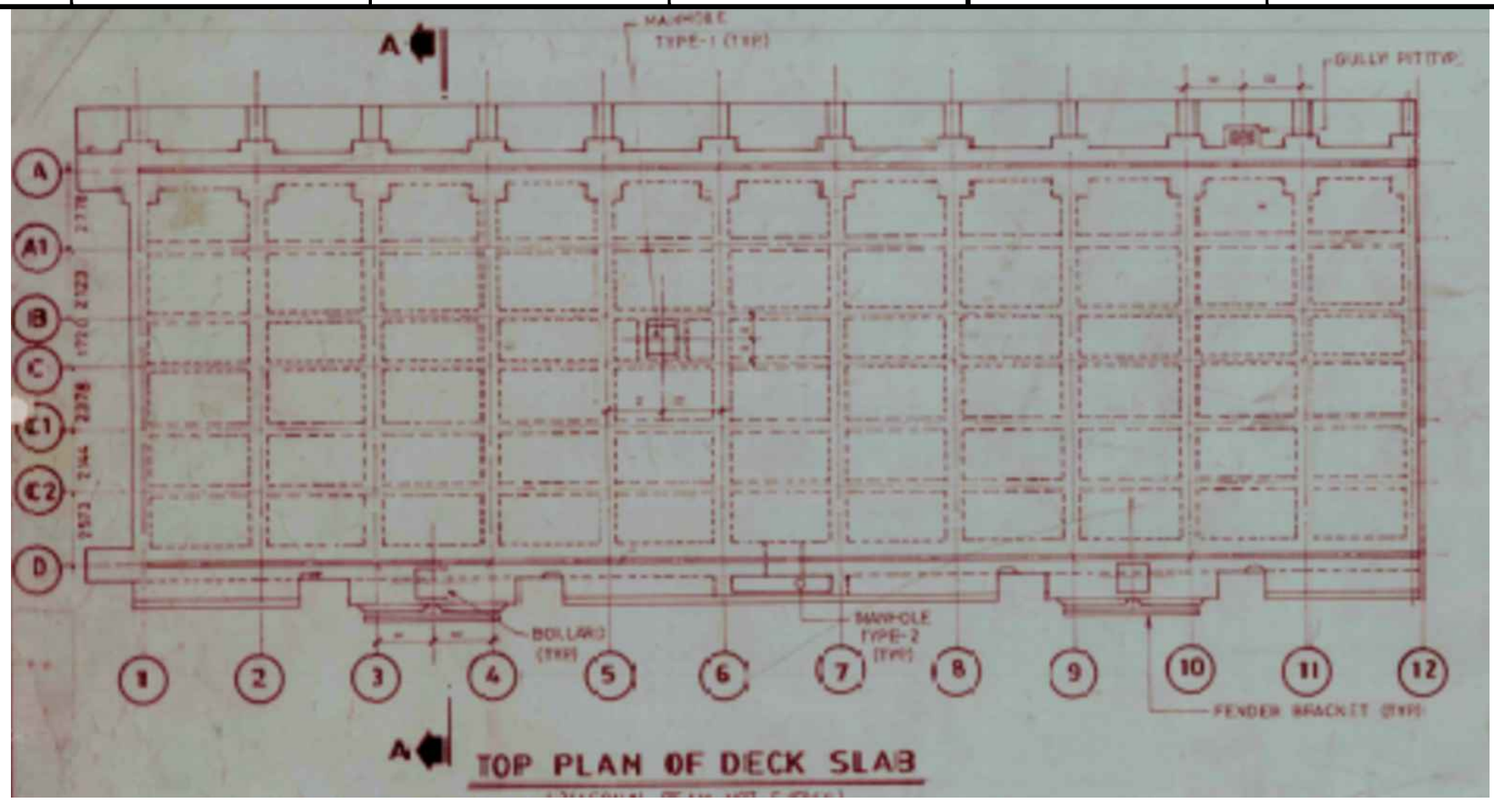
Project Title:

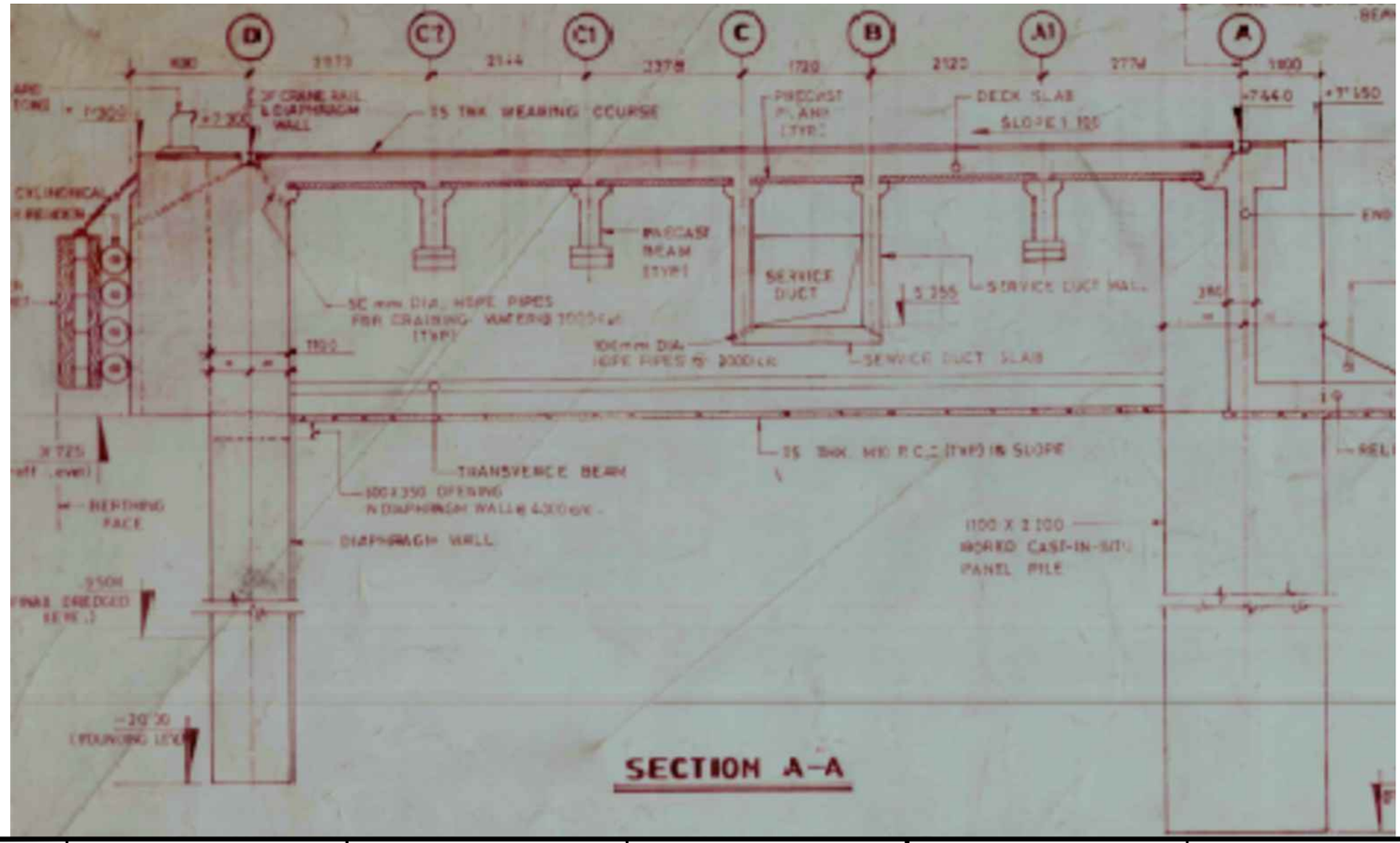
DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

Drawing Title:

EXISTING RAIL AND ROAD CONNECTIVITY

Drawing No. SMPK/PMS/2425-052/HDC/TEFR/0207		Report No RP001
Project No. SMPK-GUR/2425-052/PORTS		
Rev No. : R2	Sheet size : A3	
Date :22-01-2026	Scale : NTS	
Drawn by: ABR	Checked by: BSK	Approved by: SDC





1. All dimensions are given in "m" unless otherwise specified.
2. All levels are in "m" w.r.t C.D where C.D is Chart Datum

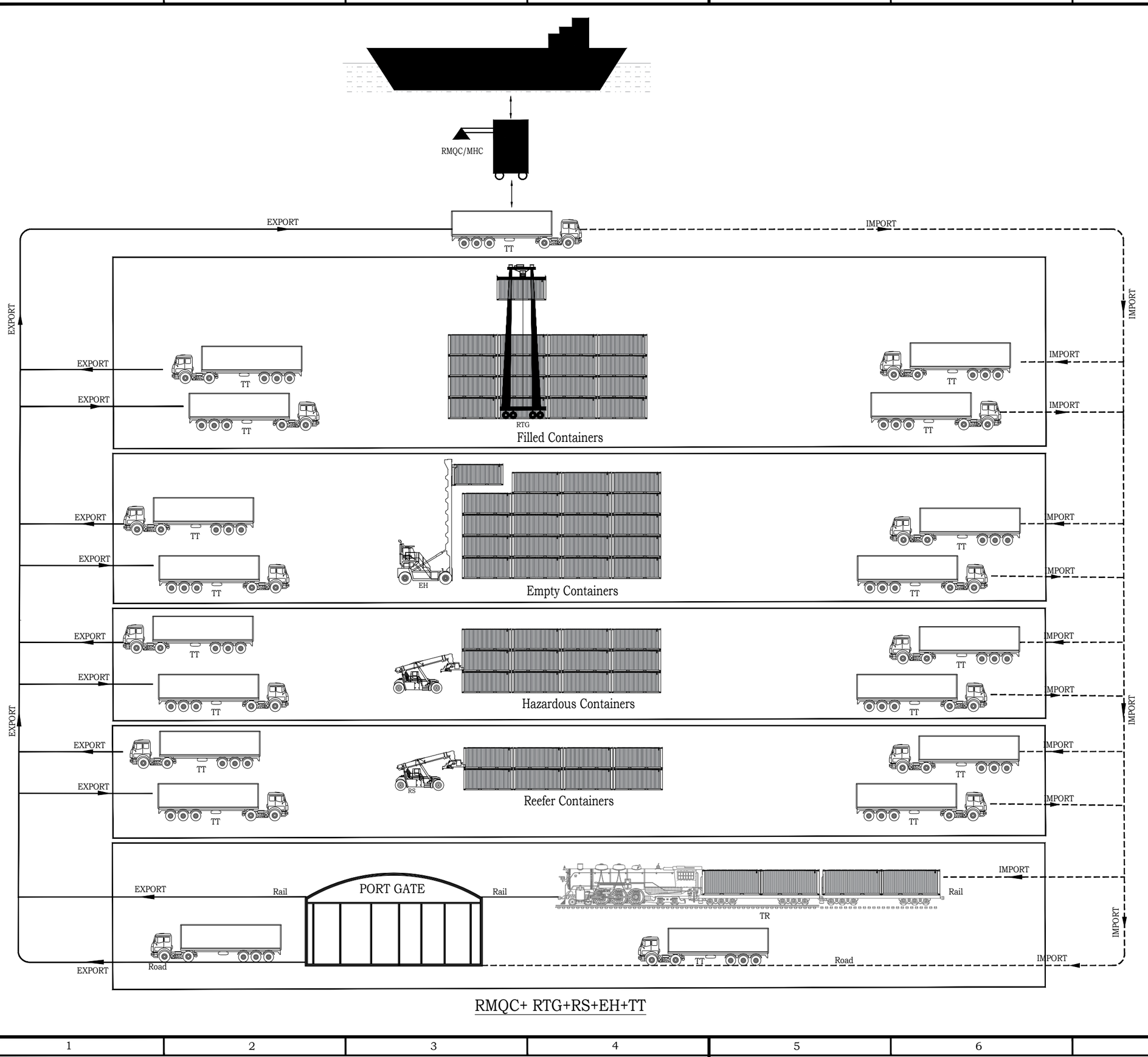
Client:
Syama Prasad Mookerjee Port, Kolkata

Consultant:
Voyants Solutions Private Limited

Project Title:
DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

Drawing Title:
BERTH NO.11 & 12 PLAN AND CROSS SECTION OF DECK SLAB

Drawing No. SMPK/PMS/2425-052/HDC/TEFR/0501	Report No RP001
Project No. SMPK-GUR/2425-052/PORTS	
Rev No. : R1	Sheet size : A3
Date 14-05-2025	Scale : NTS
Drawn by: ABR	Checked by: NBL
	Approved by: SDC



1. Details are indicative only for demonstration of operations

Legends

———	Export
- - - - -	Import

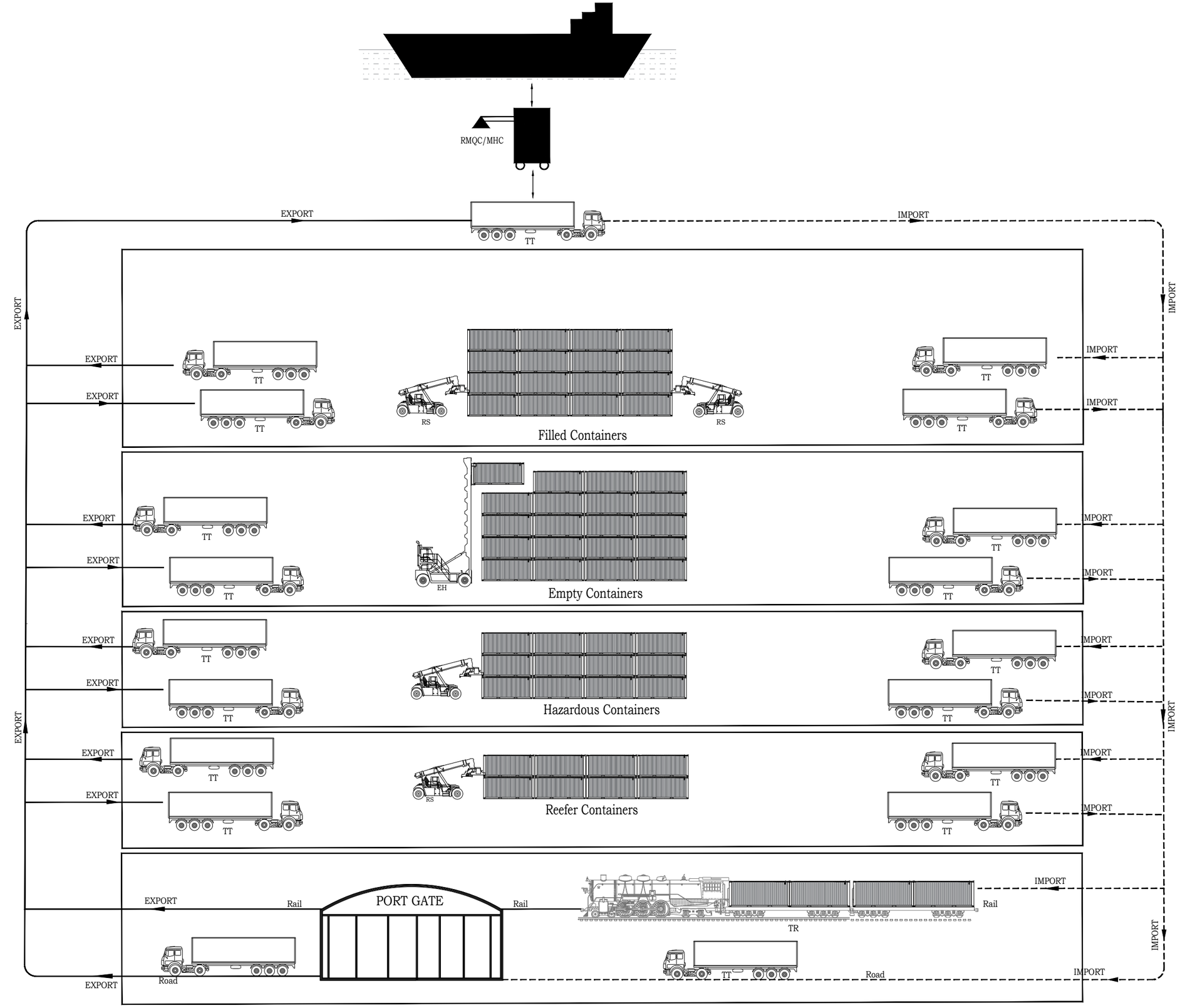
Client: **Syama Prasad Mookerjee Port, Kolkata**

Consultant: **Voyants Solutions Private Limited**

Project Title:
DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

Drawing Title:
MECHANIZATION SCHEME - I
(RMQC/MHC+RTG+RS+EH+TT)

Drawing No. SMPK/PMS/2425-052/HDC/TEFR/0601	Report No RP001
Project No. SMPK-GUR/2425-052/PORTS	
Rev No. : R1	Sheet size : A3
Date 14-05-2025	Scale : NTS
Drawn by: ABR	Checked by: NBL
Approved by: SDC	



1. Details are indicative only for demonstration of operations

Legends

———	Export
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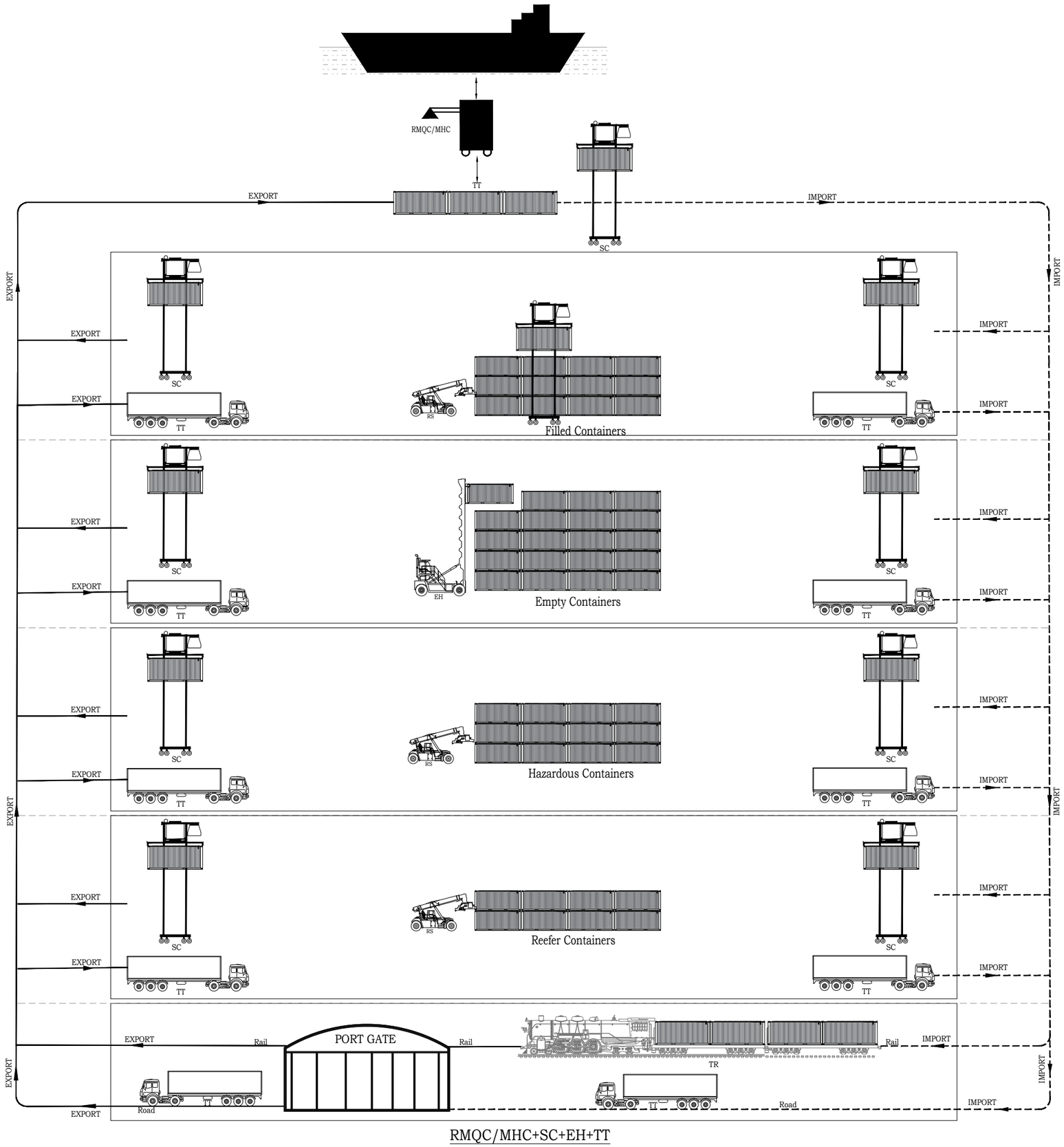
Client: **Syama Prasad Mookerjee Port, Kolkata**

Consultant: **Voyants Solutions Private Limited**

Project Title:
DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

Drawing Title:
MECHANIZATION SCHEME -II
(RMQC/MHC+RS+EH+TT)

Drawing No. SMPK/PMS/2425-052/HDC/TEFR/0602	Report No RP001
Project No. SMPK-GUR/2425-052/PORTS	
Rev No. : R1	Sheet size : A3
Date 14-05-2025	Scale : NTS
Drawn by: ABR	Checked by: NBL
Approved by: SDC	



RMQC/MHC+SC+EH+TT

1. Details are indicative only for demonstration of operations

Legends

———	Export
- - - - -	Import

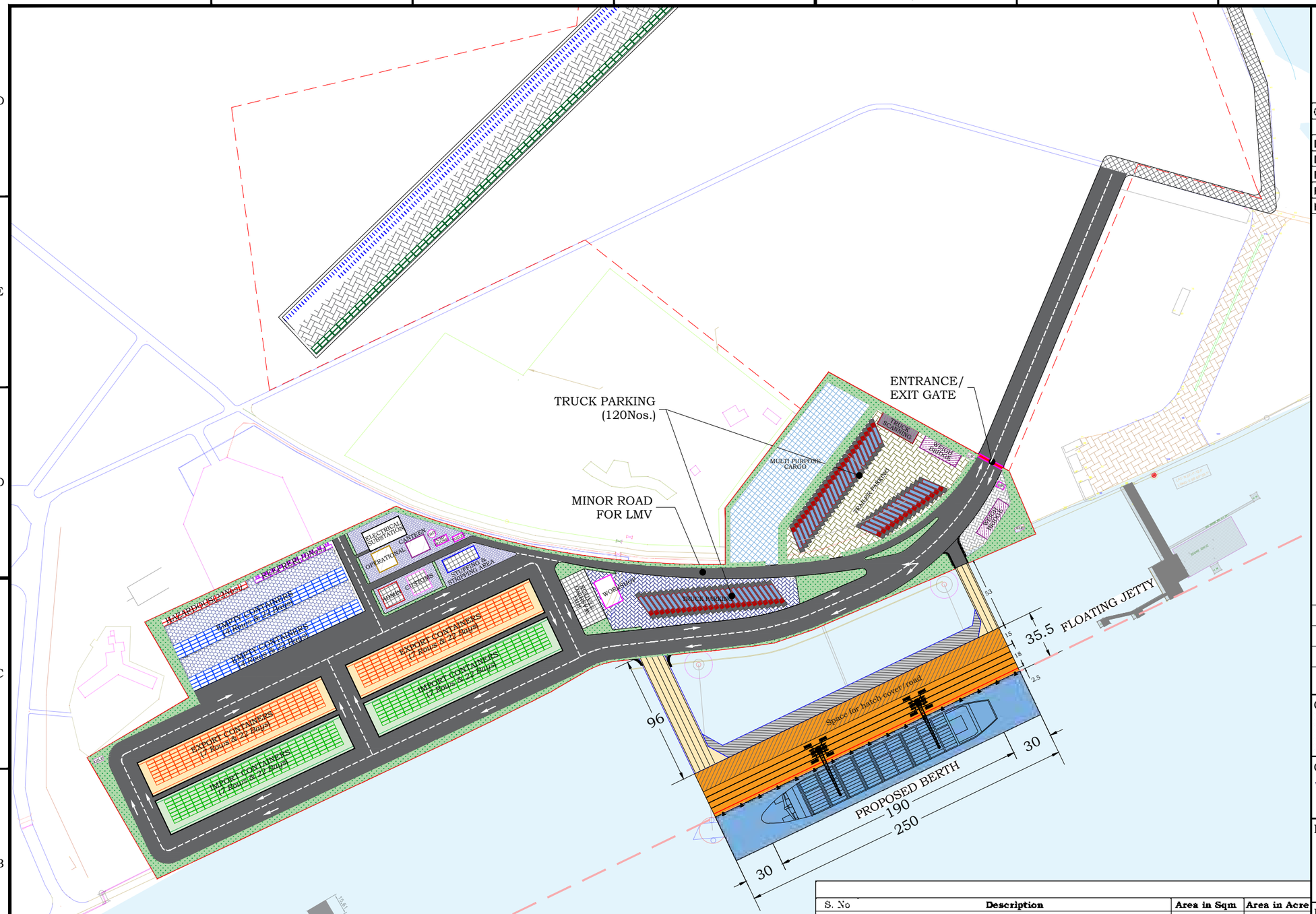
Client: **Syama Prasad Mookerjee Port, Kolkata**

Consultant: **Voyants Solutions Private Limited**

Project Title:
DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

Drawing Title:
MECHANIZATION SCHEME -III
(RMQC/MHC+RS+EH+TT)

Drawing No. SMPK/PMS/2425-052/HDC/TEFR/0603	Report No RP001
Project No. SMPK-GUR/2425-052/PORTS	
Rev No. : R1	Sheet size : A3
Date 14-05-2025	Scale : NTS
Drawn by: ABR	Checked by: NBL
Approved by: SDC	



NOTES:

1. All dimensions in Meters,unless otherwise specified.
2. Dimension shall not be scaled only written dimensions shall be followed.
3. This drawing shall not be used other than purpose marked issued.
4. The location and positioning of the Outer terminal is finalized in due consultation with SMPK - IITM and the Consultant

Optimal Capacity	0.231 M TEUs		
Ground Slot			
Description	Required	Provided	Area (Acre)
Dry Filled Containers	553	616	4.07
Empty Dry Containers	147	176	0.72
Reefer Containers	7	10	0.05
Hazardous Containers	-	22	0.09

S. No	Description	Area in Sqm	Area in Acre
A	**Total Backup Area Utilized for the project**	**90685.021**	**22.41**
A.1	*Footprint area for container storage including Track Area (Empty, Dry Hazardous and Reefer containers)*	*20118.36*	*4.97*
A.2	*Reach Stacker Movement Area*	*4459.26*	*1.10*
A.3	*Area for the Road and Vehicle Movement*	*31344.76*	*7.75*
A.4	*Multi-purpose*	*5384.44*	*1.33*
A.5	*Admin, Workshop & other utility building Area*	*3717.12*	*0.92*
A.6	*Greenery*	*9895.95*	*2.45*
A.7	*Trailer parking*	*7465.65*	*1.84*
A.8	*Parking*	*4666.61*	*1.15*
A.9	*Pavement area*	*3457.83*	*0.85*
A.10	*Miscellaneous area cannot be utilized*	*175.04*	*0.04*
B	**Development of Railway siding Area**	***40468.60***	***10.00***
C	**Utilized Area (C = A + B) to be handed over to the concessional**	**131153.621**	**32.41**

No.	Stage/ Description	Drawn by	Checked by	Approved by	Date

Client:
Syama Prasad Mookerjee Port, Kolkata

Consultant:
Voyants Solutions Private Limited

Project Title:
DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

Drawing Title:
LAYOUT OF ALTERNATIVE - I OF HDC OUTER TERMINAL (RTG+RS+TT)
1 OF 2

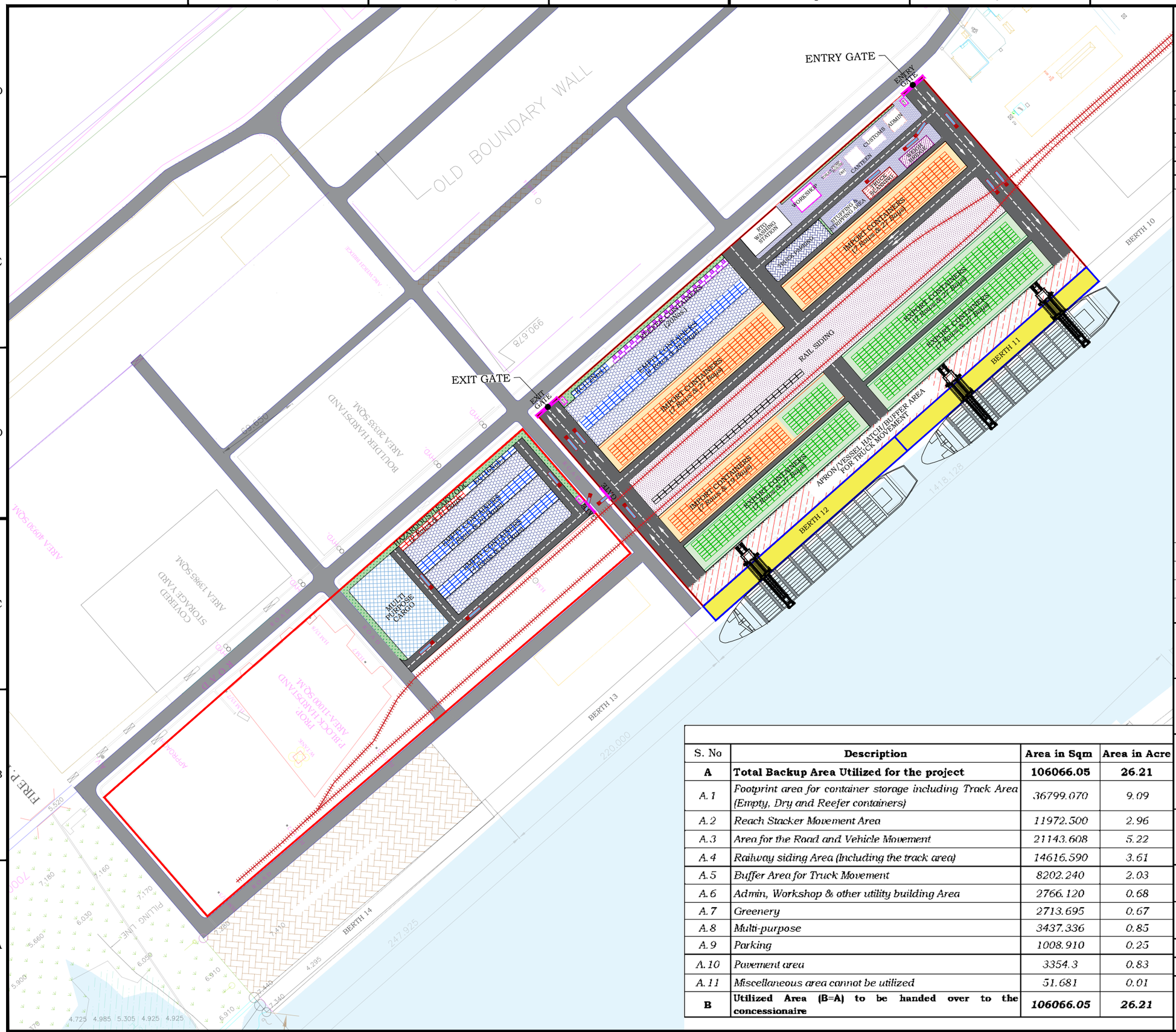
Drawing No.	Report No
SMPK/PMS/2425-052/HDC/TEFR/0604	RP001

Project No.
SMPK-GUR/2425-052/PORTS

Rev No. : R2	Sheet size : A3
Date 22-01-2026	Scale : NTS
Drawn by: ABR	Checked by: BSK

Approved by: SDC

N W E S



NOTES:

1. All dimensions in Meters,unless otherwise specified.
2. Dimension shall not be scaled only written dimensions shall be followed.
3. This drawing shall not be used other than purpose marked issued.

Optimal Capacity	0.462 M TEUs		
Ground Slot			
Description	Required	Provided	Area (Acre)
Dry Filled Containers	1103	1127	7.6
Empty Dry Containers	291	358	1.23
Reefer Containers	7	20	0.18
Hazardous Containers	-	30	0.1

S. No	Description	Area in Sqm	Area in Acre
A	**Total Backup Area Utilized for the project**	**106066.05**	**26.21**
A.1	*Footprint area for container storage including Track Area (Empty, Dry and Reefer containers)*	*36799.070*	*9.09*
A.2	*Reach Stacker Movement Area*	*11972.500*	*2.96*
A.3	*Area for the Road and Vehicle Movement*	*21143.608*	*5.22*
A.4	*Railway siding Area (Including the track area)*	*14616.590*	*3.61*
A.5	*Buffer Area for Truck Movement*	*8202.240*	*2.03*
A.6	*Admin, Workshop & other utility building Area*	*2766.120*	*0.68*
A.7	*Greenery*	*2713.695*	*0.67*
A.8	*Multi-purpose*	*3437.336*	*0.85*
A.9	*Parking*	*1008.910*	*0.25*
A.10	*Pavement area*	*3354.3*	*0.83*
A.11	*Miscellaneous area cannot be utilized*	*51.681*	*0.01*
B	**Utilized Area (B=A) to be handed over to the concessionaire**	***106066.05***	***26.21***

No.	Stage/ Description	Drawn by	Checked by	Approved by	Date

Client:
Syama Prasad Mookerjee Port, Kolkata

Consultant:
Voyants Solutions Private Limited

Project Title:
DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

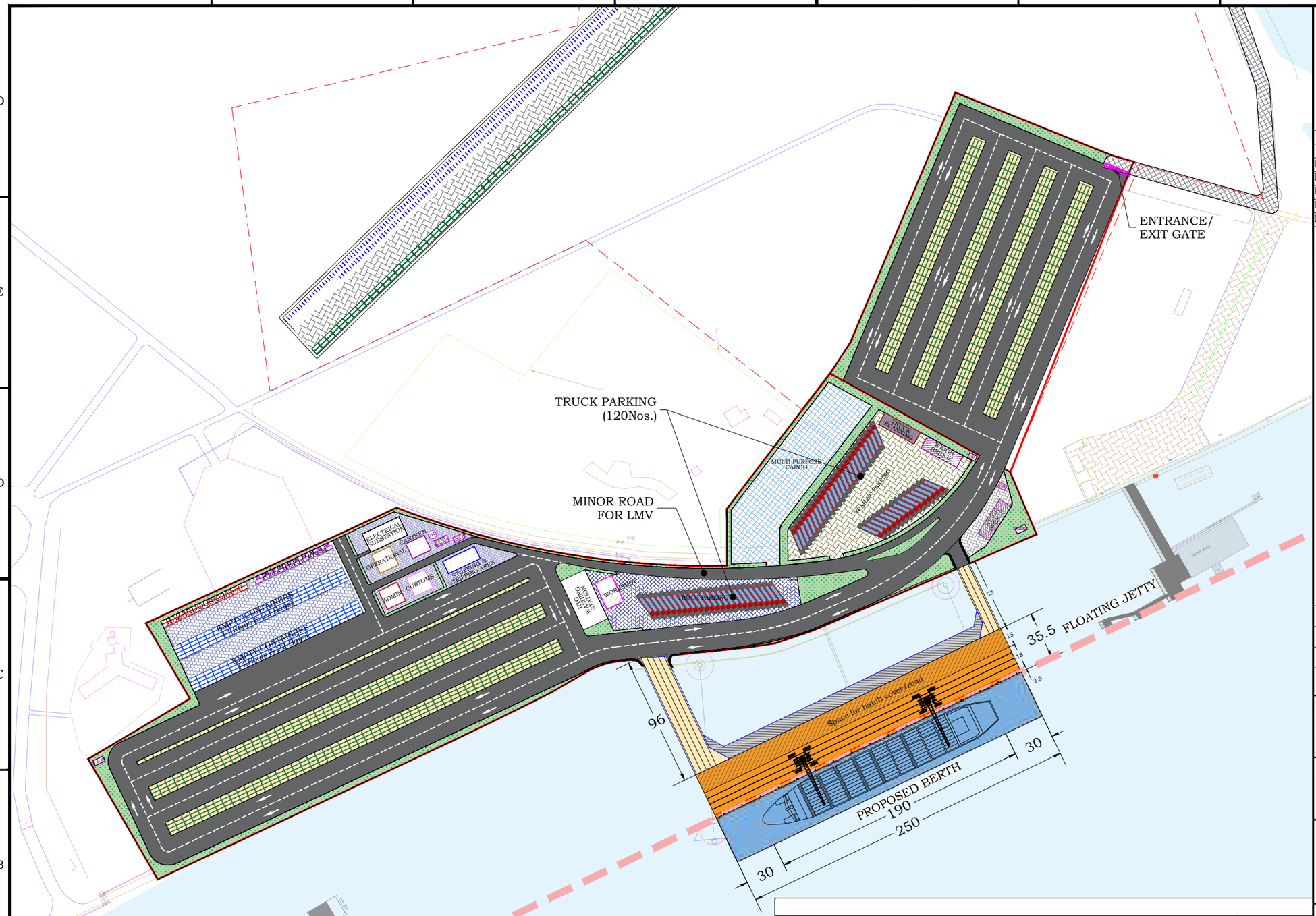
Drawing Title:
LAYOUT OF ALTERNATIVE - I OF HDC
BERTH 11 & 12
(RTG+RS+TT) 2 OF 2

Drawing No.	Report No
SMPK/PMS/2425-052/HDC/TEFR/0604	RP001

Project No.
SMPK-GUR/2425-052/PORTS

Rev No. : R2	Sheet size : A3
Date 22-01-2026	Scale : NTS

Drawn by:	Checked by:	Approved by:
ABR	BSK	SDC



NOTES:

1. All dimensions in Meters,unless otherwise specified.
2. Dimension shall not be scaled only written dimensions shall be followed.
3. This drawing shall not be used other than purpose marked issued.
4. The location and positioning of the Outer terminal is finalized in due consultation with SMPK - IITM and the Consultant

Optimal Capacity	0.231 MTEUs		
Ground slot			
Description	Required	Provided	Area (Acre)
Dry Filled Containers	900	914	3.95
Empty Dry Containers	147	176	0.72
Reefer Containers	4	10	0.08
Hazardous Containers	-	22	0.09

S. No	Description	Area in Sqm	Area in Acre
A	**Total Backup Area Utilized for the project**	**124777.67**	**30.83**
A.1	*Footprint area for container storage including Track Area (Empty, Dry Hazardous and Reefer containers)*	*24169.71*	*5.97*
A.2	*Area for the Road and Vehicle Movement*	*63071.22*	*15.58*
A.3	*Multi-purpose*	*5384.44*	*1.33*
A.4	*Admin, Workshop & other utility building Area*	*3717.12*	*0.92*
A.5	*Greenery*	*12142.62*	*3.00*
A.6	*Trailer parking*	*7465.65*	*1.84*
A.7	*Parking*	*4666.61*	*1.15*
A.8	*Pavement area*	*3457.83*	*0.85*
A.9	*Miscellaneous area cannot be utilized*	*702.47*	*0.17*
B	**Development of Railway siding Area**	***40468.60***	***10.00***
C	**Utilized Area (C = A + B) to be handed over to the concessional**	**124777.67**	**40.83**

No.	Stage/ Description	Drawn by	Checked by	Approved by	Date

Client:
Syama Prasad Mookerjee Port, Kolkata

Consultant:
Voyants Solutions Private Limited

Project Title:
DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

Drawing Title:
LAYOUT OF ALTERNATIVE - II OF HDC OUTER TERMINAL (RS+TT)
1 OF 2

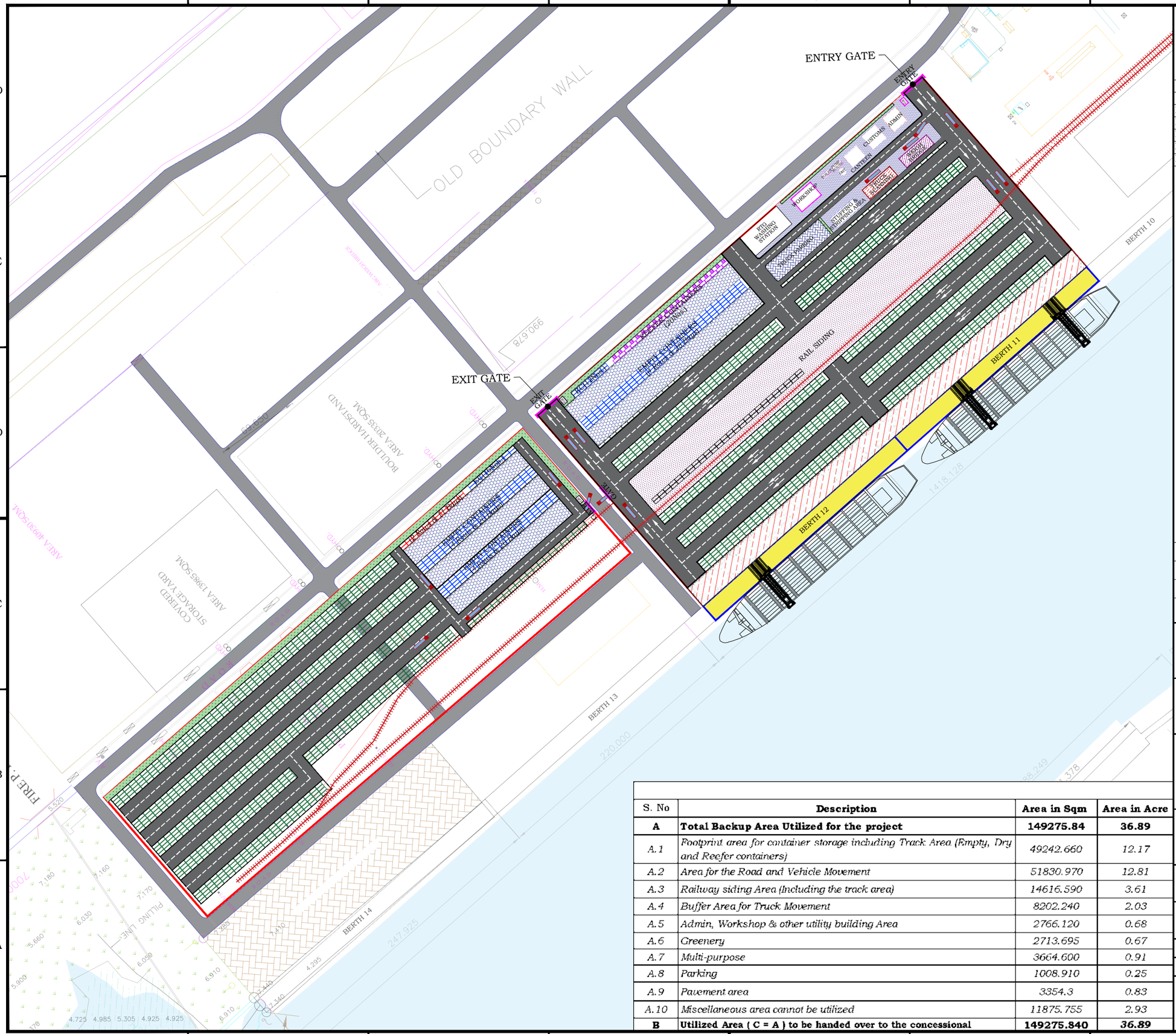
Drawing No.	Report No
SMPK/PMS/2425-052/HDC/TEFR/0605	RP001

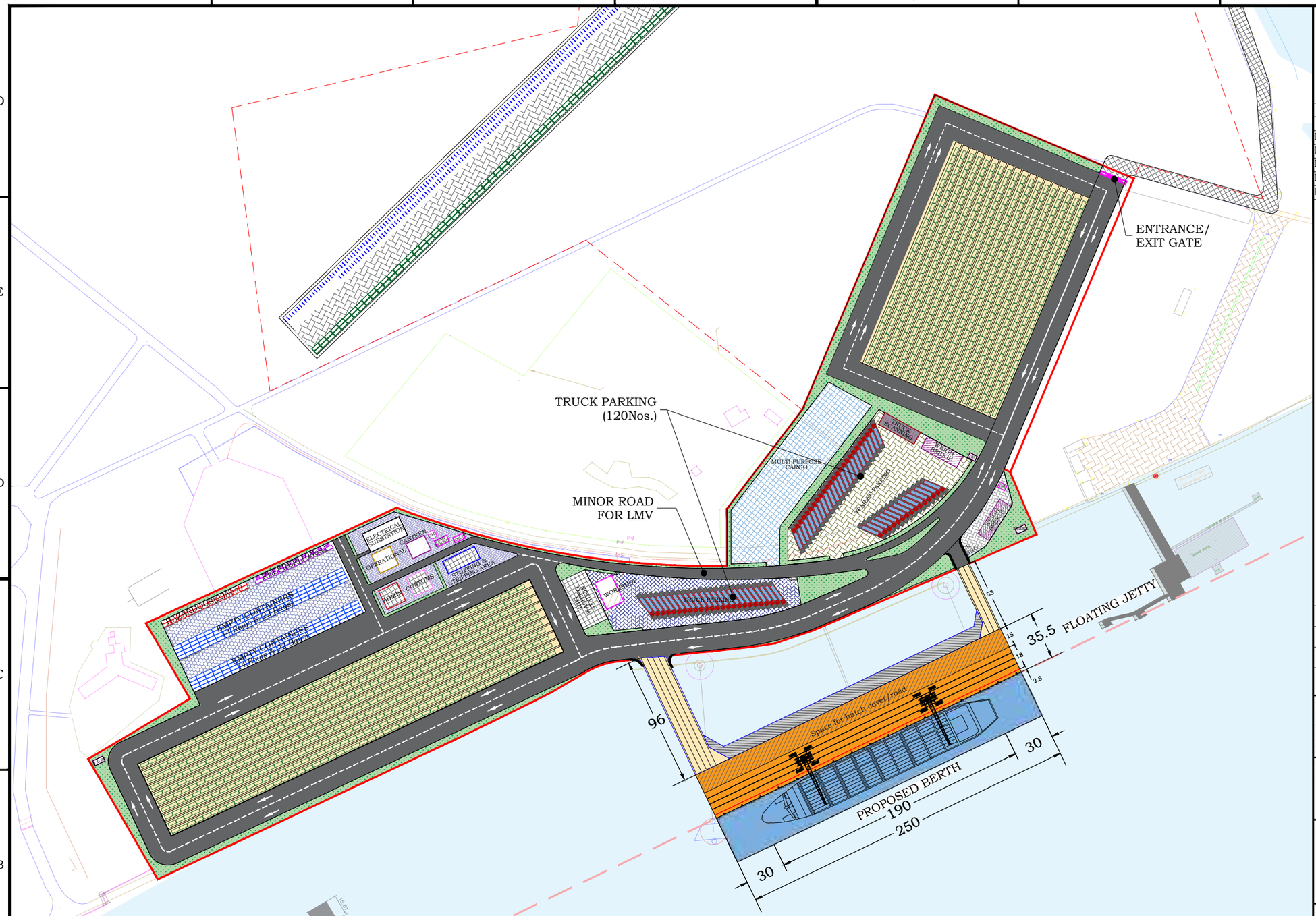
Project No.
SMPK-GUR/2425-052/PORTS

Rev No. : R2	Sheet size : A3
Date 22-01-2026	Scale : NTS

Drawn by:	Checked by:	Approved by:
ABR	BSK	SDC

N W E S


ENTRY GATE
EXIT GATE
OLD BOUNDARY WALL
ENTRY GATE
EXIT GATE
WEIGH BRIDGE
WEIGH BRIDGE
ECH PANEL
EMPTY CONTAINERS (2)(WIDE)
EMPTY CONTAINERS (2)(WIDE)
RAIL SIDING
ECH PANEL
EMPTY CONTAINERS (2)(WIDE)
EMPTY CONTAINERS (2)(WIDE)
EMPTY CONTAINERS (2)(WIDE)
EMPTY CONTAINERS (2)(WIDE)
ECH PANEL
ECH PANEL
ECH PANEL



NOTES:

1. All dimensions in Meters,unless otherwise specified.
2. Dimension shall not be scaled only written dimensions shall be followed.
3. This drawing shall not be used other than purpose marked issued.
4. The location and positioning of the Outer terminal is finalized in due consultation with SMPK - IITM and the Consultant.

Optimal Capacity	0.231 MTEUs		
Ground slot			
Description	Required	Provided	Area (Acre)
Dry Filled Containers	900	976	9.42
Empty Dry Containers	147	176	0.72
Reefer Containers	4	10	0.08
Hazardous Containers	-	22	0.09

S. No	Description	Area in Sqm	Area in Acre
A	**Total Backup Area Utilized for the project**	**127133.64**	**31.41**
A.1	*Footprint area for container storage including Track Area (Empty, Dry Hazardous and Reefer containers)*	*46296.34*	*11.44*
A.2	*Area for the Road and Vehicle Movement*	*41874.01*	*10.35*
A.3	*Multi-purpose*	*5384.44*	*1.33*
A.4	*Admin, Workshop & other utility building Area*	*3781*	*0.93*
A.5	*Greenery*	*12462.14*	*3.08*
A.6	*Parking*	*12728.53*	*3.15*
A.7	*Miscellaneous area cannot be utilized*	*4607.18*	*1.14*
B	**Development of Railway siding Area**	*40468.60*	*10.00*
C	**Utilized Area (C = A + B) to be handed over to the concessional**	**167602.24**	**41.41**

No.	Stage/ Description	Drawn by	Checked by	Approved by	Date

Client: **Syama Prasad Mookerjee Port, Kolkata**

Consultant: **Voyants Solutions Private Limited**

Project Title:

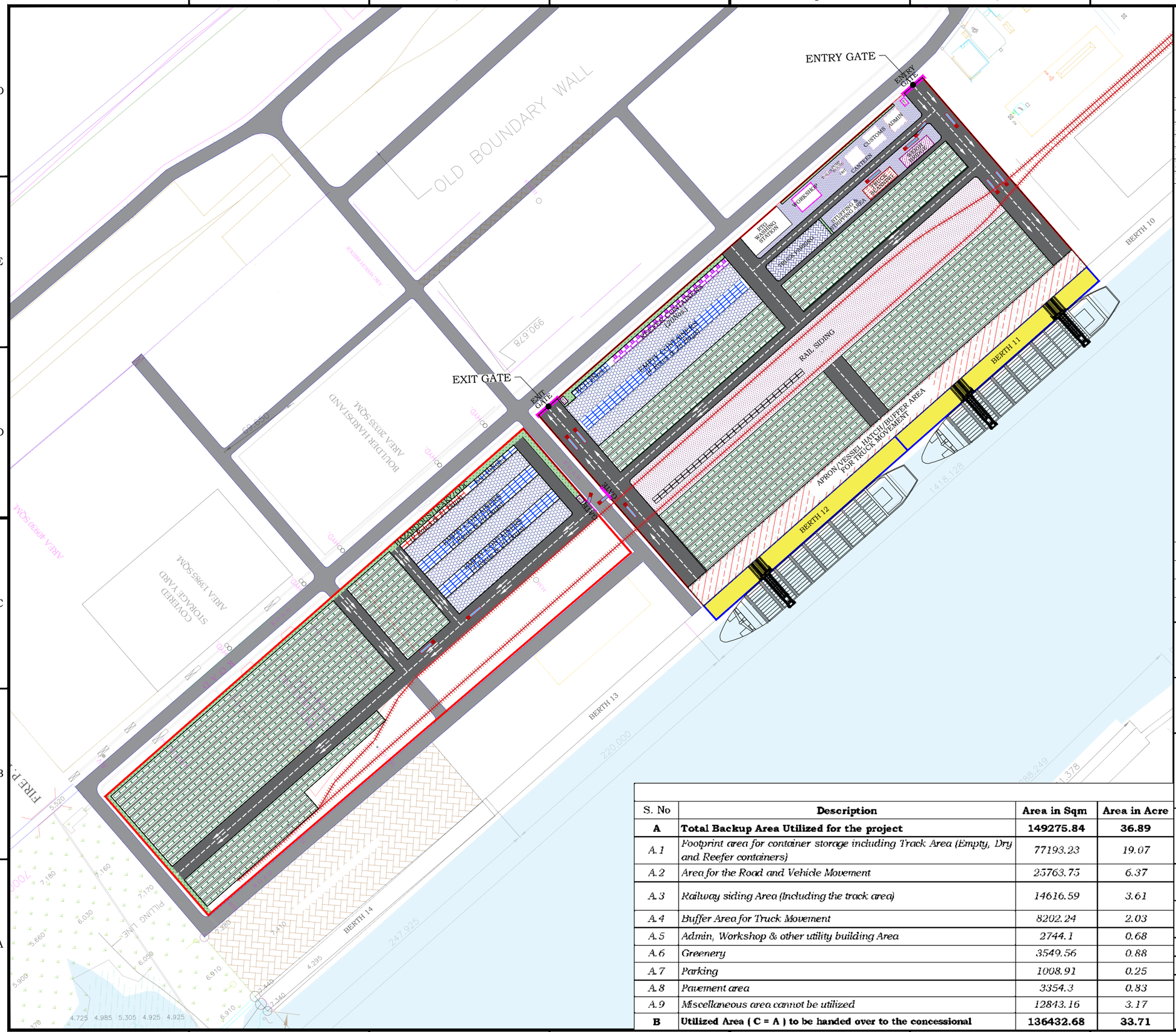
DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

Drawing Title:

LAYOUT OF ALTERNATIVE - III OF HDC OUTER TERMINAL (SC+TT)

1 OF 2

Drawing No. SMPK/PMS/2425-052/HDC/TEFR/0606	Report No RP001
Project No. SMPK-GUR/2425-052/PORTS	N W E S
Rev No. : R2	Sheet size : A3
Date 22-01-2026	Scale : NTS
Drawn by: ABR	Checked by: BSK
	Approved by: SDC



NOTES:

1. All dimensions in Meters,unless otherwise specified.
2. Dimension shall not be scaled only written dimensions shall be followed.
3. This drawing shall not be used other than purpose marked issued.

Optimal Capacity	0.231 MTEUs		
Ground slot			
Description	Required	Provided	Area (Acre)
Dry Filled Containers	1770	1548	14.59
Empty Dry Containers	291	358	1.23
Reefer Containers	7	20	0.18
Hazardous Containers	-	30	0.10

S. No	Description	Area in Sqm	Area in Acre
A	**Total Backup Area Utilized for the project**	**149275.84**	**36.89**
A.1	*Footprint area for container storage including Track Area (Empty, Dry and Reefer containers)*	*77193.23*	*19.07*
A.2	*Area for the Road and Vehicle Movement*	*25763.75*	*6.37*
A.3	*Railway siding Area (Including the track area)*	*14616.59*	*3.61*
A.4	*Buffer Area for Truck Movement*	*8202.24*	*2.03*
A.5	*Admin, Workshop & other utility building Area*	*2744.1*	*0.68*
A.6	*Greenery*	*3549.56*	*0.88*
A.7	*Parking*	*1008.91*	*0.25*
A.8	*Pavement area*	*3354.3*	*0.83*
A.9	*Miscellaneous area cannot be utilized*	*12843.16*	*3.17*
B	**Utilized Area (C = A) to be handed over to the concessional**	**136432.68**	**33.71**

No.	Stage/ Description	Drawn by	Checked by	Approved by	Date

Client:
Syama Prasad Mookerjee Port, Kolkata

Consultant:
Voyants Solutions Private Limited

Project Title:
DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

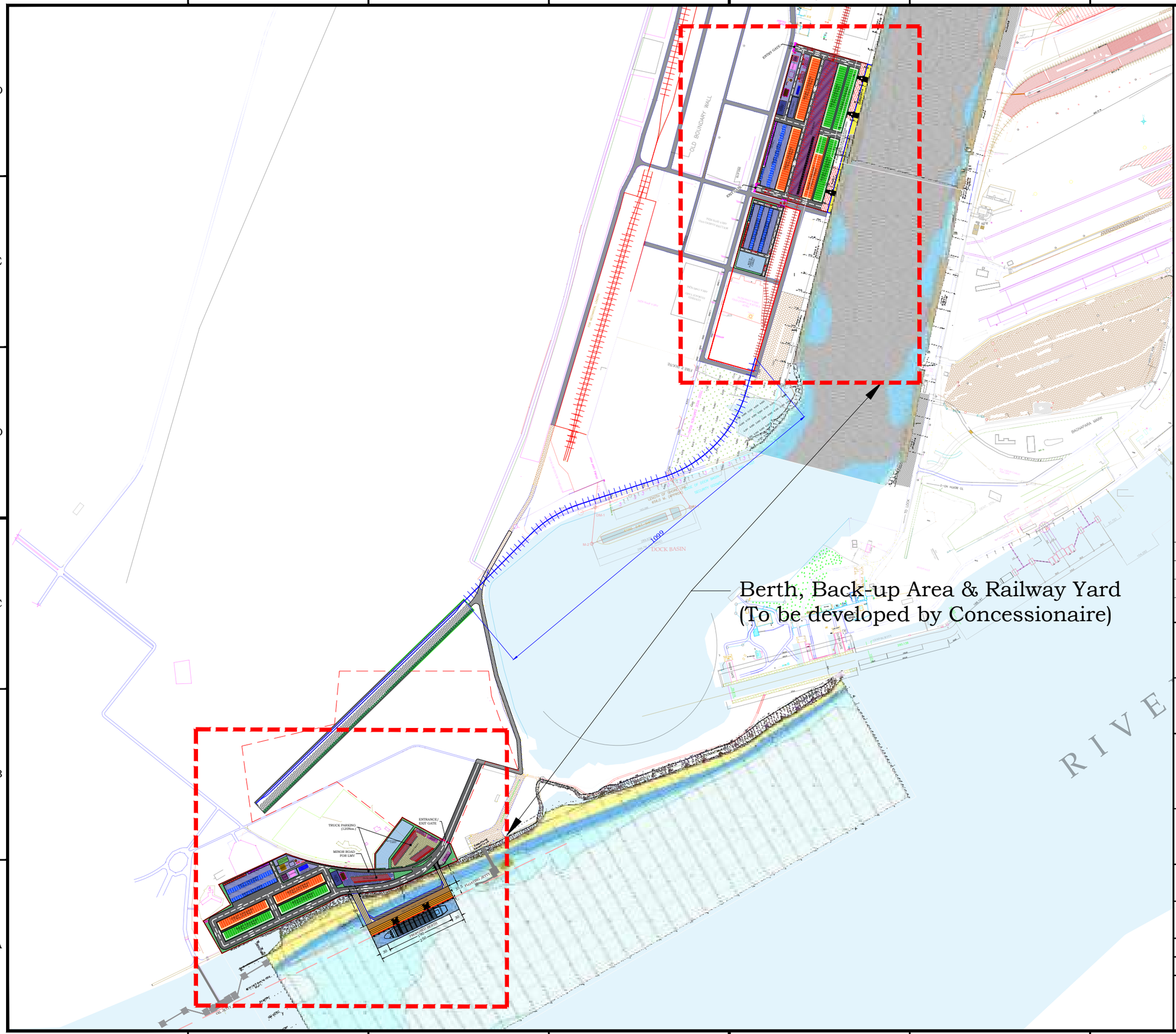
Drawing Title:
LAYOUT OF ALTERNATIVE - III OF HDC
BERTH 11 & 12
(SC+TT)
2 OF 2

Drawing No.	Report No
SMPK/PMS/2425-052/HDC/TEFR/0606	RP001

Project No.
SMPK-GUR/2425-052/PORTS

Rev No. : R2	Sheet size : A3
Date 22-01-2026	Scale : NTS

Drawn by:	Checked by:	Approved by:
ABR	BSK	SDC



NOTES:

1. All dimensions in Meters,unless otherwise specified.
2. Dimension shall not be scaled only written dimensions shall be followed.
3. This drawing shall not be used other than purpose marked issued.

No.	Stage/ Description	Drawn by	Checked by	Approved by	Date

Client:
Syama Prasad Mookerjee Port, Kolkata

Consultant:
Voyants Solutions Private Limited

Project Title:
DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

Drawing Title:
OVERALL LAYOUT DEVELOPMENT PLAN OF OUTER TERMINAL & BERTH 11 & 12

Drawing No.	Report No
SMPK/PMS/2425-052/HDC/TEFR/0701	RP001

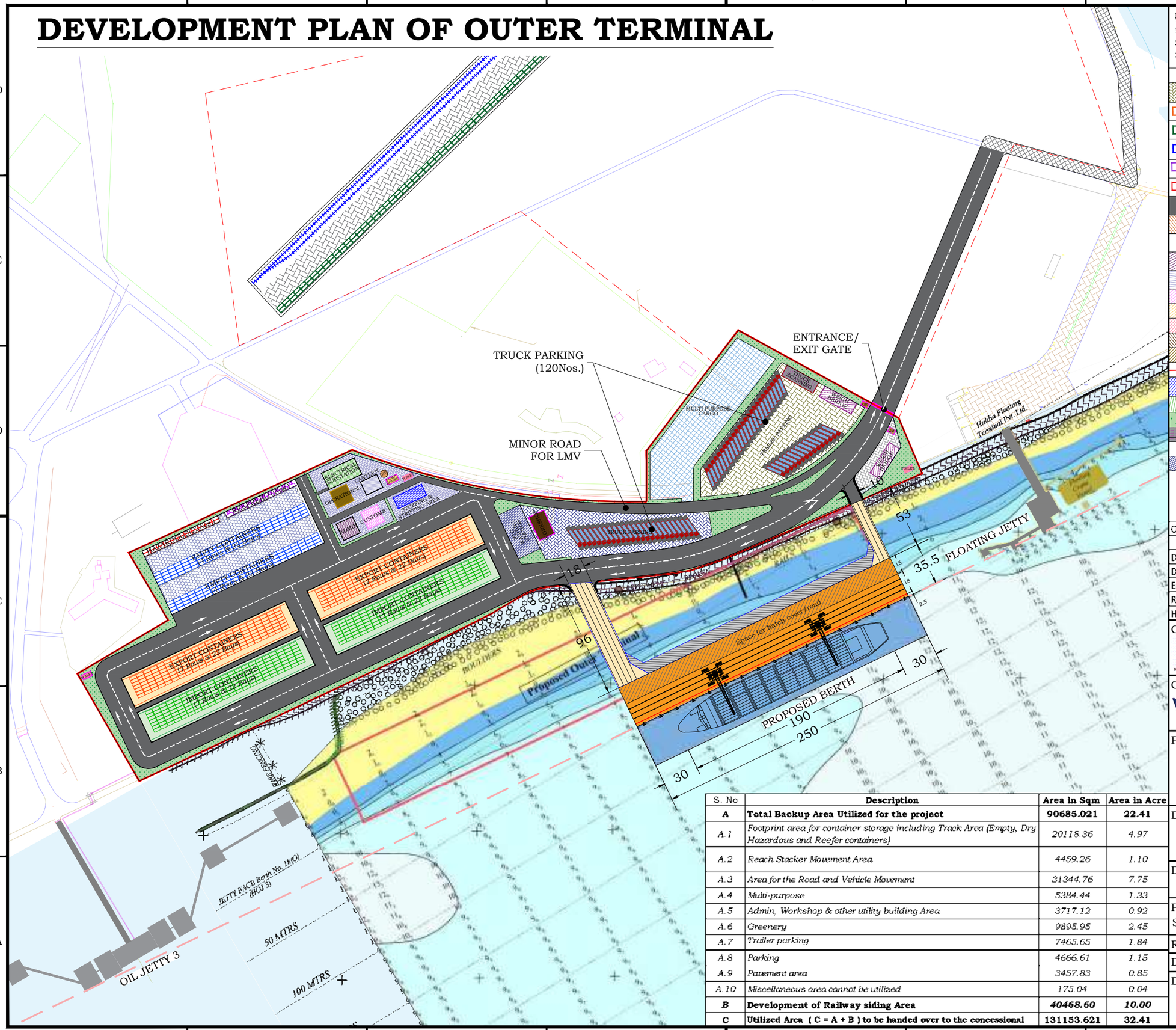
Project No.
SMPK-GUR/2425-052/PORTS

Rev No. : R1	Sheet size : A3
Date :14-05-2025	Scale : NTS

N W E S

Drawn by:	Checked by:	Approved by:
ABR	NBL	SDC

DEVELOPMENT PLAN OF OUTER TERMINAL



NOTES:

1. All dimensions in Meters,unless otherwise specified.
2. Dimension shall not be scaled only written dimensions shall be followed.
3. This drawing shall not be used other than purpose marked issued.

Legend	Description	Unit	Quantity
	Parking	Sq.m	12728.53
	Dry Container(Export)	Sq.m	8265.97
	Dry Container (Import)	Sq.m	8265.97
	Empty Container	Sq.m	7435.9
	Reefer Container	Sq.m	344.13
	Hazardous Container	Sq.m	365.5
	Road	Sq.m	31166
	Guard Room (2 Nos)	Sq.m	48
	Gate Complex	No.s	1
	Admin Office	Sq.m	225
	Canteen	Sq.m	180
	Custom Building	Sq.m	225
	Pump House	Sq.m	50
	Public Toilet (3 Nos)	Sq.m	96
	Workshop	Sq.m	294
	Operational Building	Sq.m	225
	Boundary wall	m	1782
	Stuffing and Stripping	Sq.m	260
	Electrical Substation Open Area	Sq.m	450
	Greenery	Sq.m	9630.15
	Container Scanning	Sq.m	300
	Overhead Tank	Sq.m	28
	RTG Washing Station	Sq.m	800

Optimal Capacity	0.231 M TEUs		
Ground Slot			
Description	Required	Provided	Area (Acre)
Dry Filled Containers	553	616	4.07
Empty Dry Containers	147	176	0.72
Reefer Containers	7	10	0.08
Hazardous Containers	-	22	0.09

S. No	Description	Area in Sqm	Area in Acre
A	**Total Backup Area Utilized for the project**	**90685.021**	**22.41**
A.1	*Footprint area for container storage including Track Area (Empty, Dry Hazardous and Reefer containers)*	*20118.36*	*4.97*
A.2	*Reach Stacker Movement Area*	*4459.26*	*1.10*
A.3	*Area for the Road and Vehicle Movement*	*31344.76*	*7.75*
A.4	*Multi-purpose*	*5384.44*	*1.33*
A.5	*Admin, Workshop & other utility building Area*	*3717.12*	*0.92*
A.6	*Greenery*	*9895.95*	*2.45*
A.7	*Trailer parking*	*7465.65*	*1.84*
A.8	*Parking*	*4666.61*	*1.15*
A.9	*Pavement area*	*3457.83*	*0.85*
A.10	*Miscellaneous area cannot be utilized*	*175.04*	*0.04*
B	**Development of Railway siding Area**	***40468.60***	***10.00***
C	**Utilized Area (C = A + B) to be handed over to the concessional**	**131153.621**	**32.41**

Client:
Syama Prasad Mookerjee Port, Kolkata

Consultant:
Voyants Solutions Private Limited

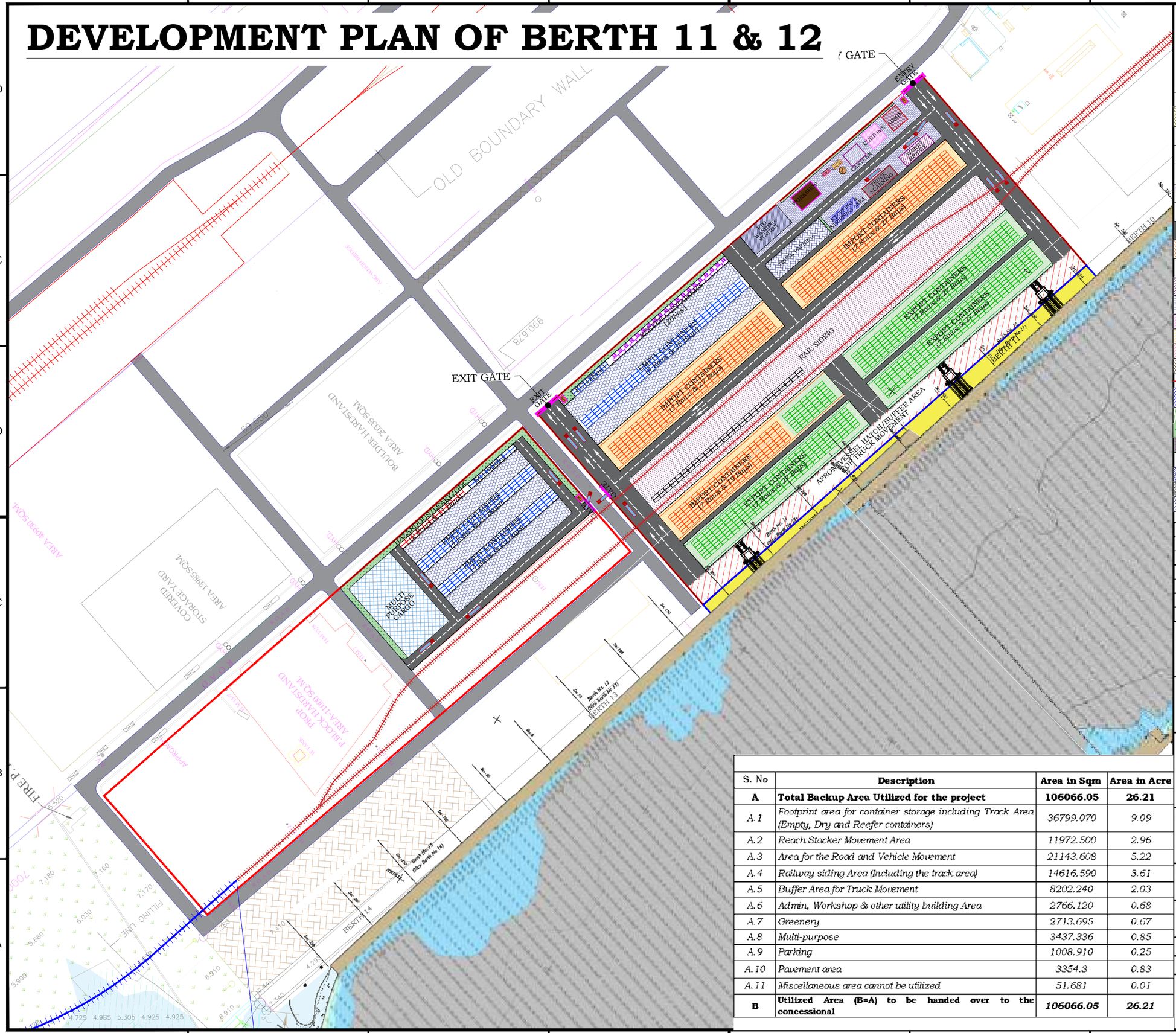
Project Title:
DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

Drawing Title:
DEVELOPMENT PLAN OF HDC OUTER TERMINAL

Drawing No.	Report No
SMPK/PMS/2425-052/HDC/TEFR/0702	RP001
Project No. SMPK-GUR/2425-052/PORTS	
Rev No. : R2	Sheet size : A3
Date 22-01-2026	Scale : NTS
Drawn by: ABR	Checked by: BSK
Approved by: SDC	

N W E S

DEVELOPMENT PLAN OF BERTH 11 & 12



NOTES:

1. All dimensions in Meters,unless otherwise specified.
2. Dimension shall not be scaled only written dimensions shall be followed.
3. This drawing shall not be used other than purpose marked issued.
4. The location and positioning of the Outer terminal is finalized in due consultation with SMPK - IITM and the Consultant.

Legend	Description	Unit	Quantity
	Parking	Sq.m	10371.52
	Dry Container(Export)	Sq.m	13843.95
	Dry Container (Import)	Sq.m	16856.38
	Empty Container	Sq.m	14347.65
	Reefer Container	Sq.m	754.36
	Hazardous Container	Sq.m	385.52
	Road	Sq.m	21143
	Guard Room (3Nos)	Sq.m	72
	Gate Complex	No.s	2
	Admin Office	Sq.m	225
	Canteen	Sq.m	180
	Custom Building	Sq.m	225
	Pump House	Sq.m	50
	Public Toilet (3 Nos)	Sq.m	32
	Workshop	Sq.m	294
	Boundary wall	m	2449.67
	Stuffing and Stripping	Sq.m	260
	Multi purpose	Sq.m	3437.34
	Greenery	Sq.m	2713.69
	Container Scanning	Sq.m	300
	Overhead Tank	Sq.m	28
	RTG Washing Station	Sq.m	800
	Rail Siding	Sq.m	14616.59
	Buffer Area	Sq.m	8202.24

Optimal Capacity	0.462 M TEUs		
Ground Slot			
Description	Required	Provided	Area (Acre)
Dry Filled Containers	1103	1127	7.6
Empty Dry Containers	291	358	1.23
Reefer Containers	7	20	0.18
Hazardous Containers	-	30	0.1

S. No	Description	Area in Sqm	Area in Acre
A	**Total Backup Area Utilized for the project**	**106066.05**	**26.21**
A.1	*Footprint area for container storage including Track Area (Empty, Dry and Reefer containers)*	*36799.070*	*9.09*
A.2	*Reach Stacker Movement Area*	*11972.500*	*2.96*
A.3	*Area for the Road and Vehicle Movement*	*21143.608*	*5.22*
A.4	*Railway siding Area (including the track area)*	*14616.590*	*3.61*
A.5	*Buffer Area for Truck Movement*	*8202.240*	*2.03*
A.6	*Admin, Workshop & other utility building Area*	*2766.120*	*0.68*
A.7	*Greenery*	*2713.695*	*0.67*
A.8	*Multi-purpose*	*3437.336*	*0.85*
A.9	*Parking*	*1008.910*	*0.25*
A.10	*Pavement area*	*3354.3*	*0.83*
A.11	*Miscellaneous area cannot be utilized*	*51.681*	*0.01*
B	**Utilized Area (B=A) to be handed over to the concessional**	***106066.05***	***26.21***

Client:
Syama Prasad Mookerjee Port, Kolkata

Consultant:
Voyants Solutions Private Limited

Project Title:
DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

Drawing Title:
DEVELOPMENT PLAN OF HDC
BERTH 11 & 12

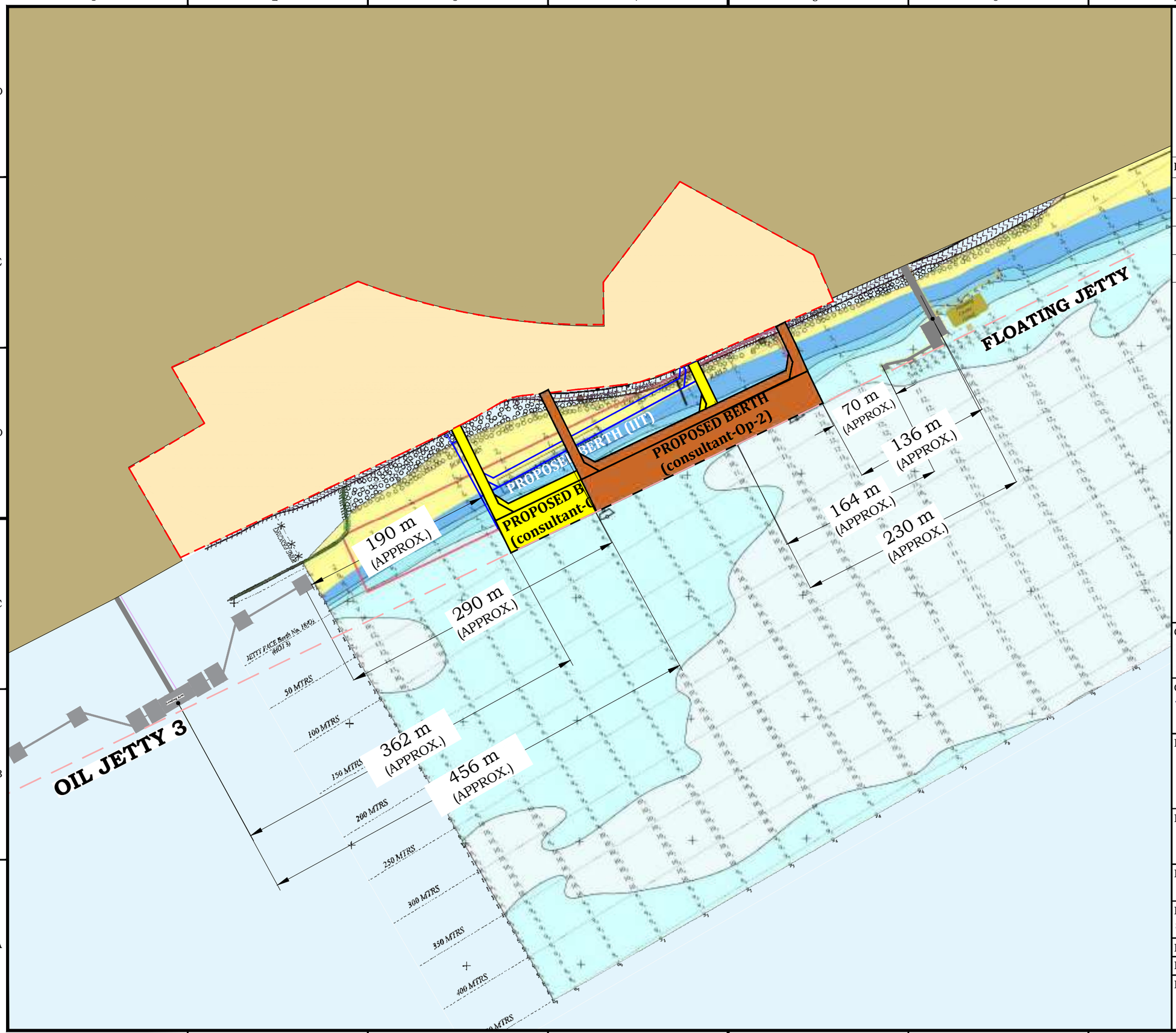
Drawing No.	Report No
SMPK/PMS/2425-052/HDC/TEFR/0703	RP001

Project No.
SMPK-GUR/2425-052/PORTS

Rev No. : R2	Sheet size : A3
Date 22-01-2026	Scale : NTS

N W E S

Drawn by:	Checked by:	Approved by:
ABR	BSK	SDC



NOTES:

1. All dimensions in Meters,unless otherwise specified.
2. Dimension shall not be scaled only written dimensions shall be followed.
3. This drawing shall not be used other than purpose marked issued.
4. Three different layouts have been proposed, and Layout-III (Consultant-Op-2) has been finalized in consultation with SMPK-IITM.

Legend

S.No	Description	Unit
1		Proposed Berth (IIT)
2		Proposed Berth (Consultant-Op-1)
3		Proposed Berth (Consultant-Op-2)

Client: **Syama Prasad Mookerjee Port, Kolkata**

Consultant: **Voyants Solutions Private Limited**

Project Title:

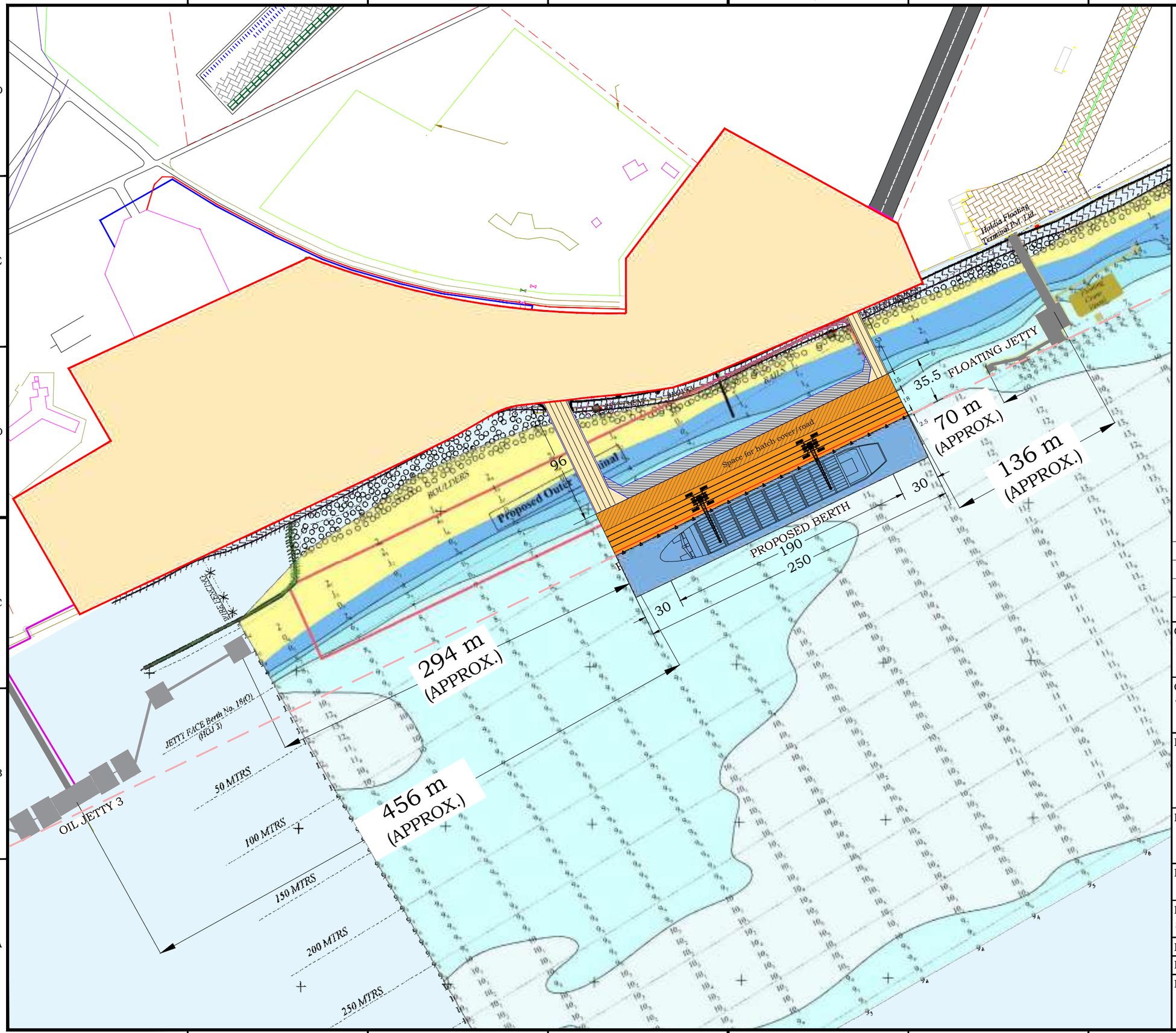
DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

Drawing Title:

OPTIONS PROPOSED FOR OT BERTHS

01 OF 02

Drawing No. SMPK/PMS/2425-052/HDC/TEFR/0704	Report No RP001
Project No. SMPK-GUR/2425-052/PORTS	N W E S
Rev No. : R1	Sheet size : A3
Date 14-05-2025	Scale : NTS
Drawn by: ABR	Checked by: NBL
	Approved by: SDC



NOTES:

1. All dimensions in Meters,unless otherwise specified.
2. Dimension shall not be scaled only written dimensions shall be followed.
3. This drawing shall not be used other than purpose marked issued.
4. The location and positioning of the Outer terminal is finalized in due consultation with SMPK - IITM and the Consultant

No.	Stage/ Description	Drawn by	Checked by	Approved by	Date

Client: **Syama Prasad Mookerjee Port, Kolkata**

Consultant: **Voyants Solutions Private Limited**

Project Title:

DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

Drawing Title:

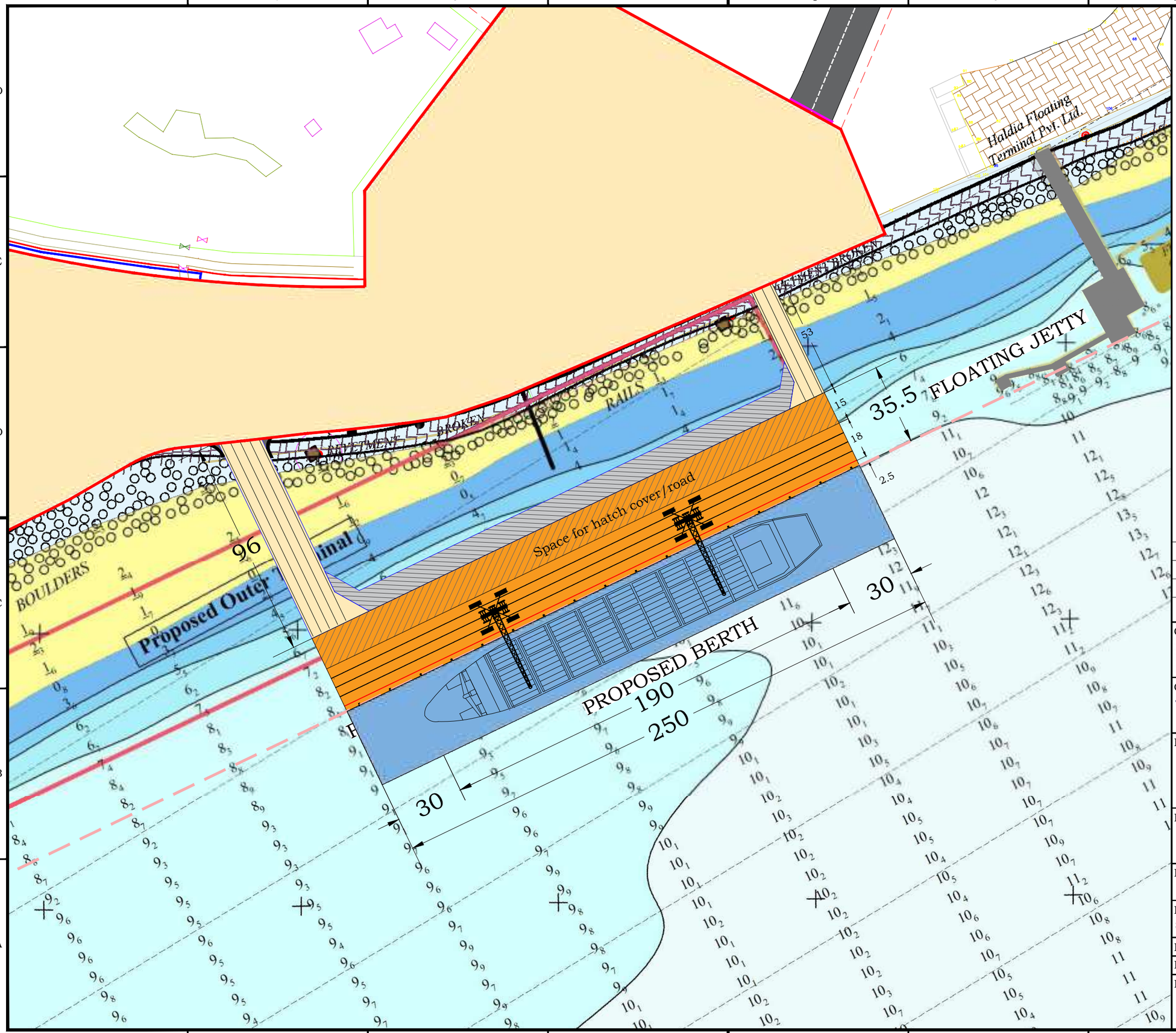
LAYOUT OF MARINE SIDE FACILITY

02 OF 02

Drawing No.	Report No
SMPK/PMS/2425-052/HDC/TEFR/0704	RP001

Project No. SMPK-GUR/2425-052/PORTS

Rev No. : R1	Sheet size : A3	N / W E / S
Date :14-05-2025	Scale : NTS	
Drawn by: ABR	Checked by: NBL	Approved by: SDC



NOTES:

1. All dimensions in Meters,unless otherwise specified.
2. Dimension shall not be scaled only written dimensions shall be followed.
3. This drawing shall not be used other than purpose marked issued.

No.	Stage/ Description	Drawn by	Checked by	Approved by	Date

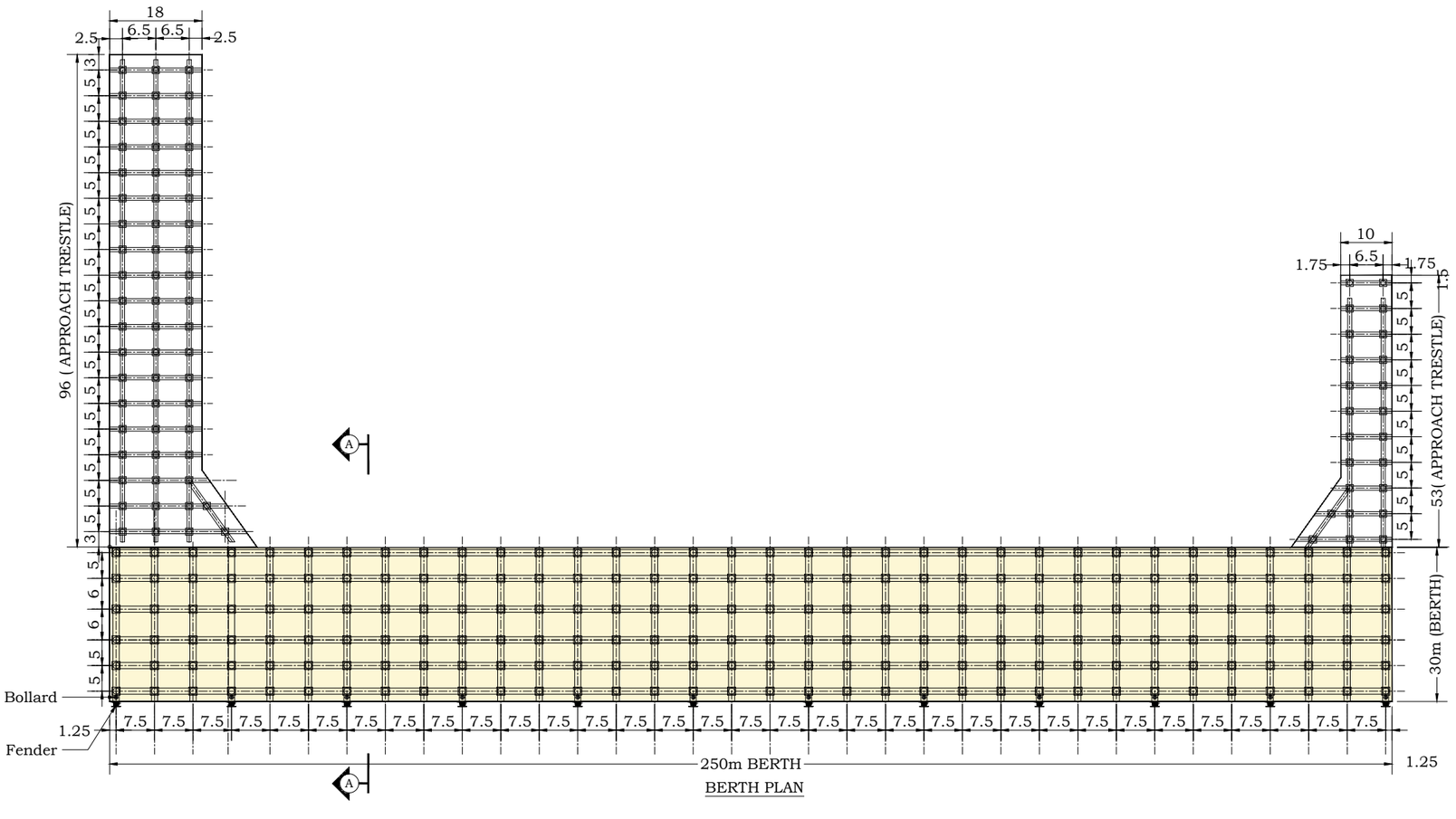
Client:
Syama Prasad Mookerjee Port, Kolkata

Consultant:
Voyants Solutions Private Limited

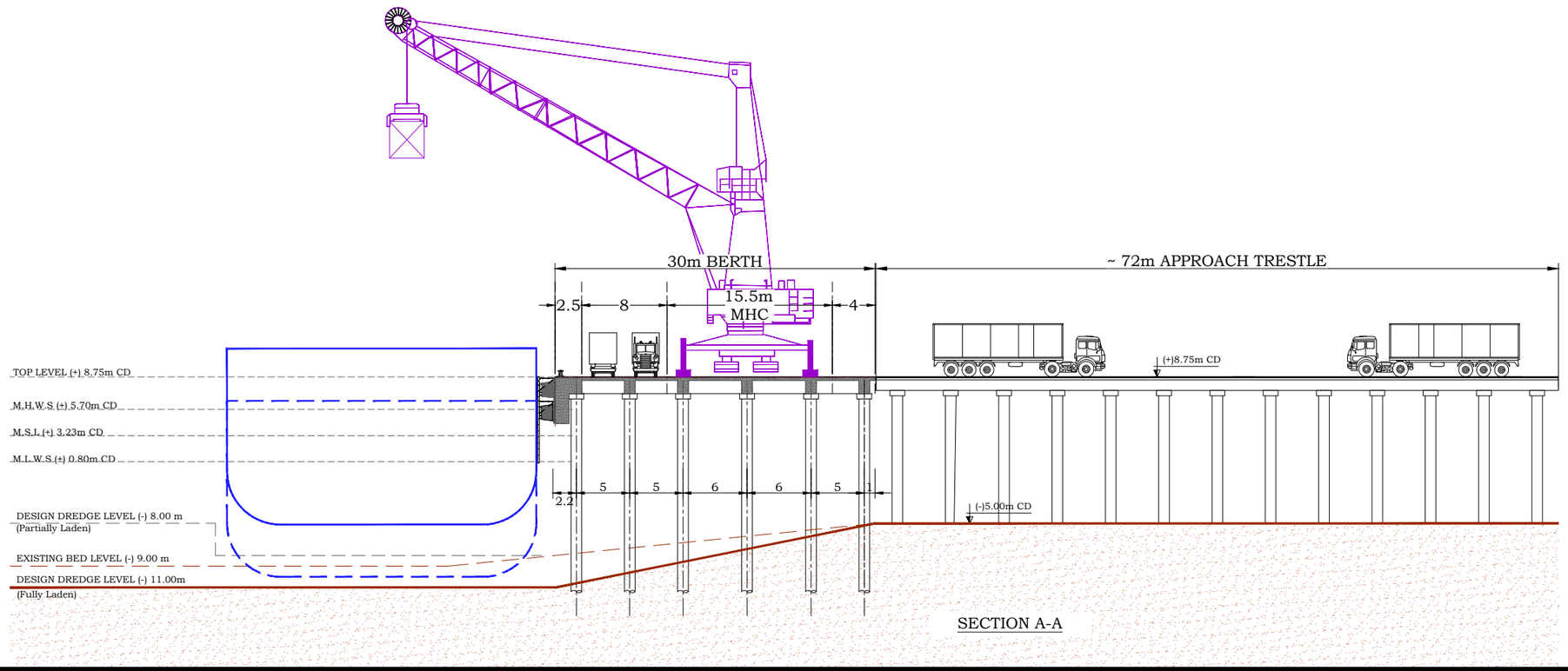
Project Title:
DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

Drawing Title:
GENERAL ARRANGEMENT OF PROPOSED OUTER TERMINAL

Drawing No. SMPK/PMS/2425-052/HDC/TEFR/0705	Report No RP001
Project No. SMPK-GUR/2425-052/PORTS	N W E S
Rev No. : R1	Sheet size : A3
Date :14-05-2025	Scale : NTS
Drawn by: ABR	Checked by: NBL
	Approved by: SDC



BERTH PLAN



SECTION A-A

NOTES:

1. All dimensions in millimeters,unless otherwise specified.
2. Dimension shall not be scaled only written dimensions shall be followed.
3. This drawing shall not be used other than purpose marked issued.

No.	Stage/ Description	Drawn by	Checked by	Approved by	Date

Client: **FOR APPROVAL**

Syama Prasad Mookerjee Port, Kolkata

Consultant:

Voyants Solutions Private Limited

Project Title:

DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

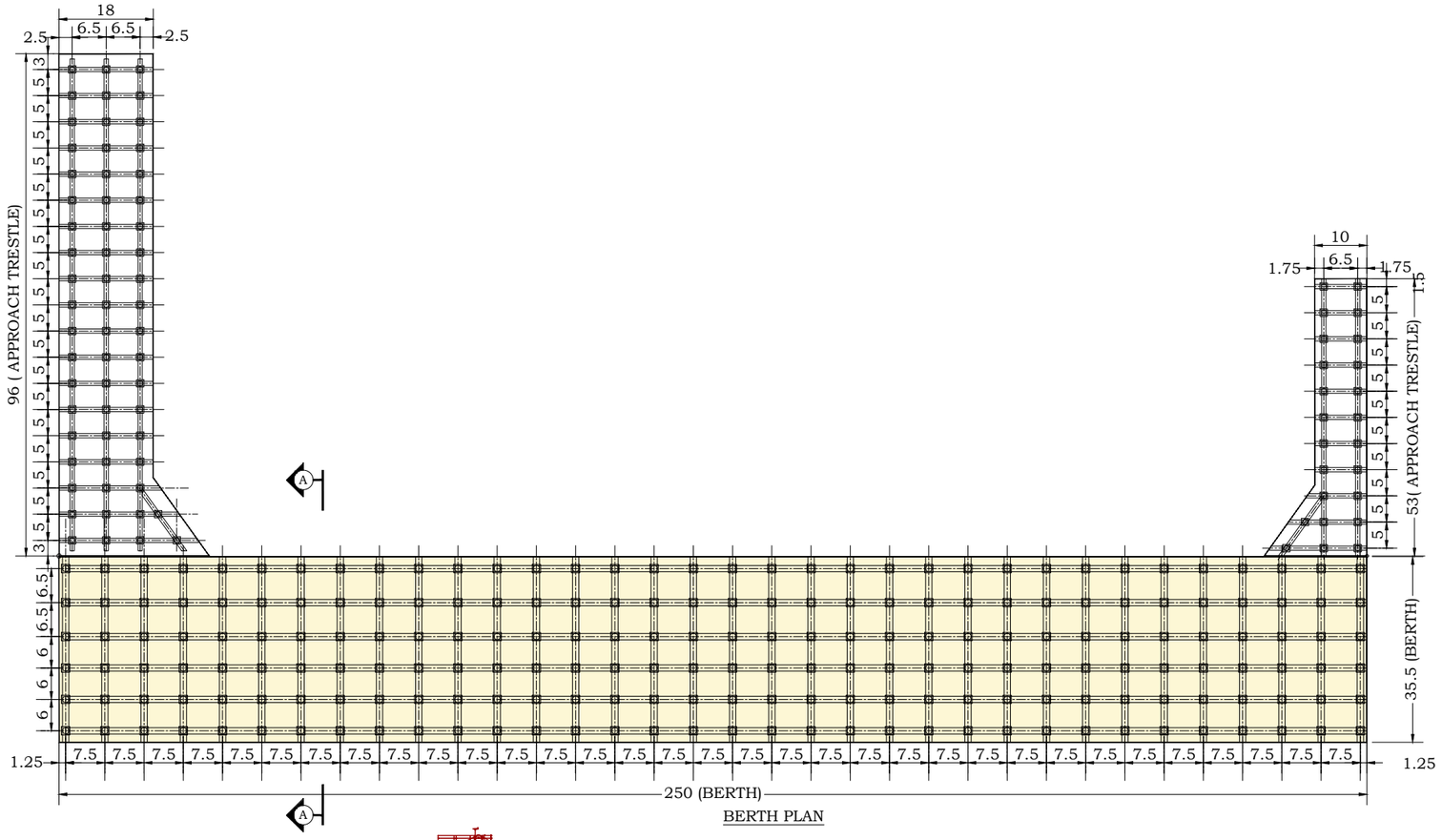
Drawing Title:
PROPOSED OUTER TERMINAL
LAYOUT & CROSS SECTION
MHC ARRANGEMENT

Drawing No.	Report No
SMPK/PMS/2425-052/HDC/TEFR/0706	1 OF 2

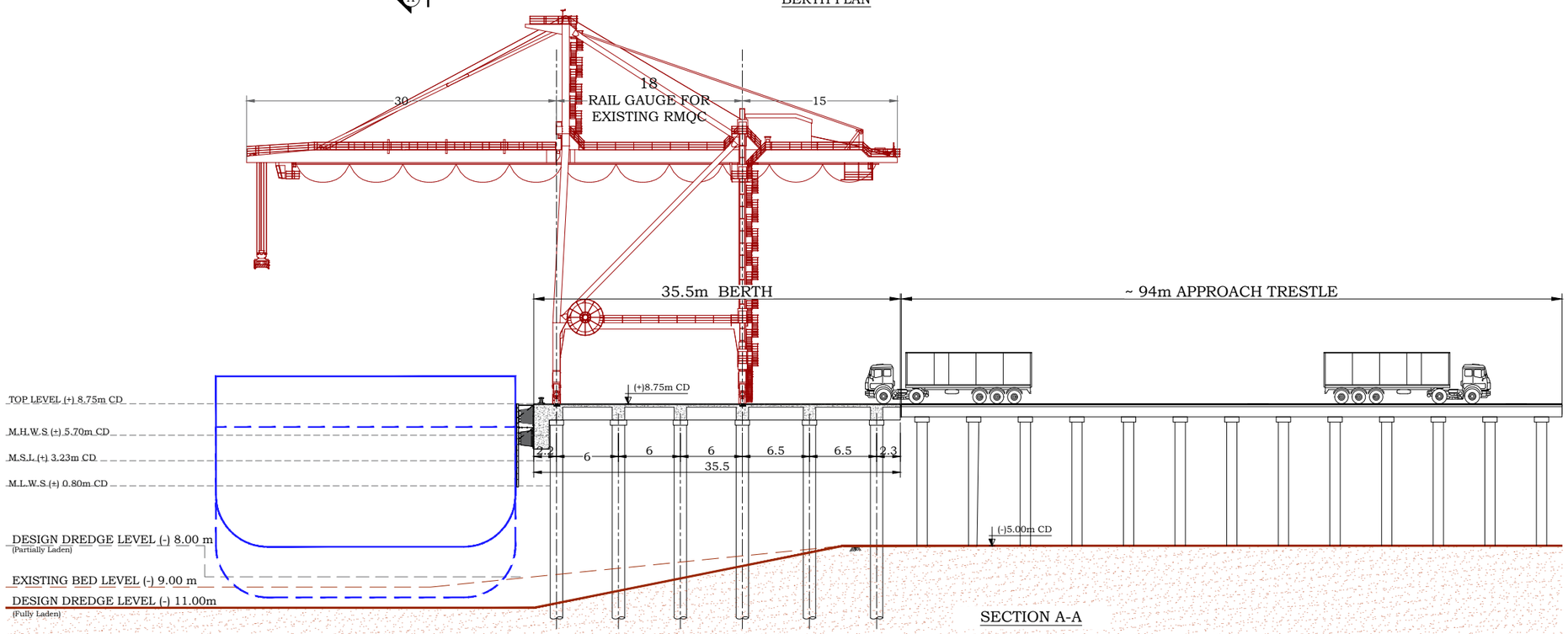
Project No.
SMPK-GUR/2425-052/PORTS

Rev No. : R1	Sheet size : A3
Date :14-05-2025	Scale : NTS

Drawn by:	Checked by:	Approved by:
HSR	NBL	SDC



BERTH PLAN



SECTION A-A

NOTES:

1. All dimensions in millimeters,unless otherwise specified.
2. Dimension shall not be scaled only written dimensions shall be followed.
3. This drawing shall not be used other than purpose marked issued.

No.	Stage/ Description	Drawn by	Checked by	Approved by	Date

Client: **FOR APPROVAL**

Syama Prasad Mookerjee Port, Kolkata

Consultant:

Voyants Solutions Private Limited

Project Title:

DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

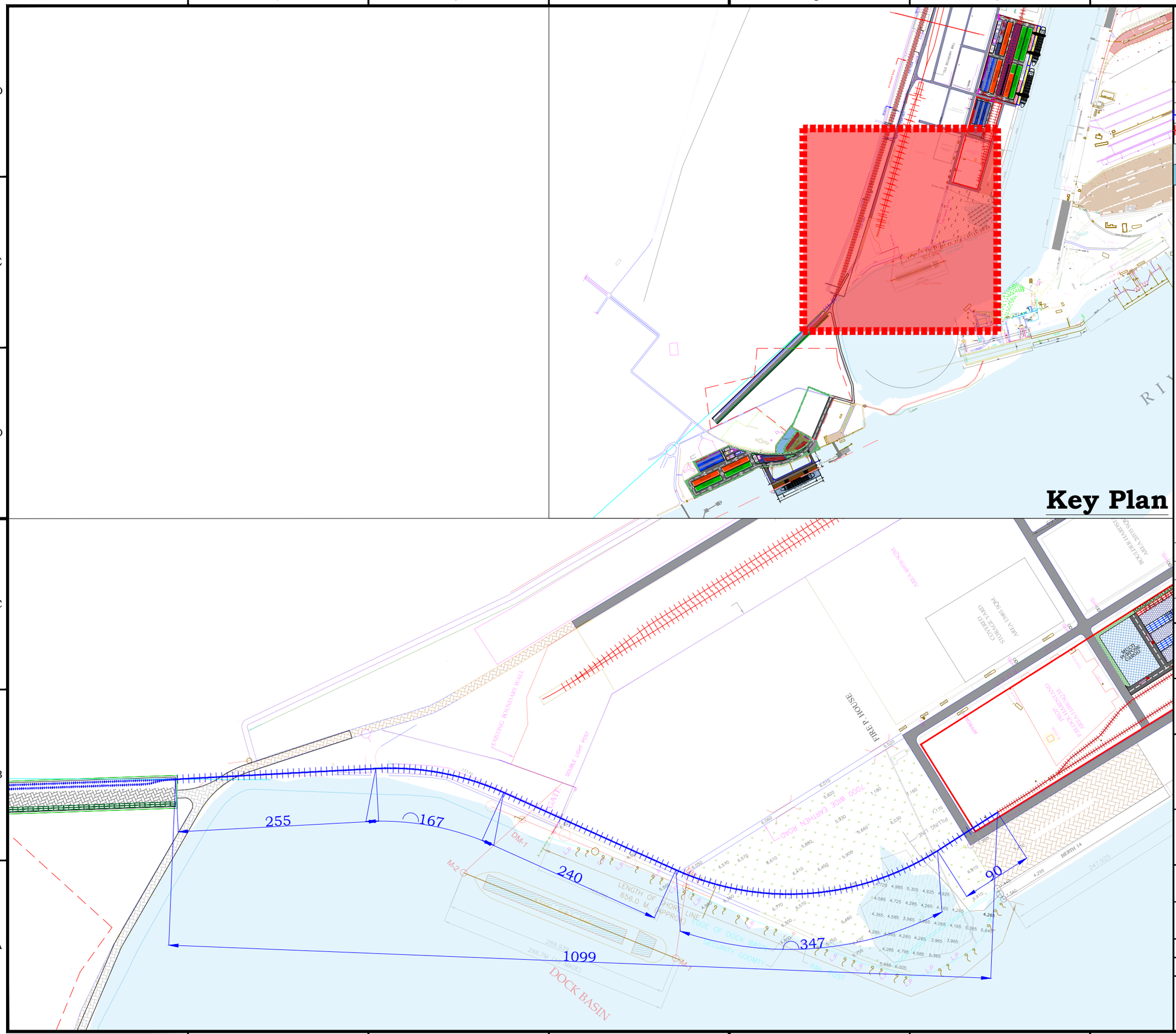
Drawing Title:

PROPOSED OUTER TERMINAL
LAYOUT & CROSS SECTION
RMQC ARRANGEMENT

Drawing No.	Report No
SMPK/PMS/2425-052/HDC/TEFR/0706	2 OF 2

Project No.
SMPK-GUR/2425-052/PORTS

Rev No. : R1	Sheet size : A3	
Date :14-05-2025	Scale : NTS	
Drawn by: HSR	Checked by: NBL	Approved by: SDC



Key Plan

NOTES:

1. All dimensions in Meters,unless otherwise specified.
2. Dimension shall not be scaled only written dimensions shall be followed.
3. This drawing shall not be used other than purpose marked issued.

Legends

	Proposed Road
	Existing Rail
	River
	Dock Basin

No.	Stage/ Description	Drawn by	Checked by	Approved by	Date

Client:

Syama Prasad Mookerjee Port, Kolkata

Consultant:

Voyants Solutions Private Limited

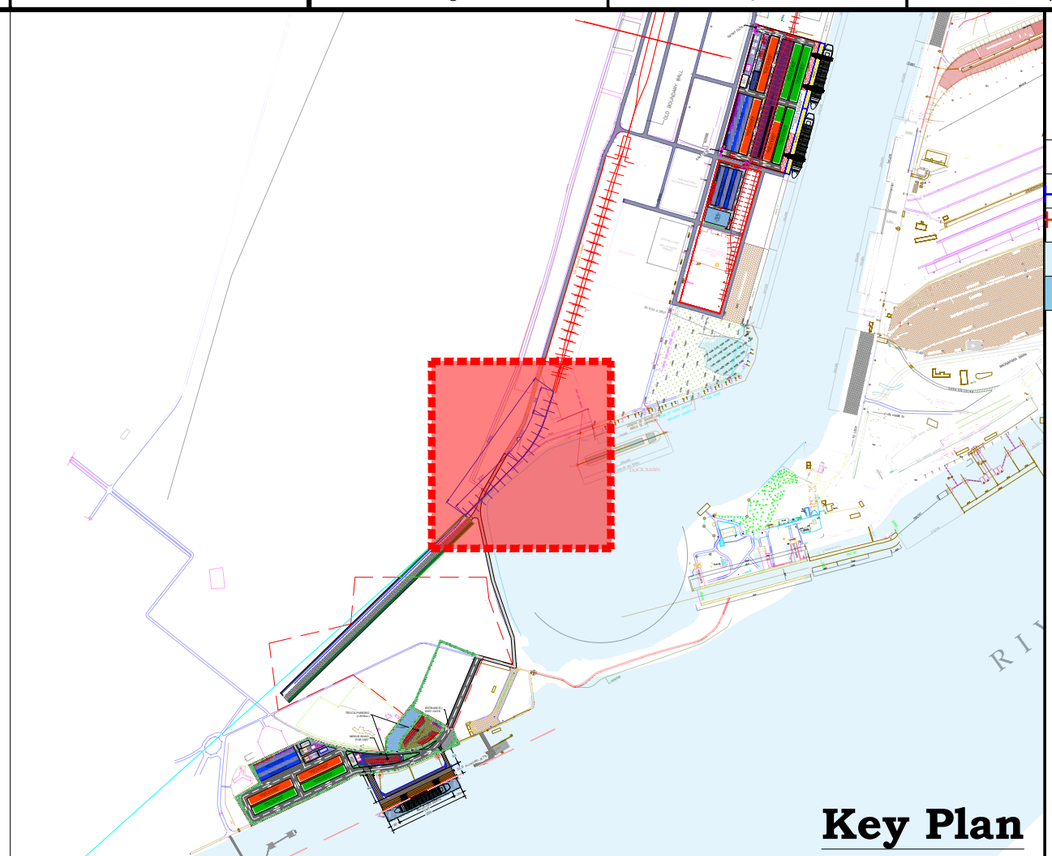
Project Title:

DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

Drawing Title:

OPTION-I RAIL LAYOUT OF HDC

Drawing No. SMPK/PMS/2425-052/HDC/TEFR/0707	Report No RP001
Project No. SMPK-GUR/2425-052/PORTS	N W E S
Rev No. : R1	Sheet size : A3
Date 14-05-2025	Scale : NTS
Drawn by: ABR	Checked by: NBL
	Approved by: SDC



Key Plan

NOTES:

1. All dimensions in Meters,unless otherwise specified.
2. Dimension shall not be scaled only written dimensions shall be followed.
3. This drawing shall not be used other than purpose marked issued.

Legends

	Proposed Road
	Existing Rail
	River
	Dock Basin

No.	Stage/ Description	Drawn by	Checked by	Approved by	Date

Client:
Syama Prasad Mookerjee Port, Kolkata

Consultant:
Voyants Solutions Private Limited

Project Title:
DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

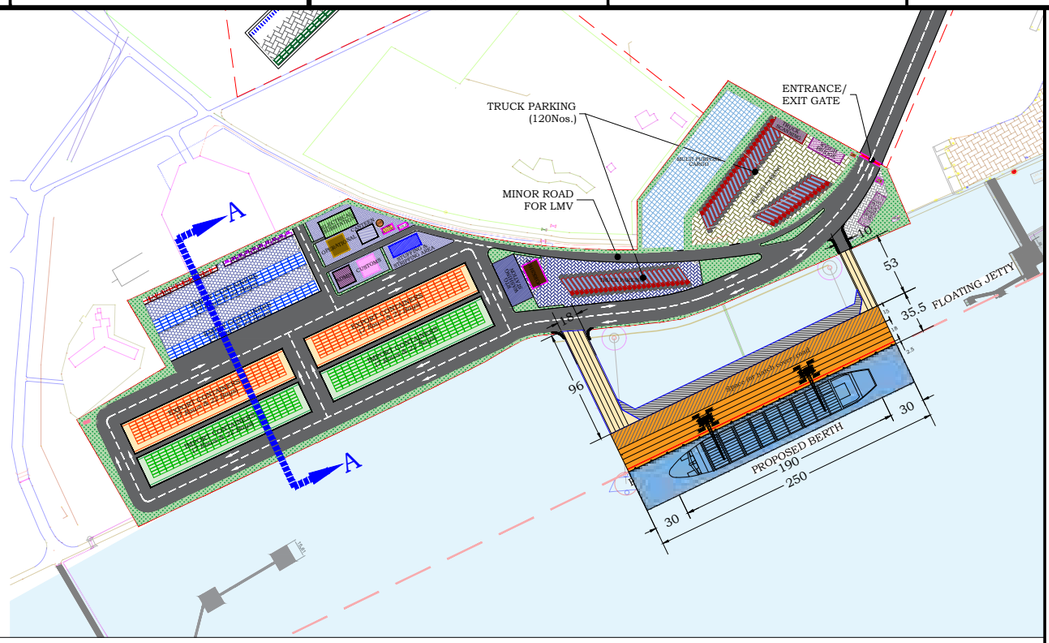
Drawing Title:
OPTION-II RAIL LAYOUT OF HDC

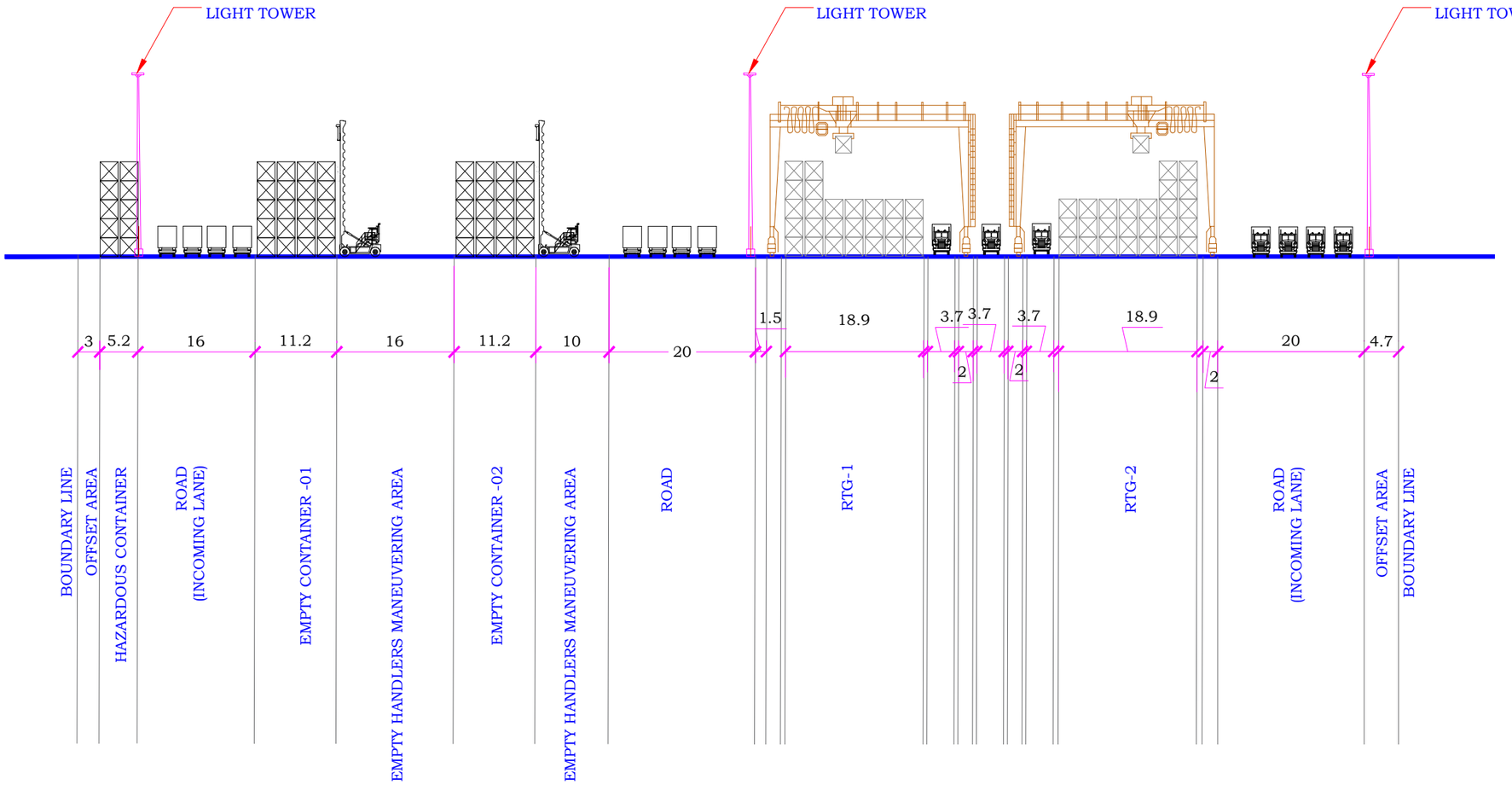
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Project No.
SMPK-GUR/2425-052/PORTS

Rev No. : R1	Sheet size : A3
Date 14-05-2025	Scale : NTS

Drawn by:	Checked by:	Approved by:
ABR	NBL	SDC





CROSS SECTION -AA
(HDC OUTER TERMINAL CONTAINER)

NOTES:

1. All dimensions in Meters,unless otherwise specified

No.	Stage/ Description	Drawn by	Checked by	Approved by	Date

Client:
Syama Prasad Mookerjee Port, Kolkata

Consultant:
Voyants Solutions Private Limited

Project Title:
DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

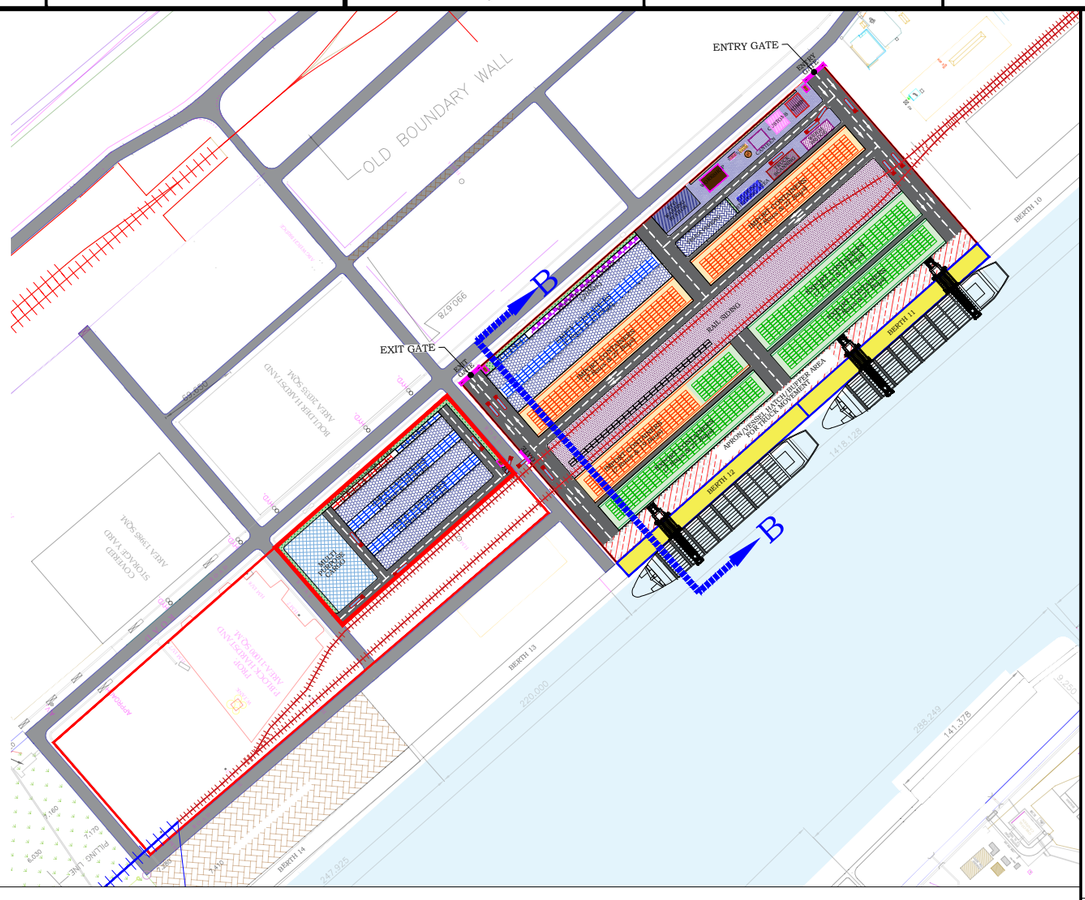
Drawing Title:
TYPICAL CROSS SECTION OF HDC OUTER TERMINAL

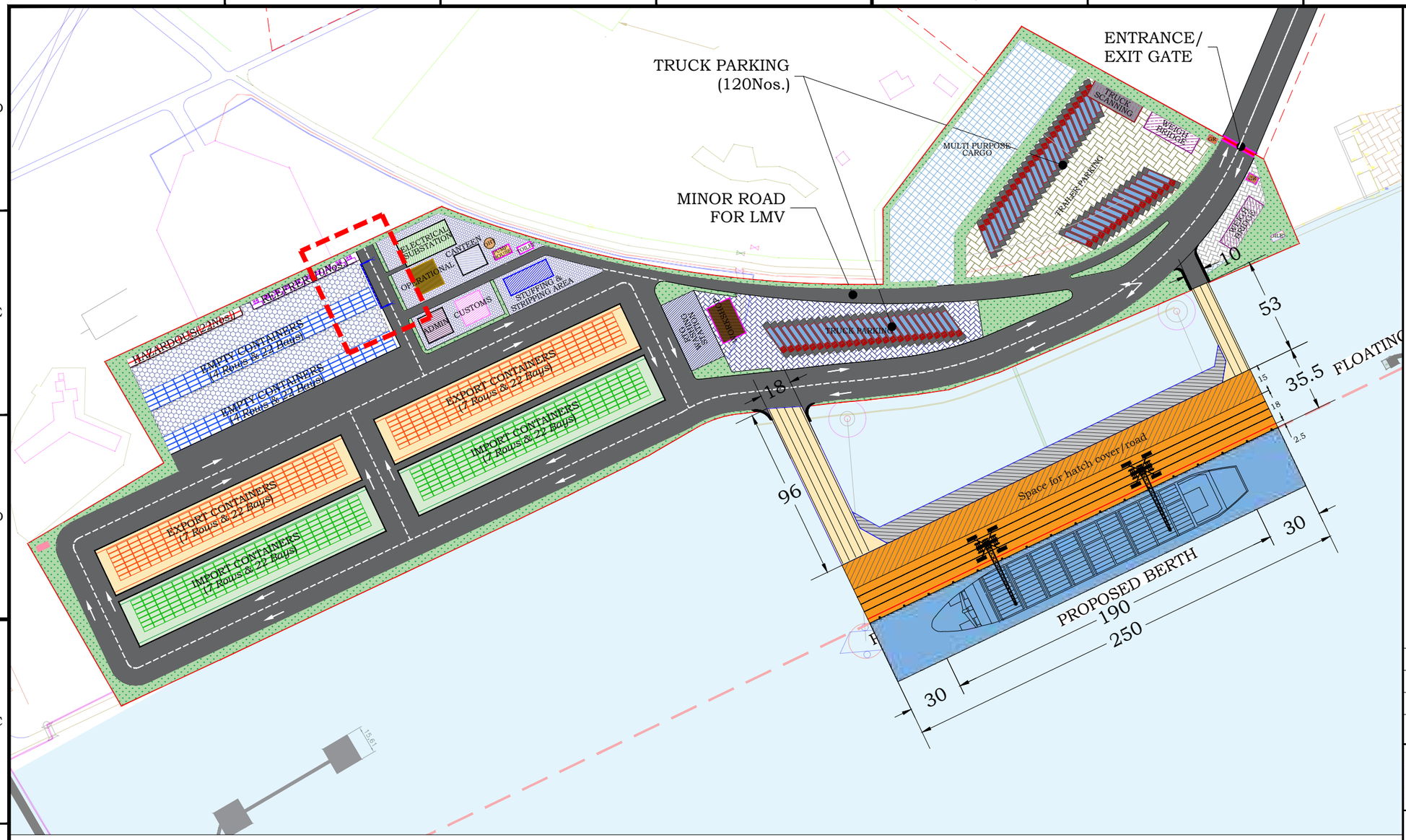
Drawing No.	Report No
SMPK/PMS/2425-052/HDC/TEFR/0709	RP001

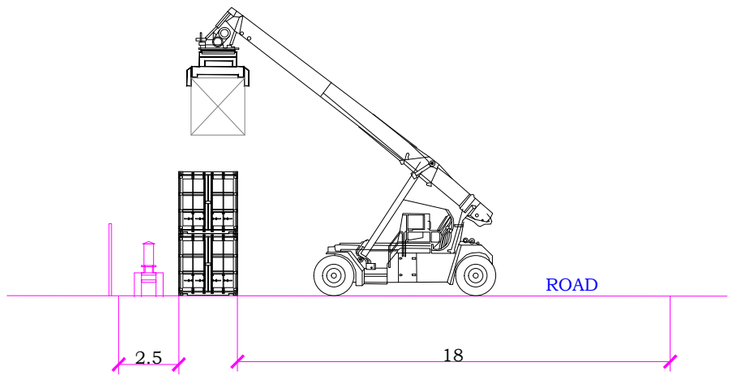
Project No.
SMPK-GUR/2425-052/PORTS

Rev No. : R1	Sheet size : A3
Date 14-05-2025	Scale : NTS

Drawn by:	Checked by:	Approved by:
ABR	NBL	SDC


ENTRY GATE
OLD BOUNDARY WALL
EXIT GATE
B
B
RAIL SIDING
BERTH 11
BERTH 12
BERTH 13
BERTH 14
BERTH 15
BERTH 16
BERTH 17
BERTH 18
BERTH 19
APPROACH ROAD FOR BERTH NO. 11 & 12
APPROACH ROAD FOR BERTH NO. 13 & 14
APPROACH ROAD FOR BERTH NO. 15 & 16
APPROACH ROAD FOR BERTH NO. 17 & 18
APPROACH ROAD FOR BERTH NO. 19
COVERED STORAGE AREA 1760 SQM
OPEN STORAGE AREA 2000 SQM
OPEN STORAGE AREA 2000 SQM
OPEN STORAGE AREA 2000





CROSS SECTION -CC
(HDC OUTER TERMINAL CONTAINER)

NOTES:

1. All dimensions in Meters,unless otherwise specified.

No.	Stage/ Description	Drawn by	Checked by	Approved by	Date

Client: **Syama Prasad Mookerjee Port, Kolkata**

Consultant: **Voyants Solutions Private Limited**

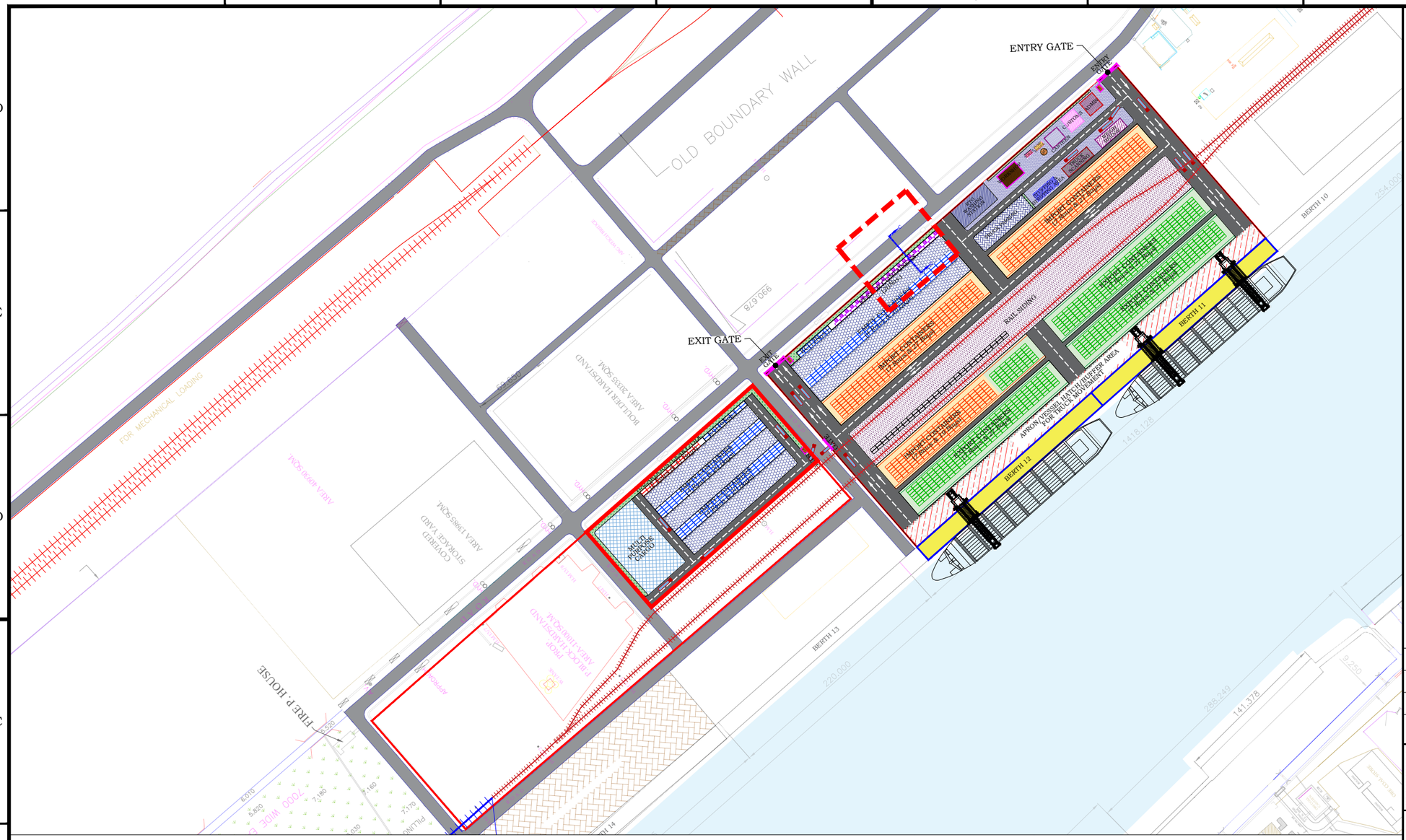
Project Title:

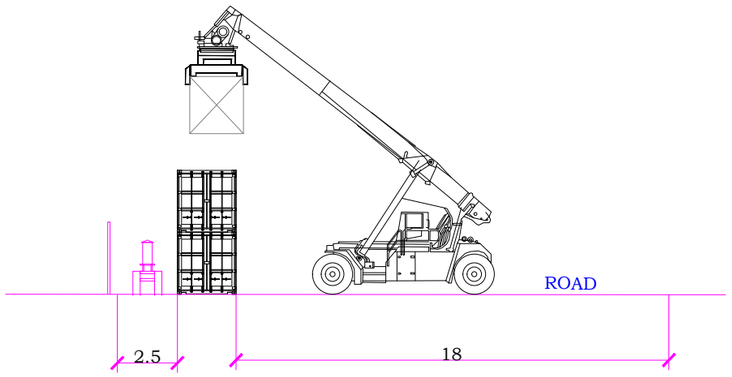
DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

Drawing Title:

REEFER CROSS SECTION OF HDC OUTER TERMINAL

Drawing No. SMPK/PMS/2425-052/HDC/TEFR/0711	Report No RP001
Project No. SMPK-GUR/2425-052/PORTS	N / W E / S
Rev No. : R1	Sheet size : A3
Date 14-05-2025	Scale : NTS
Drawn by: ABR	Checked by: NBL
	Approved by: SDC





CROSS SECTION -DD
(BERTH NO 11&12)

NOTES:

1. All dimensions in Meters,unless otherwise specified.

No.	Stage/ Description	Drawn by	Checked by	Approved by	Date

Client:
Syama Prasad Mookerjee Port, Kolkata

Consultant:
Voyants Solutions Private Limited

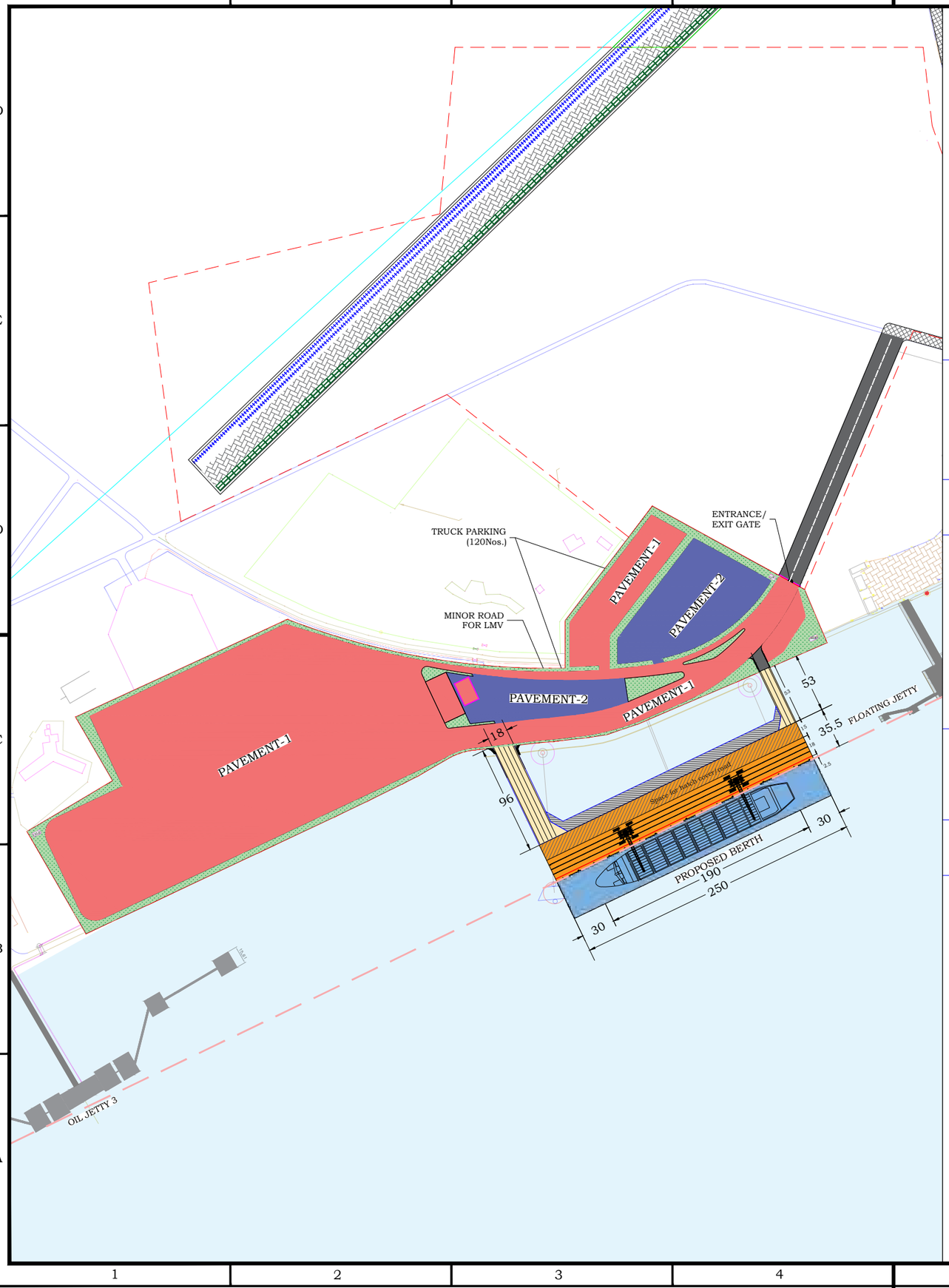
Project Title:
DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

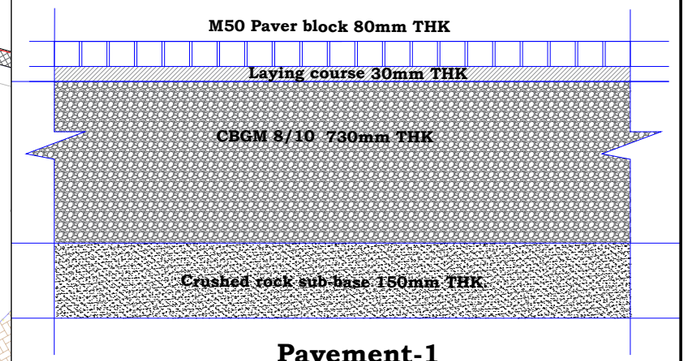
Drawing Title:
REEFER CROSS SECTION OF BERTH NO.11 &12

Drawing No.	Report No
SMPK/PMS/2425-052/HDC/TEFR/0712	RP001

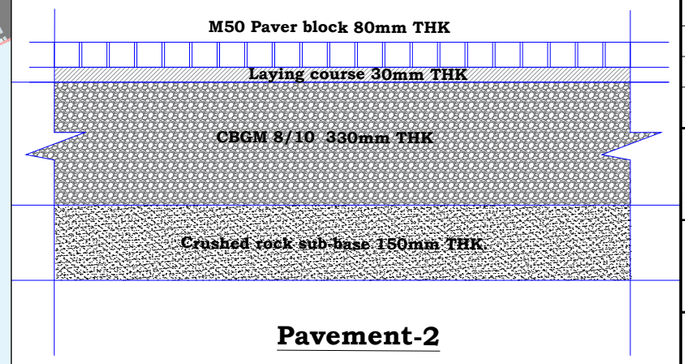
Project No.	
SMPK-GUR/2425-052/PORTS	
Rev No. : R1	Sheet size : A3
Date :14-05-2025	Scale : NTS

Drawn by:	Checked by:	Approved by:
ABR	NBL	SDC





Pavement-1



Pavement-2

NOTES:

1. All dimensions in Meters,unless otherwise specified.
2. Dimension shall not be scaled only written dimensions shall be followed.
3. This drawing shall not be used other than purpose marked issued.

Legends

	Pavement-1
	Pavement-2
	Greenary

No.	Stage/ Description	Drawn by	Checked by	Approved by	Date

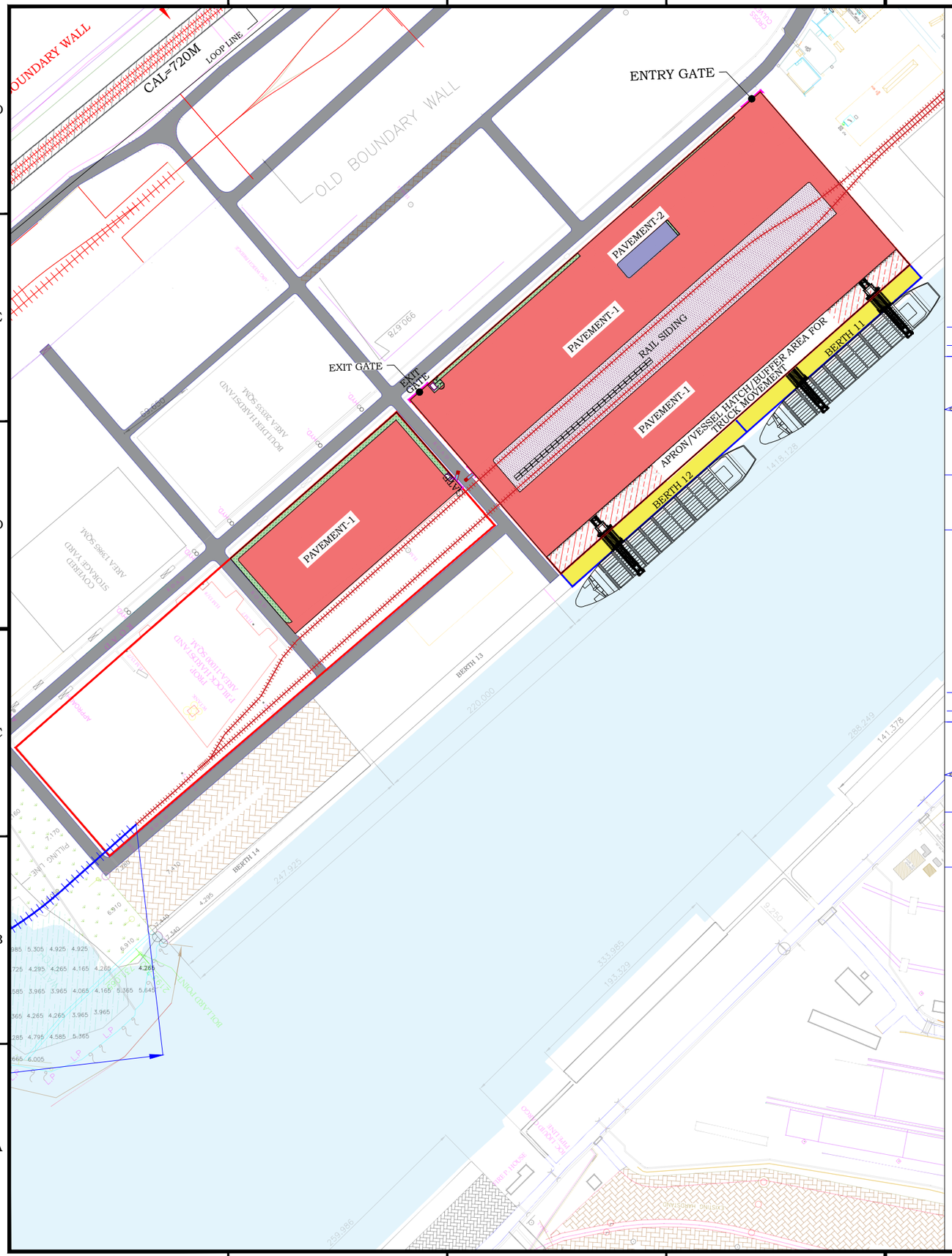
Client:
Syama Prasad Mookerjee Port, Kolkata

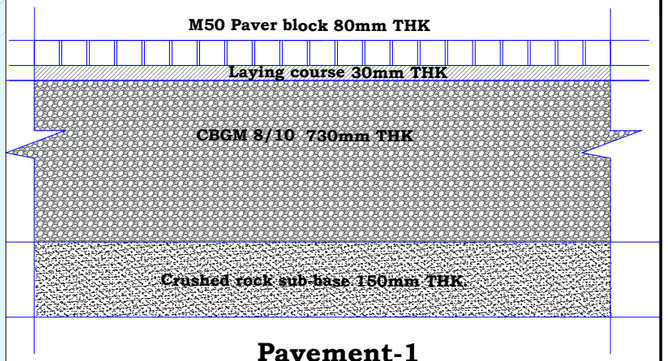
Consultant:
Voyants Solutions Private Limited

Project Title:
DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

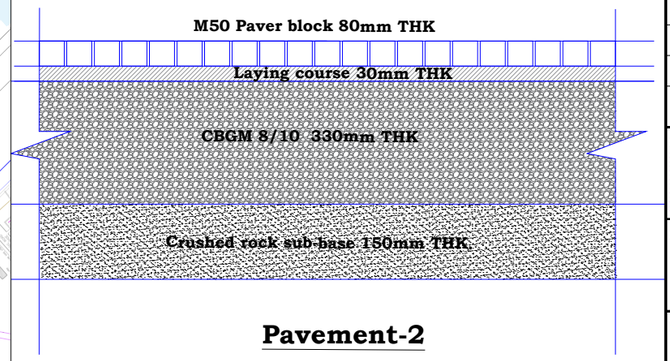
Drawing Title:
PAVEMENT LAYOUT AND PAVEMENT DETAILS OF OUTER TERMINAL

Drawing No. SMPK/PMS/2425-052/HDC/TEFR/0713	Report No RP001
Project No. SMPK-GUR/2425-052/PORTS	N W E S
Rev No. : R1	Sheet size : A3
Date 14-05-2025	Scale : NTS
Drawn by: ABR	Checked by: NBL
	Approved by: SDC





Pavement-1



Pavement-2

NOTES:

1. All dimensions in Meters,unless otherwise specified.
2. Dimension shall not be scaled only written dimensions shall be followed.
3. This drawing shall not be used other than purpose marked issued.

Legends

	Pavement-1
	Pavement-2
	Greenary

No.	Stage/ Description	Drawn by	Checked by	Approved by	Date

Client:
Syama Prasad Mookerjee Port, Kolkata

Consultant:
Voyants Solutions Private Limited

Project Title:
DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

Drawing Title:
PAVEMENT LAYOUT AND PAVEMENT DETAILS OF BERTH NO. 11 &12

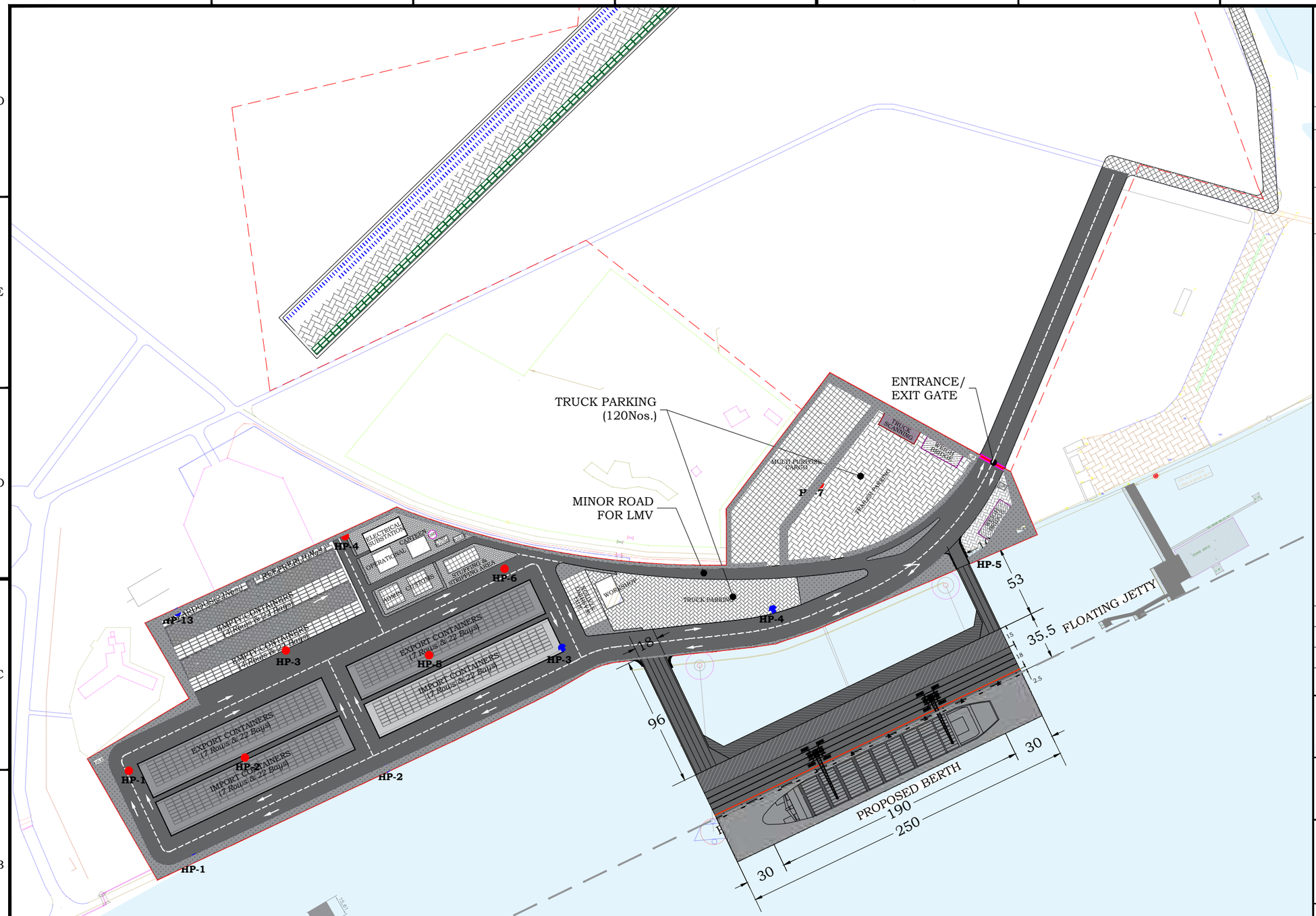
Drawing No.	Report No
SMPK/PMS/2425-052/HDC/TEFR/0714	RP001

Project No.
SMPK-GUR/2425-052/PORTS

Rev No. : R1	Sheet size : A3
Date 14-05-2025	Scale : NTS

N W E S

Drawn by:	Checked by:	Approved by:
ABR	NBL	SDC



NOTES:

1. All dimensions in Meters,unless otherwise specified.
2. Dimension shall not be scaled only written dimensions shall be followed.
3. This drawing shall not be used other than purpose marked issued.

Legends

	New, 13 Nos. 350 Watt led flood light with 30 meter high mast pole, symmetric type
	13 Nos. 350 Watt led flood light with 30 meter high mast pole, asymmetric type

No.	Stage/ Description	Drawn by	Checked by	Approved by	Date

Client:
Syama Prasad Mookerjee Port, Kolkata

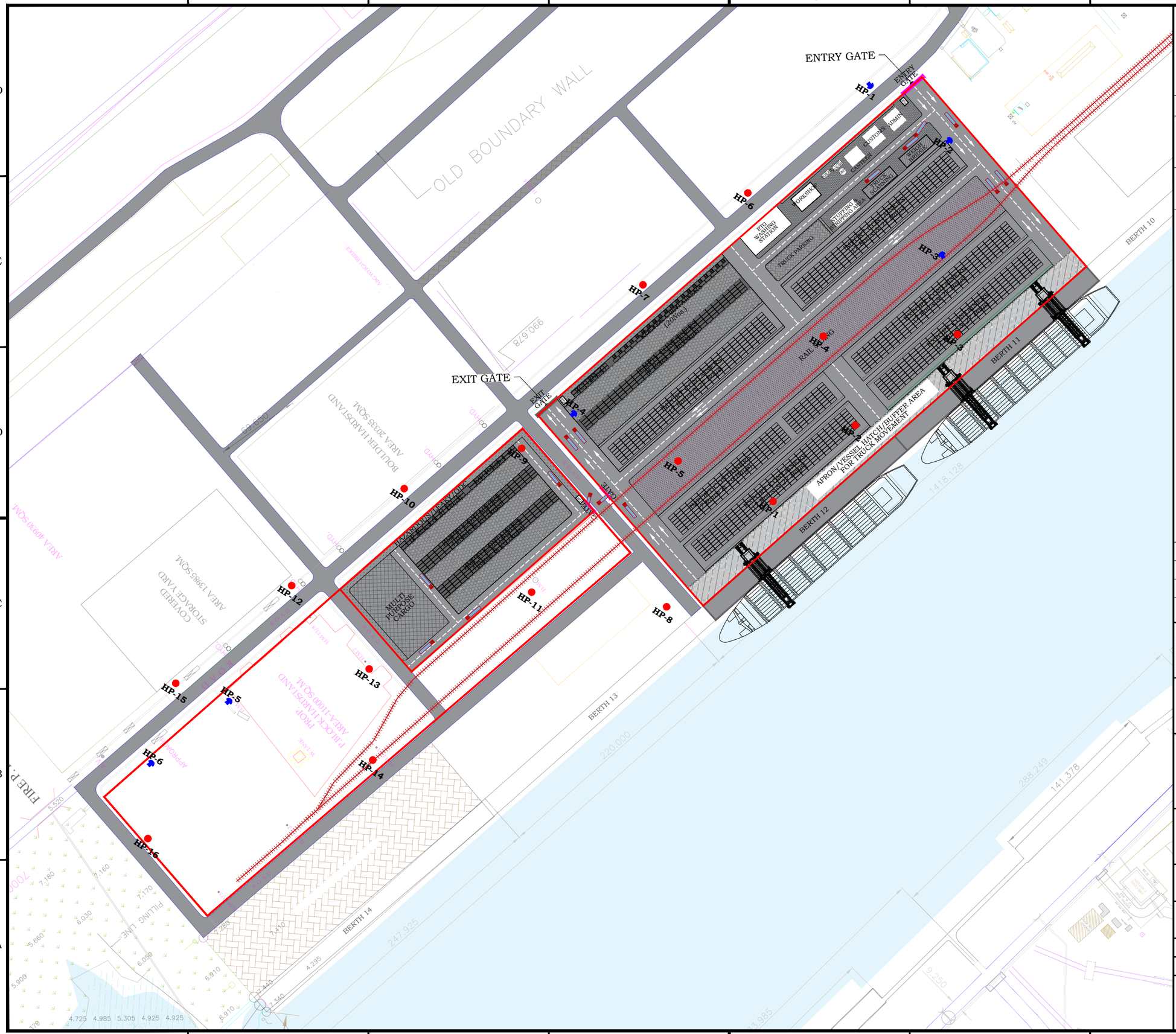
Consultant:
Voyants Solutions Private Limited

Project Title:
DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

Drawing Title:
ILLUMINATION LAYOUT OF HDC OUTER TERMINAL

1 OF 2

Drawing No. SMPK/PMS/2425-052/HDC/TEFR/0715	Report No RP001
Project No. SMPK-GUR/2425-052/PORTS	N W E S
Rev No. : R1	Sheet size : A3
Date 14-05-2025	Scale : NTS
Drawn by: ABR	Checked by: NBL
	Approved by: SDC



NOTES:

1. All dimensions in Meters,unless otherwise specified.
2. Dimension shall not be scaled only written dimensions shall be followed.
3. This drawing shall not be used other than purpose marked issued.

Legends

	New, 13 Nos. 350 Watt led flood light with 30 meter high mast pole, symmetric type
	13 Nos. 350 Watt led flood light with 30 meter high mast pole, asymmetric type

No.	Stage/ Description	Drawn by	Checked by	Approved by	Date

Client: **Syama Prasad Mookerjee Port, Kolkata**

Consultant: **Voyants Solutions Private Limited**

Project Title:

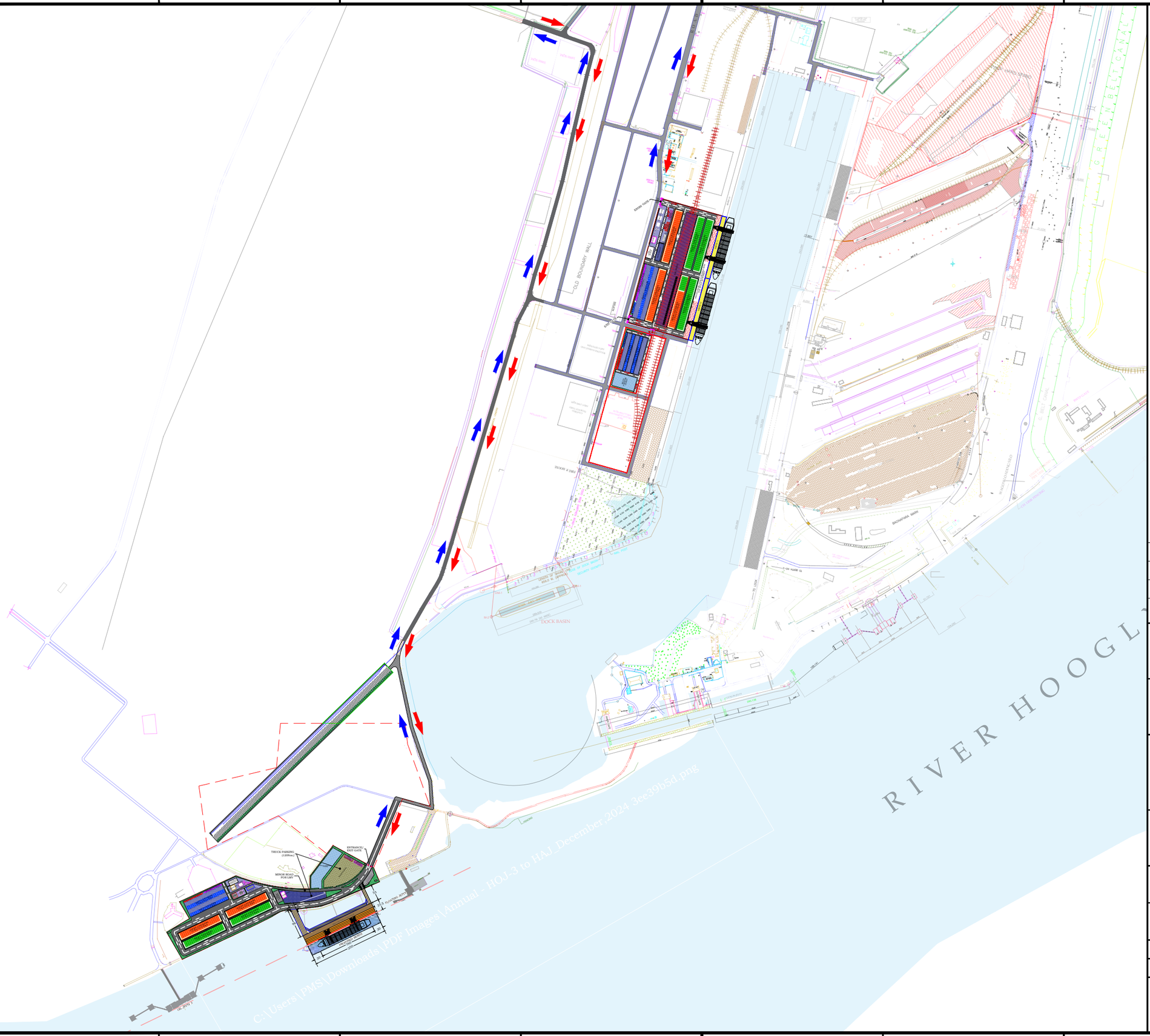
DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

Drawing Title:

ILLUMINATION LAYOUT OF HDC BERTH NO. 11&12

2 OF 2

Drawing No. SMPK/PMS/2425-052/HDC/TEFR/0716	Report No RP001
Project No. SMPK-GUR/2425-052/PORTS	
Rev No. : R1	Sheet size : A3
Date 14-05-2025	Scale : NTS
Drawn by: ABR	Checked by: NBL
	Approved by: SDC



NOTES:

1. All dimensions in Meters,unless otherwise specified.
2. Dimension shall not be scaled only written dimensions shall be followed.
3. This drawing shall not be used other than purpose marked issued.

No.	Stage/ Description	Drawn by	Checked by	Approved by	Date

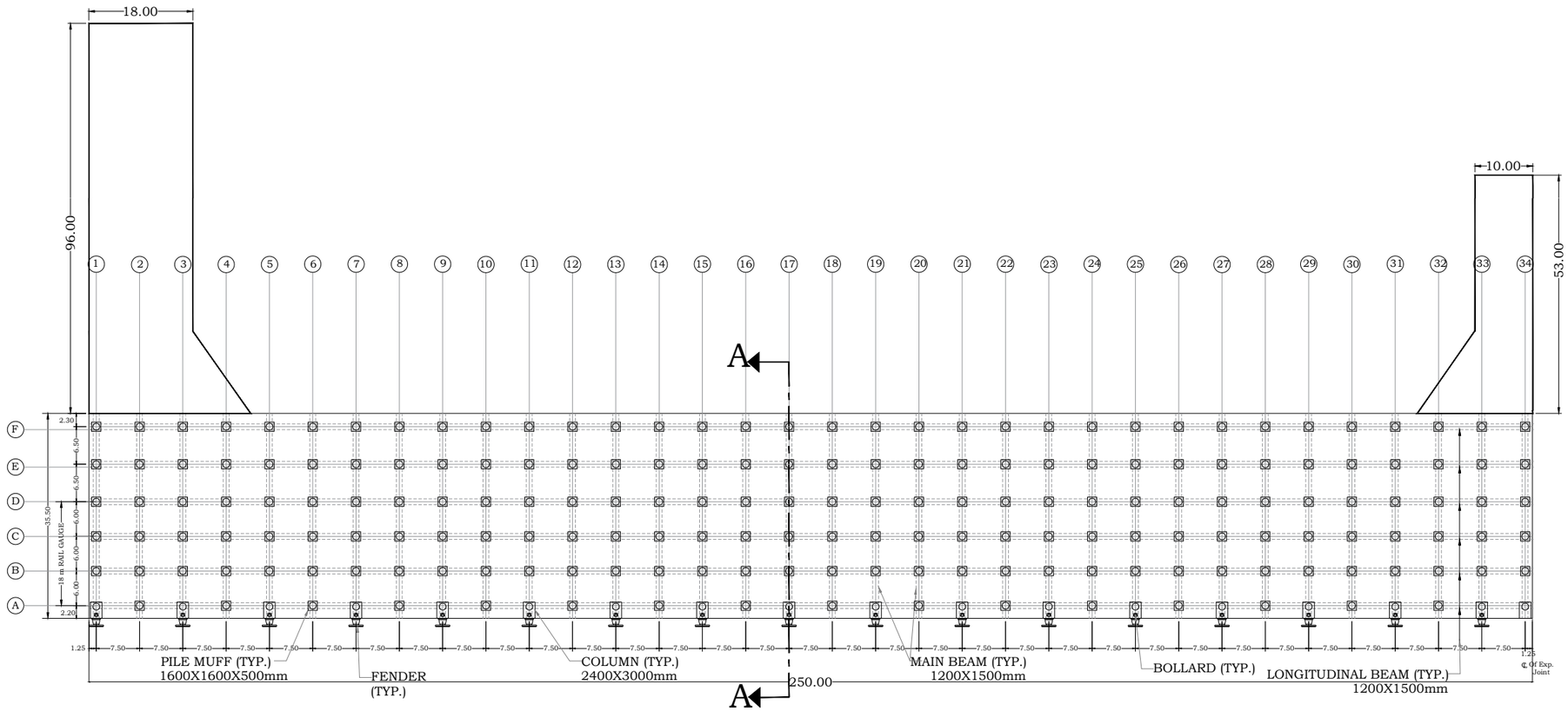
Client:
Syama Prasad Mookerjee Port, Kolkata

Consultant:
Voyants Solutions Private Limited

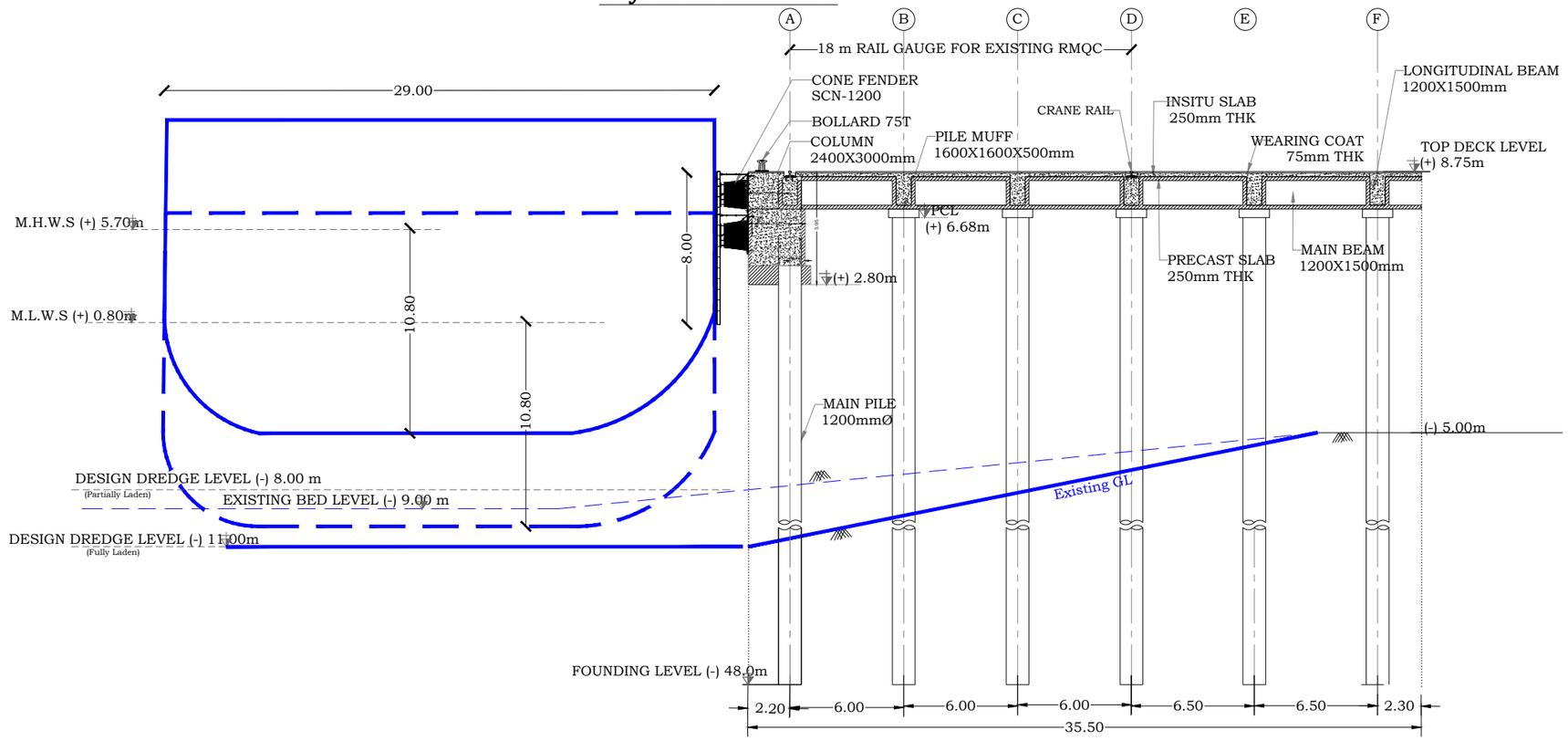
Project Title:
DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

Drawing Title:
HDC OCT & BERTH 11 & 12
TRAFFIC FLOW PLAN

Drawing No. SMPK/PMS/2425-052/HDC/TEFR/0717	Report No RP001
Project No. SMPK-GUR/2425-052/PORTS	N W E S
Rev No. : R1	Sheet size : A3
Date : 14-05-2025	Scale : NTS
Drawn by: ABR	Checked by: NBL
	Approved by: SDC



Layout Plan - Berth



CROSS SECTION-AA

1. All dimensions are given in "m" unless otherwise specified.
2. All levels are in "m" w.r.t C.D where C.D is Chart Datum

Tide Level	Garden Reach
Highest High Water (HHW)	(+) 7.26m C.D
Mean High Water Spring Freshets	(+) 5.92m C.D
Mean High Water Spring Dry Season	(+)5.51m C.D
Mean High Water Spring (MHWS)	(+) 5.70m C.D
Mean High Water (MHW)	(+) 5.01m C.D
Mean High water Neap (MHWN)	(+) 4.26m C.D
Local mean water Level (LMWL)	(+) 3.23m C.D
Mean Low water Neap (MLWN)	(+) 2.10m C.D
Mean Low Water (MLW)	(+) 1.34m C.D
Mean Low Water Spring (MLWS)	(+) 0.80m C.D
Lowest Low Water (LLW)	(-) 0.07m C.D

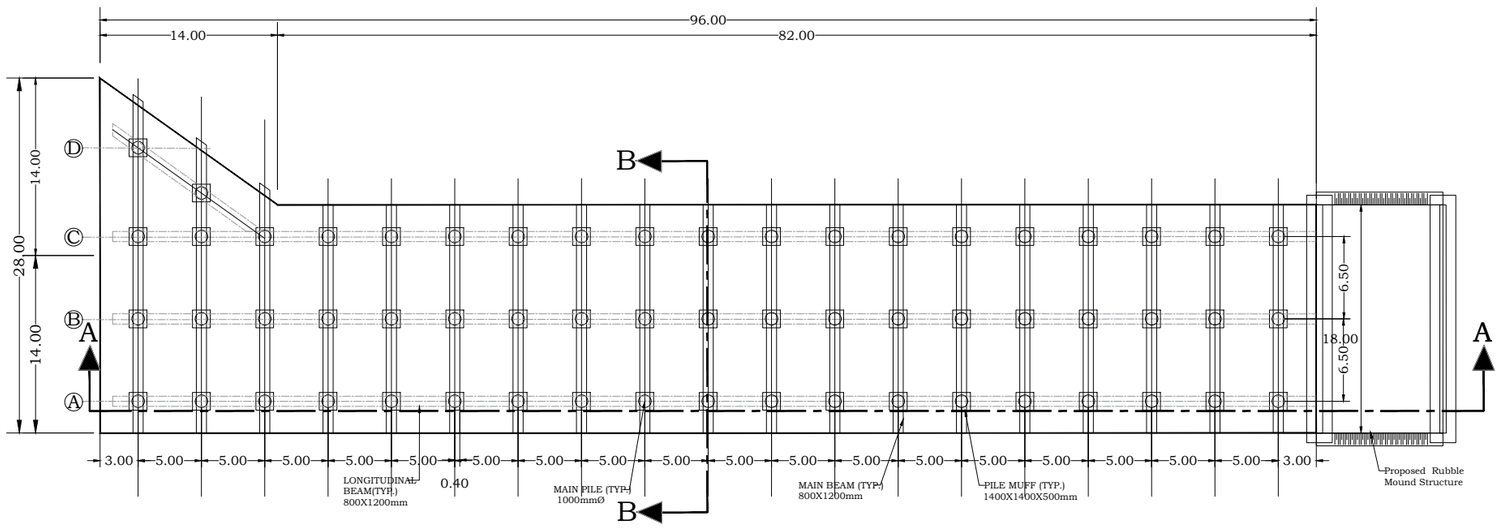
Client:
Syama Prasad Mookerjee Port, Kolkata

Consultant:
Voyants Solutions Private Limited

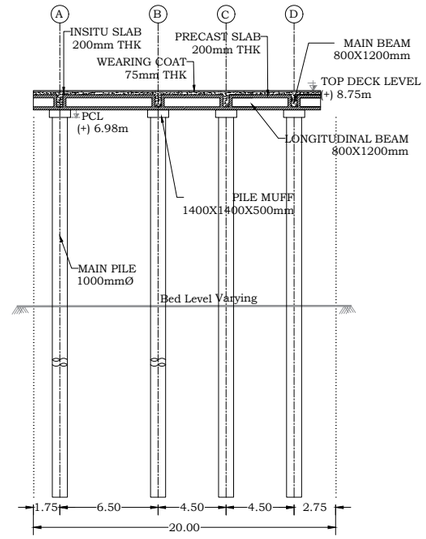
Project Title:
DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

Drawing Title:
BERTH STRUCTURAL LAYOUT OF PLAN

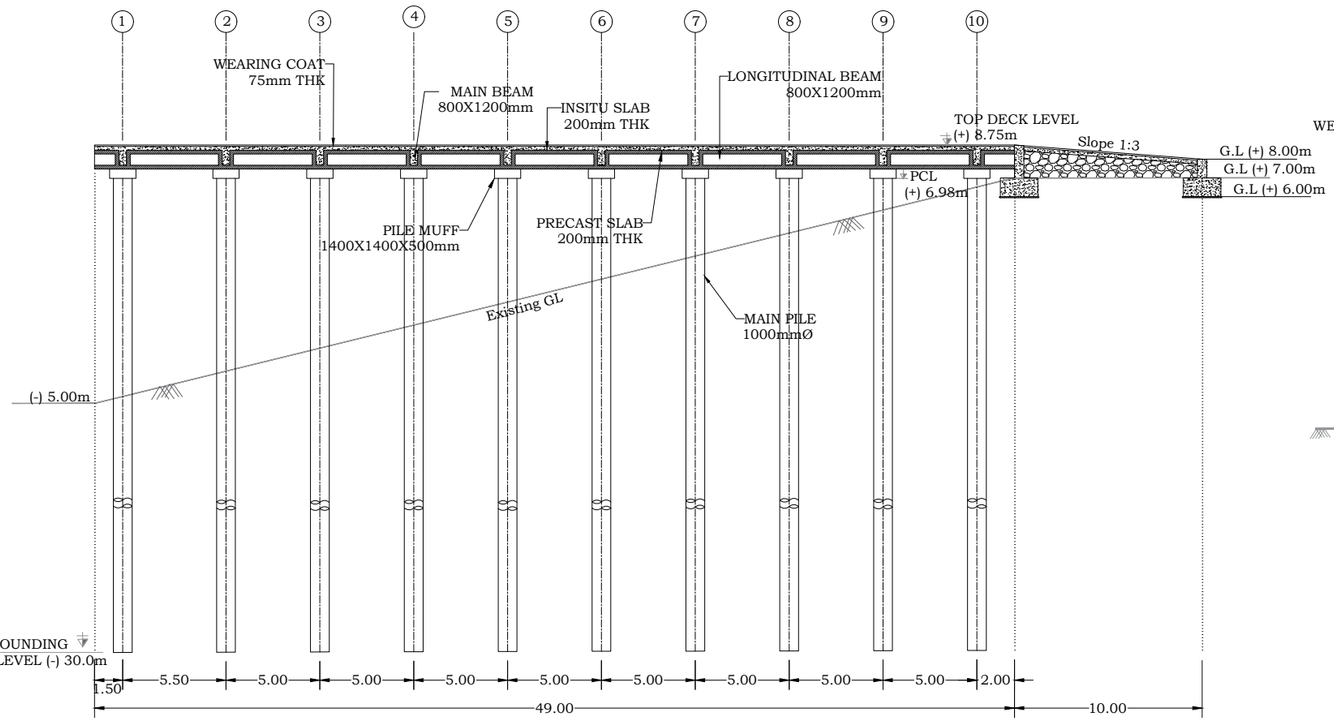
Drawing No. SMPK/PMS/2425-052/HDC/TEFR/0718	Report No RP001
Project No. SMPK-GUR/2425-052/PORTS	
Rev No. : R1	Sheet size : A3
Date 14-05-2025	Scale : NTS
Drawn by: ABR	Checked by: NBL
Approved by: SDC	



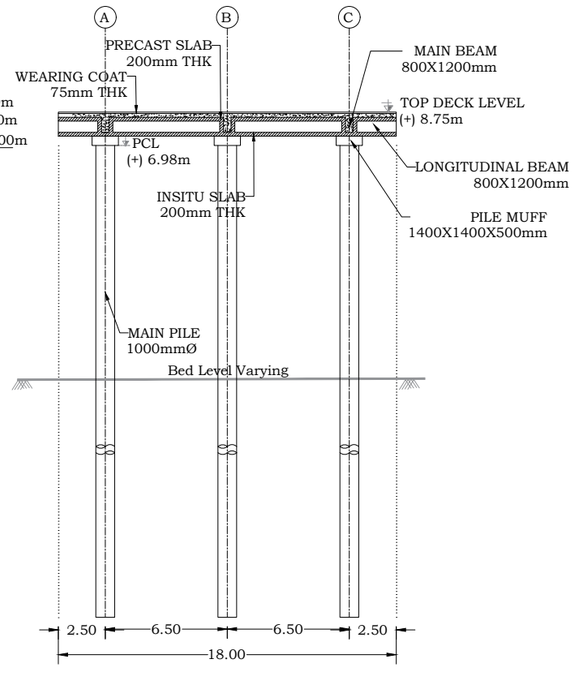
LAYOUT - APPROACH TRESTLE-1



CROSS SECTION-CC



CROSS SECTION-AA



CROSS SECTION-BB

1. All dimensions are given in "m" unless otherwise specified.
2. All levels are in "m" w.r.t C.D where C.D is Chart Datum

Tide Level	Garden Reach
Highest High Water (HHW)	(+) 7.26m C.D
Mean High Water Spring Freshets	(+) 5.92m C.D
Mean High Water Spring Dry Season	(+)5.51m C.D
Mean High Water Spring (MHWS)	(+) 5.70m C.D
Mean High Water (MHW)	(+) 5.01m C.D
Mean High water Neap (MHWN)	(+) 4.26m C.D
Local mean water Level (LMWL)	(+) 3.23m C.D
Mean Low water Neap (MLWN)	(+) 2.10m C.D
Mean Low Water (MLW)	(+) 1.34m C.D
Mean Low Water Spring (MLWS)	(+) 0.80m C.D
Lowest Low Water (LLW)	(-) 0.07m C.D

Client: **Syama Prasad Mookerjee Port, Kolkata**

Consultant: **Voyants Solutions Private Limited**

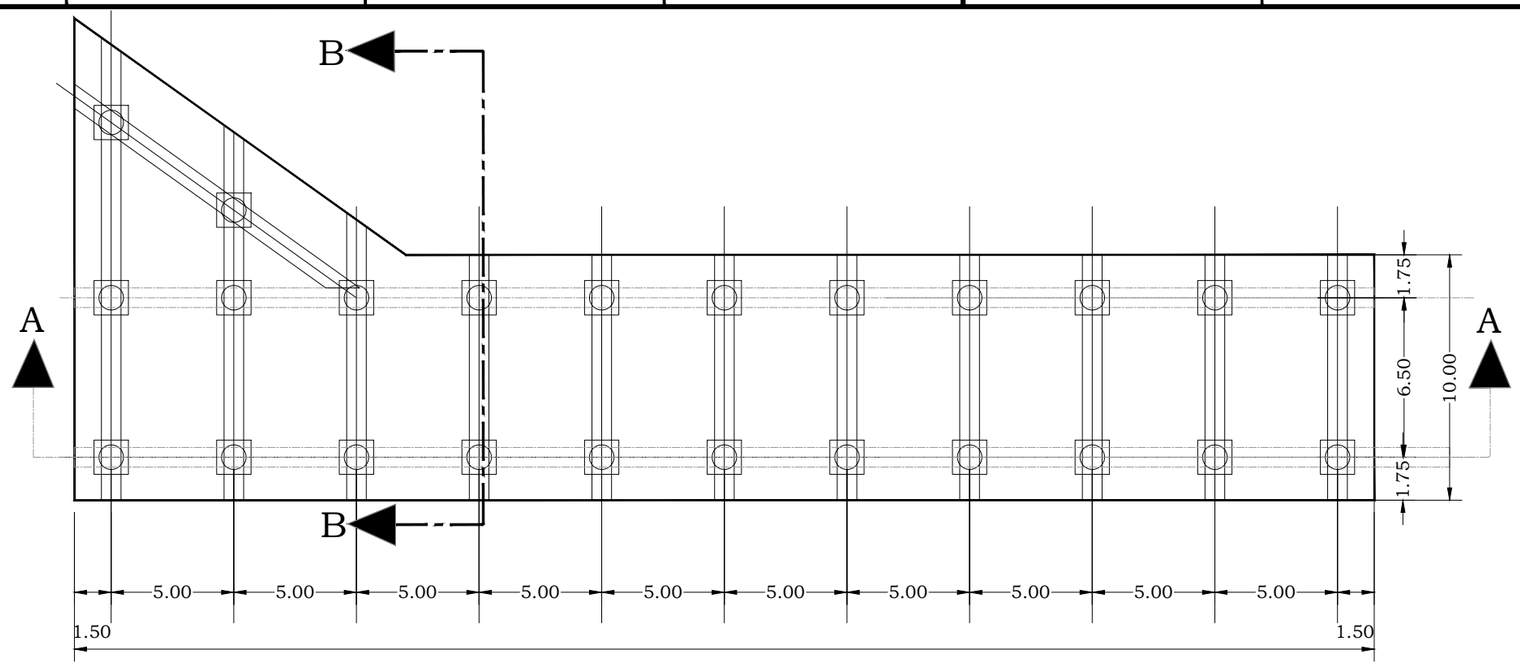
Project Title:

DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

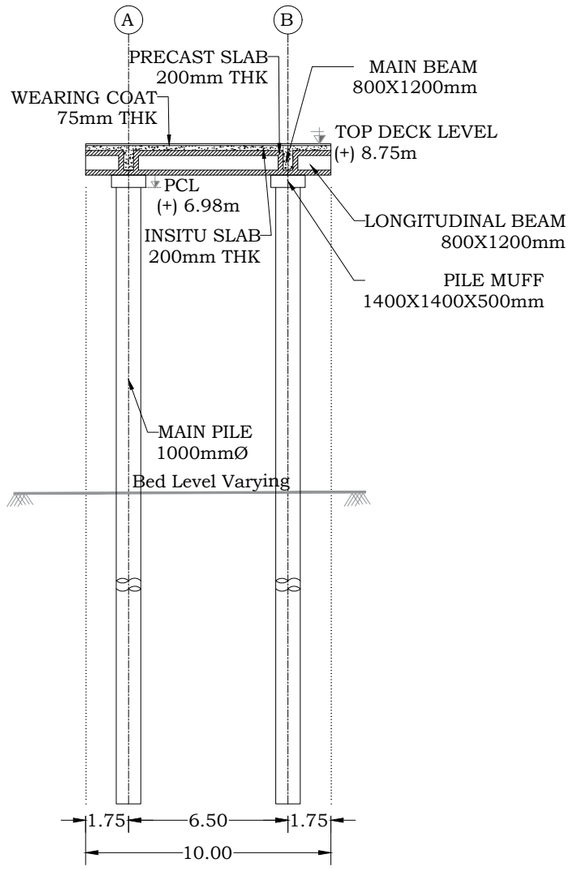
Drawing Title:

APPROACH TRESTLE -I
STRUCTURAL LAYOUT OF PLAN, CROSS-SECTION

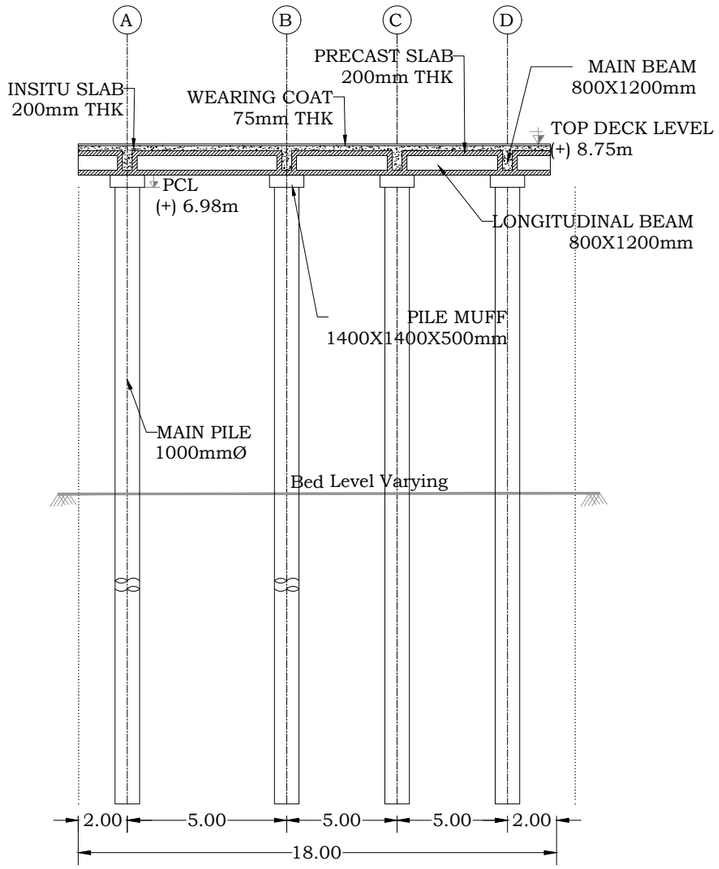
Drawing No. SMPK/PMS/2425-052/HDC/TEFR/0718	Report No 1 OF 2
Project No. SMPK-GUR/2425-052/PORTS	
Rev No. : R1	Sheet size : A3
Date :14-05-2025	Scale : NTS
Drawn by: HSR	Checked by: NBL
	Approved by: SDC



(APPROACH TRESTLE)
53m



CROSS SECTION-BB



CROSS SECTION-AA

1. All dimensions are given in "m" unless otherwise specified.
2. All levels are in "m" w.r.t C.D where C.D is Chart Datum

Tide Level	Garden Reach
Highest High Water (HHW)	(+) 7.26m C.D
Mean High Water Spring Freshets	(+) 5.92m C.D
Mean High Water Spring Dry Season	(+)5.51m C.D
Mean High Water Spring (MHWS)	(+) 5.70m C.D
Mean High Water (MHW)	(+) 5.01m C.D
Mean High water Neap (MHWN)	(+) 4.26m C.D
Local mean water Level (LMWL)	(+) 3.23m C.D
Mean Low water Neap (MLWN)	(+) 2.10m C.D
Mean Low Water (MLW)	(+) 1.34m C.D
Mean Low Water Spring (MLWS)	(+) 0.80m C.D
Lowest Low Water (LLW)	(-) 0.07m C.D

Client: **Syama Prasad Mookerjee Port, Kolkata**

Consultant: **Voyants Solutions Private Limited**

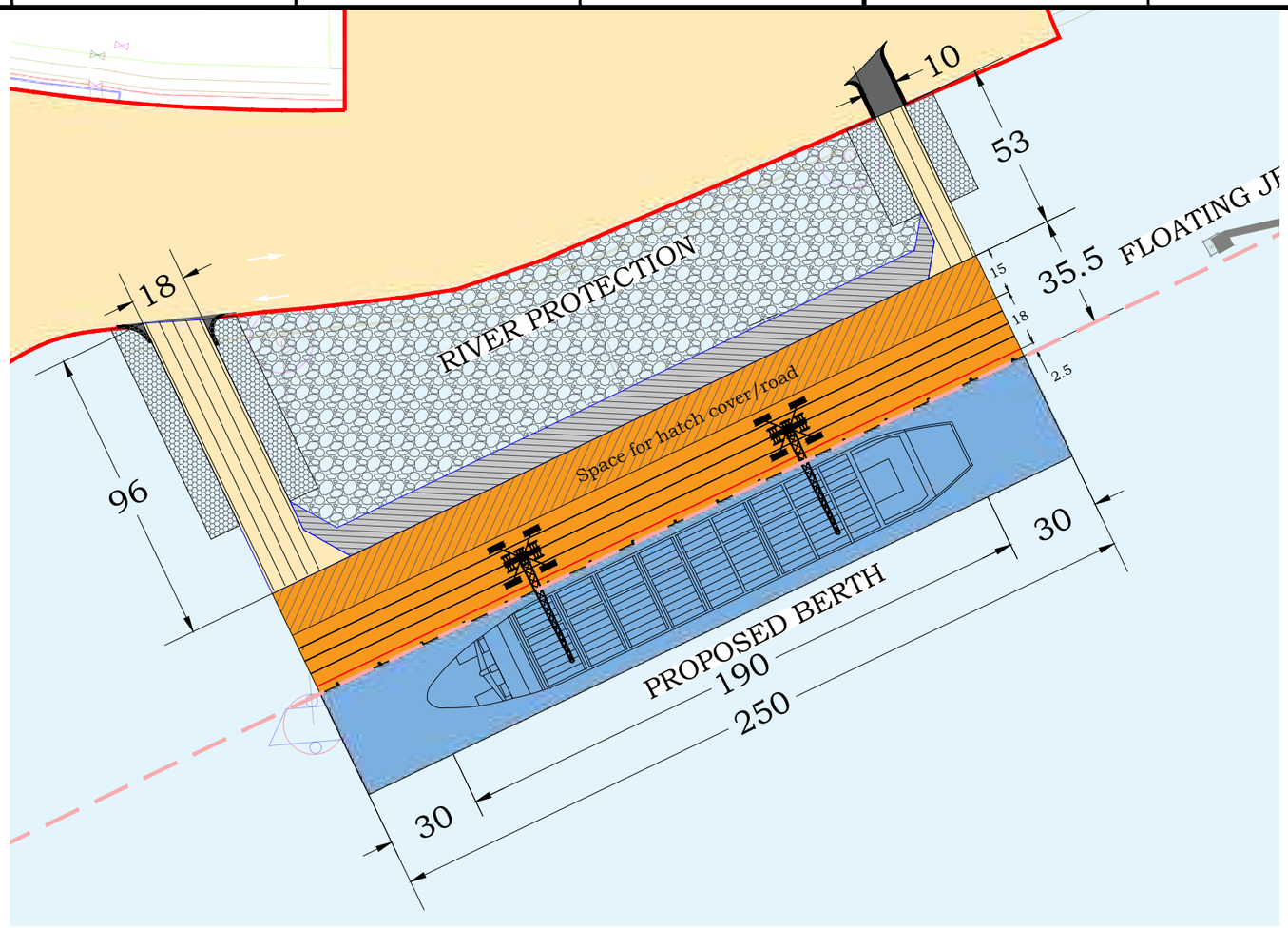
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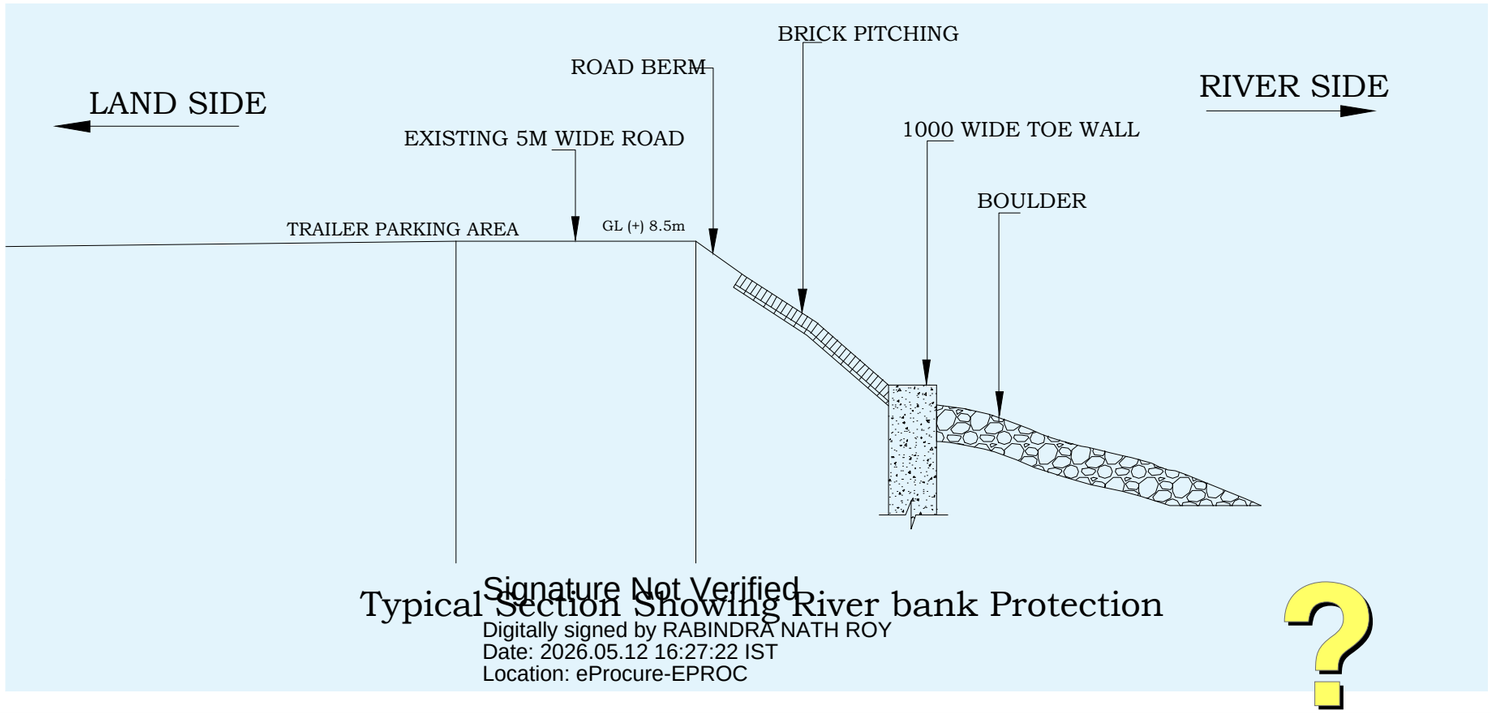
DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

Drawing Title:

APPROACH TRESTLE-II
STRUCTURAL LAYOUT OF PLAN, CROSS-SECTION

Drawing No. SMPK/PMS/2425-052/HDC/TEFR/0719	Report No 1 OF 2
Project No. SMPK-GUR/2425-052/PORTS	
Rev No. : R1	Sheet size : A3
Date 14-05-2025	Scale : NTS
Drawn by: HSR	Checked by: NBL
	Approved by: SDC





Typical Section Showing River bank Protection

Signature Not Verified
Digitally signed by RABINDRA NATH ROY
Date: 2026.05.12 16:27:22 IST
Location: eProcure-EPROC

NOTES:

1. All dimensions in Meters,unless otherwise specified.
2. Dimension shall not be scaled only written dimensions shall be followed.
3. This drawing shall not be used other than purpose marked issued.

No.	Stage/ Description	Drawn by	Checked by	Approved by	Date

Client: **Syama Prasad Mookerjee Port, Kolkata**

Consultant: **Voyants Solutions Private Limited**

Project Title:

DEVELOPMENT OF OUTER TERMINAL (BETWEEN HOJ-III AND HFTPL AT HDC) AND BERTH NO. 11 & 12 AT HDC SMPK, KOLKATA

Drawing Title:

HDC OCT
RIVER BANK PROTECTION DETAILS

Drawing No.	Report No
SMPK/PMS/2425-052/HDC/TEFR/0720	RP001

Project No. SMPK-GUR/2425-052/PORTS

Rev No. : R1	Sheet size : A3	N / W / E / S
Date : 14-05-2025	Scale : NTS	
Drawn by: ABR	Checked by: NBL	Approved by: SDC