Pre bid replies of Mechanization of Berth No. 2 on Design, Build, Finance, Operate, Transfer ("DBFOT") basis" at Haldia Dock Complex for a concession period of Thirty (30) years

Sl. No	Clause Reference	Particulars	Queries / Observation	Response of HDC, SMP, KOLKATA
1.	General	Project Capacity	The RFQ document doesn't mention about the project capacity. We request Authority to specify the capacity of the project.	The project capacity is 3.744 MMTPA
2.	General	Project Location & Layout Plan	Generally RFQ Document contains the Project Location and Layout Plan for the preliminary understanding of the Project. However, the same is not provided in the issued RFQ. Hence, we request the Authority to provide the Project Location and Layout Plan with clear demarcation for backup yard, rail and road connectivity.	The plan is produced at page no 40-41 of DPR.
3.	General	Current traffic	In order to have a better understanding of the traffic potential of the project, we request the Authority to provide the berth wise, commodity wise cargo traffic handled at Haldia Dock Complex for FY2018-19 and FY2019-20.	The berth wise, commodity wise cargo traffic handled at Haldia Dock Complex for FY2018-19 and FY2019-20 are enclosed as **Annex-A.**
4.	1.1.1	Cargo Evacuation	The RFQ mentioned about cargo evacuation by rail through rapid wagon loading system through silo but doesn't mention evacuation of cargo by road. Road evacuation of cargo is necessary for nearby industries which will handle cargo at the proposed project and may not be commercially feasible to be serviced by railway. We request Authority to advise how much	The ratio of evacuation of cargo by Rail and Road is expected be 80:20.

Sl. No	Clause Reference	Particulars	Queries / Observation	Response of HDC, SMP, KOLKATA
			cargo in Million Ton Per Annum will be allowed to be evacuated by road.	
5.	1.1.1	Project cost breakup	The issued RFQ document only provide the scope of work, equipment list and project cost but doesn't provide the breakup of the project cost. We request authority to provide the detailed breakup of the estimated project cost.	Please refer page no 5-6 and 66-67 of DPR
6.	1.1.3 (i)	Scope	Referred clause mention that proposed project is for handling of dry bulk cargo. We request Authority to clarify on the different commodities which will be allowed to handle at the berth.	All Types of Import Coal ,Coke, Limestone, Thermal Coal, Iron Ore and other compatible Dry Bulk Cargoes may be handled in the proposed facility.
			We also request Authority to allow to handle import and export of dry bulk cargo at the proposed project.	The equipment at Mechanization of Berth no-2 have been considered for import cargo only. Moreover, the jetty has got limitation of width for movement of Dumper/payloaders etc. Export of dry bulk cargo shall not be considered at this stage. However, successful bidder may be allowed export cargo during concession period by own arrangement through any infrastructural development required by his own cost.
7.	1.2.1 and 2.13.2	Demand Draft	Clause 2.13.2 (xiii) mentions that the envelope should contain demand draft of Rs 35,400/- towards the	Please refer **Addendum-II**

Sl. No	Clause Reference	Particulars	Queries / Observation	Response of HDC, SMP, KOLKATA
			purchase of RFQ. However the clause 1.2.1 mentions that prior to making an Application, Applicant shall pay to the Authority a sum of Rs 35,400/- (Rupees Thirty Five Thousand Four Hundred only) as the cost of the RFQ process. We request the Authority to remove the aforesaid provision from clause 1.2.1 of the RFQ document and allow the Applicant to submit the demand draft as mentioned in Clause 2.13.2 (xiii).	
8.	1.2.7	Feasibility Study	The RFQ document doesn't contain detailed information about the project. Hence, we request Authority to share the Feasibility study of the Berth no 2. This will help Applicants to understand more about the project.	Please refer DPR attached.
9.	1.2.8	Royalty	We understand that the Applicants will be free to quote Royalty per MT of cargo handled at the proposed project during the bidding stage and there will be no minimum Royalty. Please confirm.	The RFQ deals only with prequalification of bidders for the project. The terms and conditions governing submission of bid and grant of concession will be dealt with at the RFP stage.
10.	General	Land for stack yard	RFQ does not provide details of the land allocated for stack yard of the project as well as the stack yard capacity. Please provide area of the stack yard. It is suggested that the stack yard capacity should be in-line with the terminal capacity.	1. The stackyard capacity is 3.744 MMTPA. 2. The stockpile area is 1,00,000 sqm. 3. Area for stackyard for supporting utilities 1,44,264 sqm.

Sl. No	Clause Reference	Particulars	Queries / Observation	Response of HDC, SMP, KOLKATA
				4. Total project area is 2,11,640 sqm (bareland 1,68,888+ hardstand 42,752 sqm)
11.	General	Discharge rate	We request Authority to provide the expected gross berth output. This will help us in better understanding of the specification of the equipments required for the project.	The norms of Gross Berth Output for Coal/ Coke, Limestone and other Dry Bulk Cargoes is 20000MT/day for the Panamax/ Handymax/Supramax Vessels.
12.	General	Environmental clearance	We request Authority to clarify on the status of the Environment Clearance for the Project. If Environment Clearance is granted for the Project, then please provide the copy of the Environment Clearance.	Since this is an existing berth and there is no increase in capacity of the berth, hence there is no need for environmental clearance.
13.	General	Finalization of Project cost & structure for Tariff Fixation	We request Authority to clarify the status of Tariff Fixation for the project. We would suggest that the project cost and structure for tariff fixation should be finalized before the submission of RFQ. Finalization of project cost, which is the basis of the eligibility criteria of the RFQ qualification, will always be subject to TAMP approval during the tariff fixation process. Hence we suggest that it is better to finalize the project cost before submission of RFQ application, so that later on the need of re-inviting RFQ doesn't arise due to change in project cost during the tariff fixation.	HDC has already submitted proposal to TAMP for approval of tariff for the project and will be forwarded to prospective bidders after getting approval.

Sl. No	Clause Reference	Particulars	Queries / Observation	Response of HDC, SMP, KOLKATA
14.	General	Rail and Road Share of Cargo	Please provide clarity on the Rail / Road evacuation share of each type of cargo.	The ratio of evacuation of cargo by Rail and Road is expected be 80:20.
15.	General	Ship Size and Avg. Parcel Size	Please provide ship size to be handled and Average Parcel size of each type of cargo.	Presently, the average parcel size of Panamax vessel is 31,000 MT whereas for the Supramax / Handymax, the parcel load is of 25,000 MT. Normally Coal vessels are of Panamax type, which are being handled at HDC.
16.	General	Minimum cargo Unloading Rate	RFQ document does not clarify about the minimum cargo unloading rate, conveyor capacity and evacuation rate. Please provide the details pertaining to minimum cargo unloading rate, conveyor capacity and evacuation rate.	Please refer page no 62 - 65 of DPR
17.	General	Stacker Reclaimer Details	Please provide the yard cross section and yard equipment details i.e. Boom requirement, stacking and reclaiming capacity (Rated).	Please refer section 6 (page no 45-57) of DPR
18.	General	Silo Storage Capacity	Please provide minimum silo storage capacity and its location with Rail layout.	Please refer page no 50 of DPR
19.	General	Maximum Storage Height	Please provide the Maximum Storage height for yard stacking.	Allowable height of stockpile is 10 m

Sl. No	Clause Reference	Particulars	Queries / Observation	Response of HDC, SMP, KOLKATA
20.	General	Project Duration	RFQ document does not clarify about the project duration. Please provide clarity on the construction period.	The construction period is 24 months from the completion of condition precedent.
21.	General	Plot Plan	Please share Plot Plan with co-ordinates in AUTOCAD format.	AutoCad format of Plot Plan is attached as **Annex-B**
22.	General	Flow Diagram	Please share the Flow Diagram of proposed Mechanization of Berth no 2.	Please refer page no 78 of DPR
23.	General	Geotech Report	Please share geotech report of terminal area.	Geotech report is attached as **Annex-C**
24.	General	Total Backup Area	Please inform about the total Backup area associated with this mechanization scope. Please clarify the requirement of manual handling (if any) with additional area details marking on drawing.	Please refer Sl No 4 and 10.
25.	General	Power and water source and Battery limits	Please inform about the power source, voltage levels and nearest water source.	The nearest power source is available at berth no.3 (master control) substation and the water source is available at berth no.2
26.	General	DFDS and FFS	Please provide details in case if any existing FFS system installed and it's condition.	The firefighting system is to be installed by the Concessionaire.
27.	General	Demolish works	Please provide the details in case if any existing infrastructures/ buildings are to be demolished.	All existing infrastructure/encumbrances/building within the project area shall be dismantled by HDC, SMP, Kolkata

Sl. No	Clause Reference	Particulars	Queries / Observation	Response of HDC, SMP, KOLKATA
28.	1.1.1		Kindly confirm that TEFR refereeing in the Clause-1.1.1 is the revised TEFR as compare to previous TEFR prepared by IPA for the concern project. If yes, kindly provide the same.	Please refer the DPR
29.	1.1.1		Kindly confirm the specification of the equipment proposed in the Clause -1.1.1 for the concern project.	Please refer section 6 page no 47-57 of DPR
30.	1.1.1		Kindly provide the detail breakup of the indicative project cost as given in the RFQ viz. Mechanical cost, Civil Cost, Electrical Cost etc.	Please refer page no 5-6 and 66-67 of DPR
31.	1.1.1		Kindly advice whether the indicative project costs are based on current cost estimates.	Yes, the project cost is estimated as per current cost estimate.
32.	1.1.3		Please provide a to scale drawing of the Project Site and surrounding areas	Please refer **Annex-B**
33.	3.2.6		Kindly confirm, why the Authority has taken Clause-3.2.6, 3.2.7 & 3.2.8 for this RFQ, though these clauses was not in the previous RFQ.	It is included as per the Model RFQ document
34.	2.25		Kindly confirm that no further clearance from National Security is required for the revised RFQ.	Applicants shall apply for security clearance from Government of India and the same is to be forwarded to Ministry.
35.	General		Kindly confirm, is there any deviation in the RFQ vis-à-vis model RFQ.	No deviation, based on Model RFQ.

Sl. No	Clause Reference	Particulars	Queries / Observation	Response of HDC, SMP, KOLKATA
36.	General		Is dredging envisaged near the berth pocket? If yes, who will undertake the dredging?	Port shall maintain berth pocket draft of 8.2 m below dock chart datum.
37.	General		How much total area has been earmarked by the Authority for the project?	Please refer Sl No 10.
38.	General		Please provide a short description on the changes in the Project profile vis-à-vis earlier RFQ.	The present estimate is present at page no 3 to 7 of DPR.
39.	General		It is requested that the Application Due date be extended by adequate time (at least 4 weeks) from the date of issuance of reply to queries / amendments by KoPT to enable the application to arrange the various data/information and certificates in the desired formats	RFQ condition prevails.
40.	General		RFQ does not provide details of the land allocated for stackyard of the project. Please provide area and CAD drawing for the stackyard yard.	Please refer Sl No 10 and Sl No. 21.
41.	General		It is requested to conduct 2nd pre-application conference to discuss the various issues after circulating the revised DPR	Bidder will get sufficient time to address the issues during bidding stage. 2nd pre-application conference is not agreed to.
42.	General		Kindly confirm, whether the revised DPR is prepared considering the present market price estimate.	Please refer Sl No 31.
43.	General		Kindly confirm, whether the Authority shall have to take SFC approval for the concern project.	Further SFC approval may not be required as per extant guidelines.

Sl. No	Clause Reference	Particulars	Queries / Observation	Response of HDC, SMP, KOLKATA
44.	General		Kindly confirm the status of the study taken up for Breaching of Lock Gate.	The breaching of the lock gate is not part of this project.
45.	General		Kindly provide the copy of final Master Plan for KoPT prepared by L&T.	The report is yet to be finalized. Accordingly it is not possible to share.

Sl No	Query of the Bidder	Response of HDC, SMP, KOLKATA
46	Kindly advice reasons for variance in the earlier estimated Project Cost of Rs.331.94 Cr and present estimated Project Cost of Rs.298.26 Cr along with break-up of costs.	The revised estimate of the project is based on outcome of interactions with potential bidders/stakeholders and revision of capacity of equipment.
47	Since 'Mobile Harbour Cranes' are being prescribed now as against ' Gantry Grab Unloaders', authorities are requested to explore possibility of permitting 'Tyre Mounted Mobile Harbour Cranes' instead of 'Rail Mounted Mobile Harbour Cranes' for versatility and ease of O&M as well as total replacement as and when it becomes necessary.	Rail Mounted MHC or Rail Mounted Gantry Grab Unloader with equal or higher capacity than the mandated prescribed equipment in the RFQ shall be allowed provided, the load of the equipment during working will not endanger the Jetty.
48	Understandably, there have been meetings prior to issuance of subject RFQ in relation to this project with the prospective bidders (against earlier RFP) and in case these meetings have been minuted, authorities are requested to kindly share the same with the prospective applicants so as to understand the envisaged changes to the project.	Revised DPR prepared based on feedback of the stakeholders. Please refer DPR
49	Will the concessionaire be allowed to accord priority of vessels at this berth at their own discretion?	The licensee will not set out any preferential or priority berthing norms to any Importer or Exporter or any other agency. However, in order to optimize the use of Berth No.2 and the project facility, the licensee will enjoy the right to

		berth any vessel at Berth No.2 irrespective of the inter-say seniority of the vessel to be handled at Berth No.2.
50	Will vessels for this berth be accorded highest productivity for calling and sailing so as to minimize their TRT?	The calling and sailing of ships at HDC is guided by the comprehensive policy for calling / sailing priority of ships for SMP, Kolkata.
51	Will priority berthing charges applicable for such priority berthing?	If a vessel is accorded priority by the SMP, Kolkata, Priority Berth Hire Charges shall be levied.
52	Will the concessionaire be allowed to dispatch cargo at their own discretion without considering seniority of rakes?	Rakes will be supplied as per the seniority following the extant Indian Railway Rules.
53	Will the concessionaire be allowed to refuse vessels for working at this facility, if it finds handling them will lead to operational difficulties/constraints?	The licensee will not have the liberty to refuse acceptance of any vessel provided the optimal use of Berth No.2 and the project facility will get affected.
54	Will the concessionaire be allowed to make this berth dedicated to certain customers?	The project facility will be for all users intending to mobilize Import Dry Bulk Cargo.
55	Will the concessionaire be allowed to freely market and give commitment to potential customers for using this berth and will port accept and adhere to such commitments?	Marketing of cargo for handling at Berth No.2 is the prerogative of the concessionaire. However, Port will not be liable to accept and adhere to any commitment given by the concessionaire, which is beyond the purview or against the policy or interest of SMP, Kolkata.

Annex A

HALDIA DOCK COMPLEX

APPENDIX - 1

BERTHWISE CARGO TRAFFIC HANDLED AT HALDIA DURING THE YEAR 2019-20

Sl. No	Commodity	HOJ-I	HOJ-II	HOJ-III	Berth 2	Berth-3	Berth-4	Berth-4A	Berth-4B	Berth-5	Berth-6	Berth-7	Berth-8	Berth-9	Berth-10	Berth-11	Berth-12	Berth-13	Barge Jetty	Fly ash Jetty	IWAI Jetty	Handled by Barge	Lighterage at San	Total
1	POL (Crude)	19462	0	29078	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	48539
2	POL (Products)	505632	1023262	2156422	0	1078032	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4763349
4	Liquid Ammonia	92576	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	92576
5	L.P.G.	1598986	2417909	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4016895
6	Paraxylene	139477	0	0	9509	651307	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	800293
7	Benzene	0	0	0	0	0	0	0	0	0	64745	0	0	0	0	0	0	0	0	0	0	0	0	64745
9	Bitumen	6982	0	0	0	0	0	0	0	0	185727	23644	0	0	0	0	0	0	0	0	0	0	0	216353
10	Phosphoric Acid	0	0	0	0	0	0	0	0	22575	360665	0	0	0	0	0	0	0	0	0	0	0	0	383241
11	Liquid Carbon Black Feed Stock	0	0	0	0	0	0	0	0	0	328574	0	0	0	0	0	0	0	0	0	0	0	0	328574
12	Palm Oil	0	0	267523	0	56910	41385	0	0	650067	208805	0	0	0	0	0	0	0	0	0	0	0	0	1224691
13	Soya Oil	0	0	294379	0	176796	139005	0	0	15829	324927	21478	0	0	0	0	0	0	0	0	0	0	0	972413
14	Veg.Oil	0	0	52610	0	8706	0	0	0	5059	22731	0	0	0	0	0	0	0	0	0	0	0	0	89106
15	Mono Ethylene Glycol	0	0	0	0	0	0	0	0	0	141797	0	0	0	0	0	0	0	0	0	0	0	0	141797
16	Acetic Acid	0	0	0	0	0	0	0	0	4752	57484	0	0	0	0	0	0	0	0	0	0	0	0	62236
17	Nitric Acid	0	0	0	0	0	0	0	0	0	21006	0	0	0	0	0	0	0	0	0	0	0	0	21006
18	Methyl Alcohol	31409	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31409
19	L.C. SODA	0	0	0	0	0	0	0	0	0	6973	0	0	0	0	0	0	0	0	0	0	0	0	6973
20	Sulphuric Acid	0	0	0	0	0	0	0	0	0	7502	0	0	0	0	0	0	0	0	0	0	0	0	7502
21	DEG	0	0	0	0	0	0	0	0	0	1734	0	0	0	0	0	0	0	0	0	0	0	0	1734
22	Coking Coal	0	0	0	1820347	0	0	2811952	819096	16000	0	0	1651630	0	0	0	0	333327	0	0	0	56600	168600	7677552
23	Non Coking Coal	0	0	0	888240	0	0	344486	1366606	295431	0	0	1835137	0	0	0	0	608461	0	0	0	772462	1418251	7529075
24	Met. Coke	0	0	0	17206	0	0	0	21325	0	0	0	102321	0	0	0	0	15245	0	0	0	4000	14500	174597
25	R. P. COKE	0	0	0	63188	0	0	0	59594	0	0	0	300	0	0	0	0	24000	0	0	0	7220	0	154302
27	Lime Stone	0	0	0	870223	0	0	0	228957	69540	0	0	273715	6550	0	0	1199513	28253	0	0	0	89040	200030	2965821
28	Rock Phosphate	0	0	0	20800	0	0	0	59013	0	0	0	0	37400	0	0	0	169143	0	0	0	0	0	286356
29	Sulphur	0	0	0	0	0	0	0	7809	0	0	0	0	30700	0	0	0	41562	0	0	0	5800	0	85871
30	Fertilizer (F)	0	0	0	0	0	0	0	63784	0	0	0	0	0	0	0	0	63551	0	0	0	0	9569	136904
31	Manganese Ore	0	0	0	212273	0	0	0	148429	6801	0	0	265969	0	0	0	0	258324	0	0	0	13697	0	905492
32	Pyroxinite	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	322261	0	0	0	0	0	0	322261
33	Dolomite	0	0	0	16000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16000
36	Soda Ash	0	0	0	0	0	0	0	0	0	0	0	15000	0	0	0	0	42500	0	0	0	0	0	57500
37	Cement	0	0	0	25000	0	0	0	229783	0	0	0	0	0	0	0	0	394681	0	0	0	27090	70738	747292
38	Sand	0	0	0	15035	3972	0	0	27380	15828	0	0	0	0	0	0	84715	29992	0	0	0	0	0	176922
39	Salt	0	0	0	0	0	0	0	0	6165	0	0	0	9370	0	0	0	8285	0	0	0	0	0	23820
40	Gypsum	0	0	0	54411	0	0	0	27850	9870	0	0	51514	19630	0	0	0	153344	0	0	0	22650	0	339269
41	Wood Pulp	0	0	0	0	0	0	0	0	4899	0	0	0	68638	0	0	0	0	0	0	0	0	0	73537
42	Iron & Steel	0	0	0	0	0	0	0	0	0	0	0	0	8344	0	0	126988	0	0	0	0	0	0	135332
43	Machinery & spare parts	0	0	0	434	0	0	0	0	0	0	0	0	1430	422	0	0	420	0	0	0	0	0	2707
44	P. Cargo	0	0	0	0	0	0	0	0	563	0	0	0	371	1383	0	26176	0	0	0	0	0	0	28493
45	Container																	0						
	CARGO WT	0	0	0	0	0	0	0	0	0	0	0	0	0	699200	1003577	0	0	0	0	0	0	0	1702778
	TARE WT	0	0	0	0	0	0	0	0	0	0	0	0	0	70952	104045	0	0	0	0	0	0	0	174997
	TOTAL IMPORT	2394524	3441172	2800012	4012666	1975722	180390	3156438	3059626	1123379	1732670	45122	4195585	182433	771957	1107623	1759653	2171087	0	0	0	998559	1881688	36990307
	LOADING																							
1	POL (Products)	210197	162400	0	0	305579	0	0	0	0	0	0	0	0	0	0	0	0	242689	0	0	0	0	920864
2	Butadine	80806	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80806
3	Benzene	131642	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	131642
4	Butene	5894	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5894
5	MTBE	68796	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	68796
6	Coking Coal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1755	0	0	0	0	0	1755
7	Non Coking Coal	0	0	0	0	0	0	0	0	0	0	0	2735	0	0	0	0	-	0	0	0	0	0	2735
8	Thermal Coal	0	0	0	0	0	2358673	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2358673
9	Iron Ore	0	0	0	596860	47637	0	0	802355	21150	0	0	150198	821139	0	0	0	700232	0	0	0	2782	4800	3147153
10	Iron & Steel	0	0	0	0	0	0	0	0	0	0	0	3586	331663	8146	0	306159	0	0	0	0	0	0	649553
11	Machinery & Spare Parts	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	P. Cargo	0	0	0	0	0	0	0	0	500	0	0	0	0	0	1383	0	0	0	0	0	0	0	1883
13	Container																							
	CARGO WT	0	0	0	0	0	0	0	0	0	0	0	0	0	393973	581125	0	0	0	0	0	0	0	975098
	TARE WT	0	0	0	0	0	0	0	0	0	0	0	0	0	73829	106025	0	0	0	0	0	0	0	179854
14	Fly-Ash	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	174321	990171			1164492
	TOTAL EXPORT	497336	162400	0	596860	353216	2358673	0	802355	21650	0	0	156518	1152802.353	475948	688533	306159	701987	242689	174321	990171	2782	4800	9689199
	GRAND TOTAL	2891859	3603572	2800012	4609526	2328938	2539063	3156438	3861981.11	1145029	1732670.48	45121.6	4352103	1335235.793	1247905	1796155	2065812	2873074	242689	174321	990171	1001341	1886488	46679506

Annex A

HALDIA DOCK COMPLEX

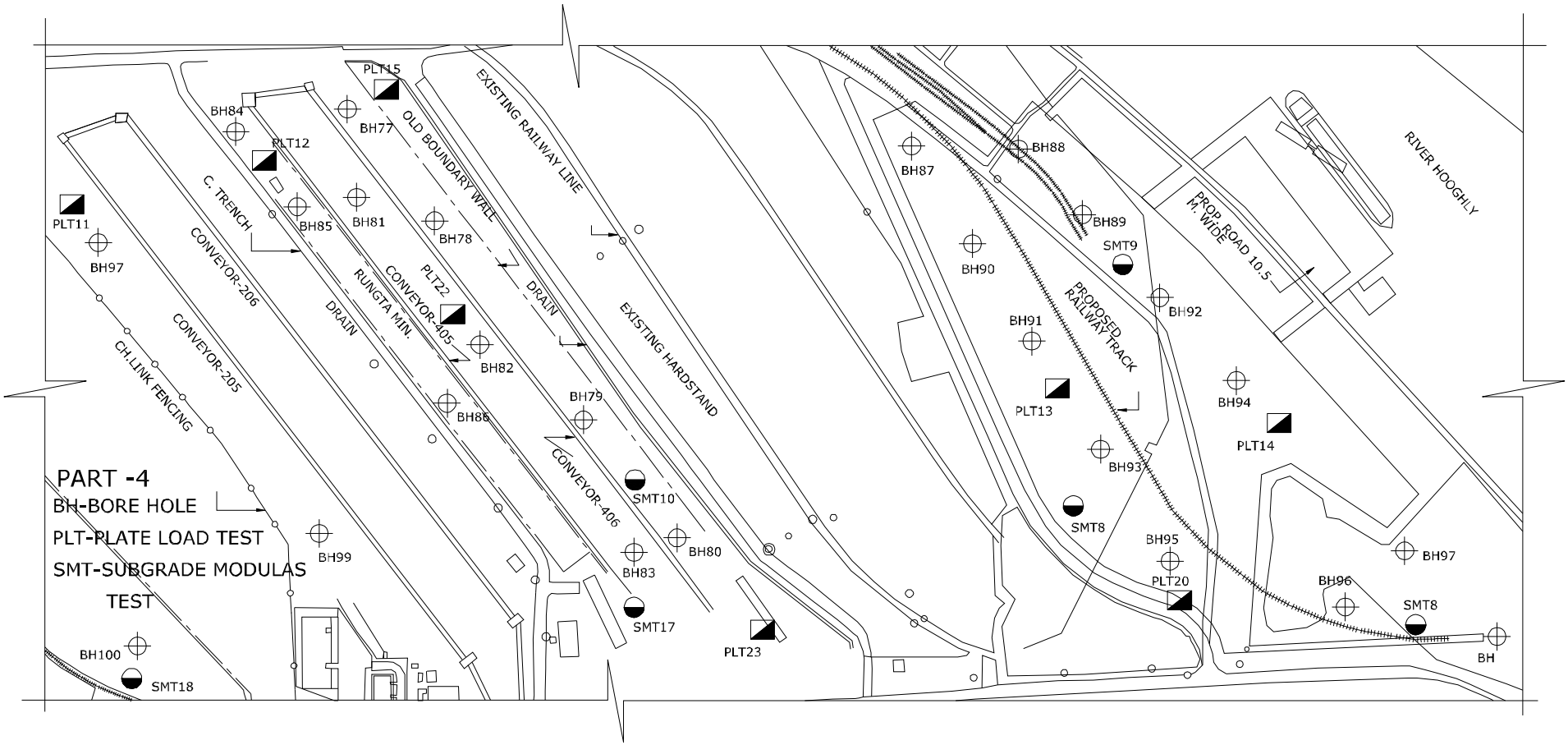
APPENDIX - 1

BERTHWISE CARGC TRAFFIC HANDLED AT HALDIA DURING THE YEAR 2018-19

(Fig. in Tonnes)

Sl No	Commodity	HOJ-I	HOJ-II	HOJ-III	Berth 2	Berth-3	Berth-4	Berth-4A	Berth-4B	Berth-5	Berth-6	Berth-7	Berth-8	Berth-9	Berth-10	Berth-11	Berth-12	Berth-13	Barge Jetty	Fly ash Jetty	IWAI Jetty	Handled by Barge at	Lighterage at Sandheads/s	Total
	A) UNLOADING :																							
1	POL (Crude)	0	0	24920	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24920
2	POL (Products)	672645	854052	1896289	0	495808	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3918794
3	MTBE	20972	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20972
4	Liquid Ammonia	88286	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	88286
5	L.P.G.	856608	2604939	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3461547
6	Paraxylene	225306	0	0	28606	537418	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	791330
7	Benzene	0	0	0	0	0	0	0	0	0	53939	17985	0	0	0	0	0	0	0	0	0	0	0	71924
8	Butene	13830	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13830
9	Bitumen	0	0	0	0	0	0	0	0	0	156306	28910	0	0	0	0	0	0	0	0	0	0	0	185216
10	Phosphoric Acid	0	0	0	0	0	0	0	0	9588	266597	96456	0	0	0	0	0	0	0	0	0	0	0	372641
11	Liquid Carbon Black	0	0	0	0	0	0	0	0	0	307394	131655	0	0	0	0	0	0	0	0	0	0	0	439049
12	Palm Oil	0	0	208098	0	90348	59997	0	0	646501	308797	92664	0	0	0	0	0	0	0	0	0	0	0	1406405
13	Soya Oil	0	0	374779	0	164551	24964	0	0	3012	194928	129392	0	0	0	0	0	0	0	0	0	0	0	891626
14	Veg.Oil	0	0	0	0	23423	0	0	0	16403	28132	0	0	0	0	0	0	0	0	0	0	0	0	67958
15	Mono Ethylene Glyc	0	0	0	0	0	0	0	0	0	90971	47555	0	0	0	0	0	0	0	0	0	0	0	138526
16	Acetic Acid	0	0	0	0	0	0	0	0	0	41439	20003	0	0	0	0	0	0	0	0	0	0	0	61442
17	N.ACID	0	0	0	0	0	0	0	0	0	8399	7917	0	0	0	0	0	0	0	0	0	0	0	16316
18	Methyl Alcohol	5867	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	5867
19	L.C. SODA	0	0	0	0	0	0	0	0	0	1249	2352	0	0	0	0	0	0	0	0	0	0	0	3601
20	SIULPHURIC ACID	0	0	0	0	0	0	0	0	0	30453	12068	0	0	0	0	0	0	0	0	0	0	0	42521
21	DEG	0	0	0	0	0	0	0	0	0	1110	601	0	0	0	0	0	0	0	0	0	0	0	1711
22	Coking Coal	0	0	0	1786135	0	0	2964365	1393173	16200	0	0	2033717	0	0	0	0	73500	0	0	0	43839	322338	8633267
23	Non Coking Coal	0	0	0	1446128	0	0	321764	1901360	18384	0	0	1345646	0	0	0	0	241867	0	0	0	1155999	1477032	7908180
24	Met. Coke	0	0	0	77023	0	0	0	126188	0	0	0	169380	0	0	0	0	17600	0	0	0	12500	7500	410191
25	R P COKE	0	0	0	19858	0	0	0	111228	0	0	0	50756	0	0	0	0	0	0	0	0	0	0	181842
26	C P COKE	0	0	0	0	0	0	0	0	0	0	0	3200	0	0	0	0	0	0	0	0	0	0	3200
27	Lime Stone	0	0	0	392527	0	0	0	95334	33478	0	0	126200	25027	0	0	997084	662616	0	0	0	120444	186249	2638959
28	Rock Phosphate	0	0	0	0		0	0	38500	23550	0	0	0	10000	0	0	0	242290	0	0	0	0	2000	316340
29	Sulphur	0	0	0	0	0	0	0			0	0	0	0	0	0	0	48399	0	0	0	0	0	48399
30	Fertilizer (F)	0	0	0	19999	0	0	0	21256	5599	0	0	0	20774	0	0	0	167448	0	0	0	0	0	235076
31	Manganese Ore	0	0	0	121237	0	0	0	254943		0	0	118691	0	0	0	0	424647	0	0	0	25750	0	945268
32	Pyroxinite	0	0	0	0	0	0	0	21530	4200	0	0		0	0	0	212221	39221	0	0	0	0	0	277172
33	Dolomite	0	0	0	0	0	0	0	18572	0	0	0	0	0	0	0	101301	0	0	0	0	0	0	119873
34	MAG. SLAG	0	0	0	0	0	0	0	0	10098	0	0	0	0	0	0	0	0	0	0	0	0	0	10098
35	Iron Ore	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26670	0	0	0	0	6500	0	33170
36	Soda Ash	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	31000	0	0	0	0	0	31000
37	Cement	0	0	0	19247	0	0	0	25940		0	0	0	0	0	0	0	794325	0	0	0	24500	51302	915314
38	Sand	0	0	0	0	0	0	0	0	0	0	0	0	12000	0	0	120113	104163	0	0	0	0	0	236276
39	Salt	0	0	0	0	0	0	0	0	10673	0	0	0	0	1327		0	31600	0	0	0	0	0	43600
40	Gypsum	0	0	0	0	0	0	0	27000	0	0	0	27650	39900	0	0	0	330304	0	0	0	0	27000	451854
41	Wood Pulp	0	0	0	0	0	0	0	0	0	0	0	0	38183	0	0	0	0	0	0	0	0	0	38183
42	Iron & Steel	0	0	0	0	0	0	0	0	0	0	0	0	30448	0	0	311242	0	0	0	0	0	0	341690
43	Machinery& spare p	0	0	0	0	0	0	0	0	0	0	0	0	0	0	191	5762	0	0	0	0	0	0	5953
44	P.Cargo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14935	0	0	0	0	0	0	14935
45	Container	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CARGO WT	0	0	0	0	0	0	0	0	0	0	0	0	0	733081	856249	0	0	0	0	0	0	0	1589330
	TARE WT	0	0	0	0	0	0	0	0	0	0	0	0	0	80146	92510	0	0	0	0	0	0	0	172656
	TOTAL IMPORT	1883514	3458991	2504086	3910760	1311548	84961	3286129	4035024	797686	1489714	587558	3875240	176332	814554	948950	1789328	3208980	0	0	0	1389532	2073421	37626308
	LOADING																							
1	POL (Products)	378312	114647	0	0	597062	0	0	0	0	0	0	0	0	0	0	0	0	242979	0	0		0	1333000
2	Butadine	74857	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	74857
3	Benzene	128007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	128007
4	MTBE	2730	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	2730
5	Non Coking Coal		0	0	0	0	0	0	0	924	0	0	0	0	0	0	0	0	0	0	0		0	924
6	Thermal Coal	0	0	0	0	0	2531160	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	2531160
7	Iron Ore	0	0	0	55800	0	0	0	12717	0	0	0	37133	0	0	0	0	327959	0	0	0		0	433609
8	Iron & Steel	0	0	0	0	0	0	0	0	0	0	0	0	195570	0	0	273166	0	0	0	0			468736
9	Machinery & Spare	0	0	0	0	0	0	0	0	0	0	0	0	67	0	0	0	0	0	0	0		0	67
10	P.Cargo	0	0	0	0	0	0	0	0	128	0	0	0	0	0	159	0	0	0	0	0		0	287
11	Container	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0
	CARGO WT	0	0	0	0	0	0	0	0	0	0	0	0	0	501800	675813	0	0	0	0	0			1177613
	TARE WT	0	0	0	0	0	0	0	0	0	0	0	0	0	89441	111357	0	0	0	0	0			200798
12	Fly-Ash	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	179247	1054537			1233784
	TOTAL EXPORT	583906	114647	0	55800	597062	2531160	0	12717	1052	0	0	37133	195637	591241	787329	273166	327959	242979	179247	1054537	0	0	7585572
	GRAND TOTAL	2467420	3573638	2504086	3966560	1908610	2616121	3286129	4047741	798738	1489714	587558	3912373	371969	1405795	1736279	2062494	3536939	242979	179247	1054537	1389532	2073421	45211880

APPENDIX – A
TEST LOCATION PLAN (PART-4)



TECHPRO
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Annex C

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH- 77)

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	87	9	21.70	1.765	1.450	45	29	16	UU	22	9	-	-	2.66	0.100	0.834
1.50		-	6	-	-	-	-	-	-	-	22.18	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		MI	-	-	0	0	0	1	89	10	25.15	1.827	1.460	46	28	18	UU	26	7	-	-	2.66	0.105	0.822
3.00		-	5	-	-	-	-	-	-	-	26.18	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	4	-	-	-	-	-	-	-	23.70	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic clays of intermediate plasticity**	CI	-	-	0	0	0	4	86	10	24.80	1.841	1.475	39	24	15	UU	27	6		-	2.66	0.107	0.803
6.00		-	5	-	-	-	-	-	-	-	25.15	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00	**Inorganic clays of low plasticity**	CL	2	-	0	0	0	5	91	4	28.19	1.897	1.480	32	23	9	UU	21	8	-	-	2.66	0.096	0.797
9.00		-	2	-	-	-	-	-	-	-	27.90	-		-	-	-	-	-	-	-	-	-	-	-
9.50		CL	-	-	0	0	0	3	91	6	28.45	1.920	1.495	33	21	12	UU	22	9			2.66	0.100	0.779
12.00		-	4	-	-	-	-	-	-	-	28.70	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			5		-	-	-	-	-	-	29.40	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	**Inorganic silt of low plasticity**	ML	5	-	0	0	0	7	87	6	29.45	-	-	31	25	6	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH-78)

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		-	3	1	3	3	79	11	26.29	1.863	1.475	43	27	16	UU	21	10	-	-	2.66	-	0.803
1.50		-	7	-	-	-	-	-	-	-	27.58	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		MI		-	2	1	1	2	82	12	30.35	1.929	1.480	44	26	18	UU	25	8	-	-	2.66	-	0.797
3.00		-	4	-	-	-	-	-	-	-	31.58	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	3	-	-	-	-	-	-	-	28.42	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic clays of intermediate plasticity**	CI		-	4	1	1	5	77	12	31.00	1.956	1.493	37	22	15	UU	26	7	-	-	2.66	-	0.782
6.00		-	2	-	-	-	-	-	-	-	31.12	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00	**Inorganic clays of low plasticity**	CL		-	2	1	1	6	84	6	33.39	2.005	1.503	30	21	9	UU	20	9	-	-	2.66	-	0.770
9.00		-	8	-	-	-	-	-	-	-	33.10	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50		CL		-	1	1	1	4	85	8	33.65	2.031	1.520	31	19	12	UU	21	10	-	-	2.66	-	0.750
12.00		-	6	-	-	-	-	-	-	-	33.90	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			4	-	-	-	-	-	-	-	34.60	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	**Inorganic silt of low plasticity**	ML	3		4	1	1	8	78	8	34.65	-	-	29	23	6	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH- 79)

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	25.18	1.809	1.445	33	25	8	UU	17	13	-	-	2.66	0.100	0.841
1.50		-	6	-	-	-	-	-	-	-	20.90	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		CL	-	-	0	0	0	3	92	5	22.70	1.790	1.459	33	23	10	UU	18	13	-	-	2.66	0.098	0.823
3.00		-	3	-	-	-	-	-	-	-	22.75	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	3	-	-	-	-	-	-	-	24.18	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic silt of intermediate plasticity**	MI	-	-	0	0	0	6	87	7	25.15	1.840	1.470	38	26	12	UU	22	9		-	2.66	0.097	0.810
6.00		-	4	-	-	-	-	-	-	-	20.90	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00		MI		-	0	0	1	1	86	12	18.19	1.749	1.480	38	26	12	UU	26	7	-	-	2.66	0.098	0.797
9.00		-	6	-	-	-	-	-	-	-	27.15	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50	**Inorganic clays of low plasticity**	CL	-	-	0	0	0	8	86	6	27.90	1.912	1.495	33	26	9	UU	25	8	-	-	2.66	0.095	0.779
12.00		-	4	-	-	-	-	-	-	-	24.70	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			4		-	-	-	-	-	-	25.45	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00		CL	3	-	0	2	2	5	86	5	22.18	-		33	26	9	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH-80)

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	5	11	75	8	29.77	1.908	1.470	31	21	10	UU	16	14	-	-	2.66	-	0.810
1.50		-	5	-	-	-	-	-	-	-	26.30	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		CL		-	2	1	1	4	85	7	27.90	1.892	1.479	31	21	10	UU	17	14	-	-	2.66	-	0.799
3.00		-	4	-	-	-	-	-	-	-	28.15	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	3	-	-	-	-	-	-	-	28.90	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic silt of intermediate plasticity**	MI		-	3	1	1	7	79	9	31.35	1.954	1.488	36	24	12	UU	21	10	-	-	2.66	-	0.788
6.00		-	2	-	-	-	-	-	-	-	26.87	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00		MI		-	1	1	2	2	80	14	23.39	1.855	1.503	36	24	12	UU	25	8	-	-	2.66	-	0.770
9.00		-	7	-	-	-	-	-	-	-	32.35	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50	**Inorganic clays of low plasticity**	CL		-	2	1	1	9	79	8	33.10	2.023	1.520	31	22	9	UU	24	9	-	-	2.66	-	0.750
12.00		-	6	-	-	-	-	-	-	-	29.90	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			4	-	-	-	-	-	-	-	30.65	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00		CL	3		1	3	3	6	80	7	27.38	-	-	31	22	9	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH- 81)

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	9	85	6	24.18	1.912	1.540	30	22	8	UU	17	13	-	-	2.66	0.090	0.727
1.50		-	7	-	-	-	-	-	-	-	24.10	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		CL	-	-	0	0	0	8	87	5	25.18	1.828	1.460	30	22	8	UU	18	13	-	-	2.66	0.098	0.822
3.00		-	5	-	-	-	-	-	-	-	20.70	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	4	-	-	-	-	-	-	-	20.80	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic clays of intermediate plasticity**	CI	-	-	0	0	0	7	83	10	24.70	1.832	1.469	40	25	15	UU	22	9		-	2.66	0.100	0.811
6.00		-	3	-	-	-	-	-	-	-	20.18	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00	**Inorganic silt of intermediate plasticity**	MI		-	0	0	1	1	86	12	18.19	1.749	1.480	38	26	12	UU	26	7	-	-	2.66	0.098	0.797
9.00		-	6	-	-	-	-	-	-	-	27.15	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50	**Inorganic clays of intermediate plasticity**	CI	-	-	0	0	8	6	76	10	22.90	1.837	1.495	45	30	15	UU	25	8	-	-	2.66	0.098	0.779
12.00		-	4	-	-	-	-	-	-	-	25.12	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			6		-	-	-	-	-	-	25.70	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	**Inorganic clays of low plasticity**	CL	3	-	0	2	5	7	81	5	25.10	-		30	21	9	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH-82)

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	10	78	8	21.77	1.906	1.565	28	20	8	UU	16	14	-	-	2.66	-	0.700
1.50		-	7	-	-	-	-	-	-	-	21.30	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		CL		-	3	1	1	9	79	7	23.03	1.821	1.480	28	20	8	UU	17	14	-	-	2.66	-	0.797
3.00		-	5	-	-	-	-	-	-	-	18.55	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	4	-	-	-	-	-	-	-	18.30	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic clays of intermediate plasticity**	CI		-	2	1	1	8	76	12	22.55	1.822	1.487	38	23	15	UU	21	10	-	-	2.66	-	0.789
6.00		-	6	-	-	-	-	-	-	-	18.03	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00		CI		-	1	1	2	2	80	14	16.04	1.744	1.503	36	24	12	UU	25	8	-	-	2.66	-	0.770
9.00		-	6	-	-	-	-	-	-	-	25.00	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50		CI		-	1	1	9	7	70	12	20.75	1.835	1.520	43	28	15	UU	24	9	-	-	2.66	-	0.750
12.00		-	3	-	-	-	-	-	-	-	22.97	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			11	-	-	-	-	-	-	-	23.55	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	**Inorganic clays of low plasticity**	CL	5		0	3	6	8	76	7	22.95	-	-	28	19	9	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH- 83)

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	2	90	7	19.90	1.747	1.457	31	22	9	UU	15	19	-	-	2.66	0.095	0.826
1.50		-	3	-	-	-	-	-	-	-	21.98	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		CL	-	-	1	1	1	2	87	8	20.53	1.766	1.465	33	25	8	UU	20	17	-	-	2.66	0.103	0.816
3.00		-	4	-	-	-	-	-	-	-	20.30	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	5	-	-	-	-	-	-	-	19.20	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00		CL	-	-	2	3	1	3	80	11	19.86	1.763	1.471	35	28	7	UU	20	17	-	-	2.66	0.116	0.808
6.00		-	3	-	-	-	-	-	-	-	18.90	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00	**Inorganic silt of intermediate plasticity**	MI	-	-	3	4	4	2	79	8	20.00	1.774	1.478	36	27	9	UU	16	20	-	-	2.66	0.110	0.800
9.00		-	7	-	-	-	-	-	-	-	20.98	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50		MI	-	-	4	6	7	4	70	9	21.30	1.795	1.480	38	28	10	UU	17	20	-	-	2.66	0.102	0.797
12.00		-	5	-	-	-	-	-	-	-	22.50	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			11		-	-	-	-	-	-	21.90	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	**Inorganic clays of low plasticity**	CL	3	-	5	2	3	1	81	8	20.30	-	-	33	24	8	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH-84)

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		-	3	1	2	3	82	9	24.49	1.845	1.482	29	20	9	UU	14	20	-	-	2.66	-	0.795
1.50		-	3	-	-	-	-	-	-	-	27.38	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		CL		-	0	2	2	3	83	10	25.73	1.867	1.485	31	23	8	UU	19	18	-	-	2.66	-	0.791
3.00		-	5	-	-	-	-	-	-	-	25.70	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	6	-	-	-	-	-	-	-	23.92	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00		CL		-	1	4	2	4	76	13	26.06	1.877	1.489	33	26	7	UU	19	18	-	-	2.66	-	0.786
6.00		-	3	-	-	-	-	-	-	-	24.87	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00	**Inorganic silt of intermediate plasticity**	MI		-	2	5	5	3	75	10	25.20	1.879	1.501	35	26	9	UU	15	21	-	-	2.66	-	0.772
9.00		-	8	-	-	-	-	-	-	-	26.18	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50		MI		-	3	7	8	5	66	11	26.50	1.904	1.505	35	25	10	UU	16	21	-	-	2.66	-	0.767
12.00		-	5	-	-	-	-	-	-	-	27.70	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			4	-	-	-	-	-	-	-	27.10	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00	**Inorganic clays of low plasticity**	CL	6		4	3	4	2	77	10	25.50	-	-	31	23	8	-	-	-	-	-	-	-	-

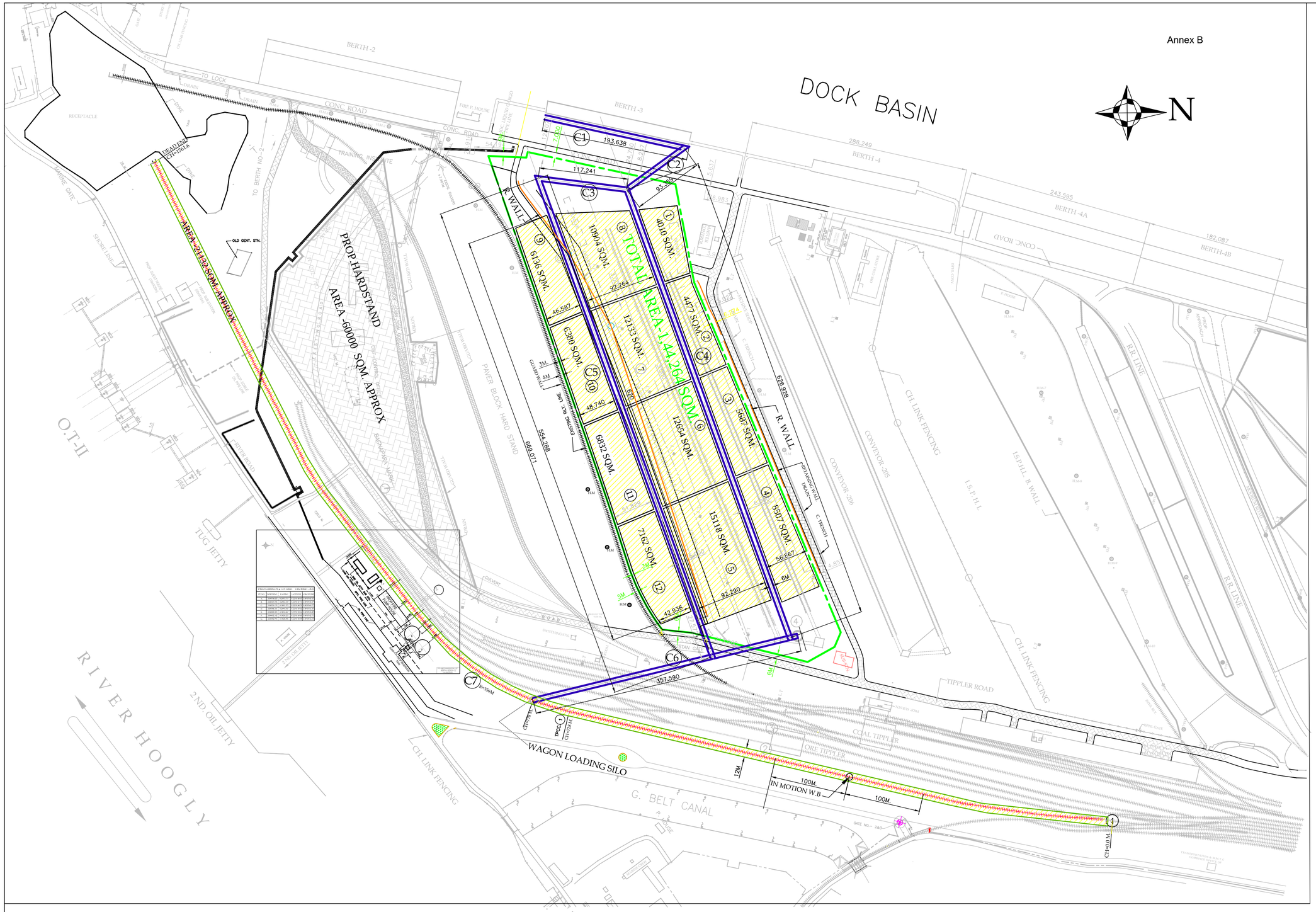
APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH- 85)

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	2	3	84	6	18.70	1.721	1.450	32	24	8	UU	17	13	-	-	2.66	0.098	0.834
1.50		-	6	-	-	-	-	-	-	-	21.70	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		CL	-	-	1	5	5	5	78	6	22.15	1.783	1.460	32	24	8	UU	18	13	-	-	2.66	0.097	0.822
3.00		-	5	-	-	-	-	-	-	-	25.18	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	2	-	-	-	-	-	-	-	25.45	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic silt and clays of low plasticity**	CL-ML	-	-	3	3	5	1	81	7	26.70	1.869	1.475	32	25	7	UU	22	9	-	-	2.66	0.097	0.803
6.00		-	4	-	-	-	-	-	-	-	22.10	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00	**Inorganic clays of low plasticity**	CL	-	-	4	3	3	1	81	8	23.18	1.823	1.480	34	25	9	UU	26	7	-	-	2.66	0.098	0.797
9.00		-	7	-	-	-	-	-	-	-	24.90	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50	**Inorganic silt and clays of low plasticity**	CL-ML	-	-	1	3	3	2	85	6	22.18	1.827	1.495	33	26	7	UU	25	8	-	-	2.66	0.099	0.779
12.00		-	5	-	-	-	-	-	-	-	23.10	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			3		-	-	-	-	-	-	25.79	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00		CL-ML	6	-	3	2	1	1	84	7	30.10	-	-	33	26	7	-	-	-	-	-	-	-	-

APPENDIX 'B'
SUMMARY OF TEST RESULTS (BH-86)

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	3	4	80	8	22.08	1.840	1.507	30	22	8	UU	16	14	-	-	2.66	-	0.765
1.50		-	4	-	-	-	-	-	-	-	24.58	-	-	-	-	-	-	-	-	-	-	-	-	-
2.50		CL		-	0	6	6	6	74	8	23.58	1.860	1.505	30	22	8	UU	17	14	-	-	2.66	-	0.767
3.00		-	5	-	-	-	-	-	-	-	23.55	-	-	-	-	-	-	-	-	-	-	-	-	-
4.50		-	4	-	-	-	-	-	-	-	21.42	-	-	-	-	-	-	-	-	-	-	-	-	-
5.00	**Inorganic silt and clays of low plasticity**	CL-ML		-	2	4	6	2	77	9	23.91	1.867	1.507	30	23	7	UU	21	10	-	-	2.66	-	0.765
6.00		-	3	-	-	-	-	-	-	-	22.72	-	-	-	-	-	-	-	-	-	-	-	-	-
7.00	**Inorganic clays of low plasticity**	CL		-	3	4	4	2	77	10	23.05	1.875	1.524	32	23	9	UU	25	8	-	-	2.66	-	0.745
9.00		-	6	-	-	-	-	-	-	-	24.03	-	-	-	-	-	-	-	-	-	-	-	-	-
9.50	**Inorganic silt and clays of low plasticity**	CL-ML		-	0	4	4	3	81	8	24.35	1.903	1.530	31	24	7	UU	24	9	-	-	2.66	-	0.739
12.00		-	6	-	-	-	-	-	-	-	25.55	-	-	-	-	-	-	-	-	-	-	-	-	-
13.50			2	-	-	-	-	-	-	-	24.95	-	-	-	-	-	-	-	-	-	-	-	-	-
15.00		CL-ML	4		2	3	2	2	82	9	23.35	-	-	31	24	7	-	-	-	-	-	-	-	-

Annex B



CONVEYORS (MKD.)	LENGTH (IN M.)
C1	194
C2	93
C3	117
C4	627
C5	669
C6	357

STACKING AREA

PT. NO.	AREA SQ.M
1.	4010
2.	4477
3.	5687
4.	8507
5.	15118
6.	12654
7.	12133
8.	10904
9.	6136
10.	6380
11.	6832
12.	7162

TOTAL AREA= 1,00,000 SQM

NOTE:-

1. AREA EARMARKED FOR STACK YARD & SUPPORTING UTILITIES =1,44,264 SQ.M.(APPROX)
2. JETTY AREA (HARDSTAND)=2,991 SQ.M.
3. LOADING CONVEYOR C6 & C5 (OUTSIDE STACKING YARD) ELEVATED AREA=(294+27)MX6M.=1,926 SQM.
4. LOADING CONVEYOR C1& C2 (OUTSIDE STACKING YARD) ELEVATED AREA=261MX6M.=1,566 SQM.
5. PROPOSED RAIL YARD C7 AREA=1761MX12M.=21,132 SQM.
6. EXISTING PAVER BLOCK HARDSTAND WITH ROAD AREA=39,761 SQM.
7. TOTAL PROJECT AREA=2,11,640 SQ.M. (BARE LAND =1,68,888 SQ.M., HARDSTAND=42,752 SQ.M.)

LEGEND:—

1. EXIST. RLY LINE

SYAMA PRASAD MOOKERJEE PORT KOLKATA
HALDIA DOCK COMPLEX

SURVED	
DRN.	
CHCK.	
TRCD.	

CONCEPT PLAN FOR PROPOSED MECHANISATION OF BERTH -3 & BACK UP FACILITIES AT HALDIA FOR HANDLING BULK CARGO.

DY. MANAGER	SR.DY. MANAGER	SCALE :— 1:2500	DATE:—30.09.20	DRG. NO:— H-B-3-A (REV-4)

Project Report

FOR

"MECHANISATION OF BERTH NO 2 (erstwhile berth no-03) ON DBFOT-PPP MODE''

HALDIA DOCK COMPLEX
SYAMA PRASAD MOOKERJEE PORT
KOLKATA

HALDIA, WEST-BENGAL-721 607

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1. Executive Summary:

1. The proposal relates to Mechanisation of Berth No. 2 (erstwhile Berth no.3) on PPP mode at Haldia Dock Complex to handle dry bulk cargo and proposed work on TEFR submitted by IPA during the year 2018-19 and has been updated with few modifications.

2. As per the traffic projections proposed by IPA in their TEFR, Haldia Dock Complex is required to equip itself to handle 24.4 million tonnes of dry bulk cargo by 2020-21 and 29.9 million tonnes by 2025-26.

3. As per planning principles, cargo-handling capacity should be at least 20 percent above the projected demand to avoid detention of vessels. The underlying principle is that berth should wait for the ship not vice versa. Since vessels arrive at Random, this spare capacity will address peak seasons also. Accordingly, the supply and demand position is as below:

Particulars	Capacity (MTPA)
Dry cargo Handling Capacity as on 31-3-2020	25.0
Total Capacity by 2025-26	30.0
Capacity required to handle projected cargo by 2025-26	29.9
Capacity required at 20% more than the traffic	6.0
Total required capacity	35.9
Balance required capacity to be added	10.9

In the Master plan submitted by L&T IL, it is projected a Dry Bulk Cargo (Import) as follows in FY-25& FY-30:

Sl no	Commodity	Projection in FY-25(In MMPA)	Projection in FY-30(In MMTPA)
01	Coaking Coal	12.00	17.4
02	Non Coaking Coal	11.30	14.10
03	Manganese Ore	1.69	2.29
04	Limestone	2.80	3.50
Total		27.79	37.29

Thus, HDC is required to enhance the capacity to handle dry cargoes present and projected with the capacity addition.

4. According to the lock gate perspective, ship scheduling and the no of vessels that can be handled through the lock gate system becomes a deciding factor in enhancing the capacity of berths in the impounded dock. After taking appropriate measures as being contemplated by port the lock gate system can handle an additional 2 to 3 movements per day thus making it possible to handle additional vessels due to enhanced capacity of berths in the impounded dock system. Thus, IPA considered mechanization of Berth no-2 is viable from this aspect as well.

5. IPA had also recommended that the physical life of berth structure can be enhanced by taking required short and long term maintenance measures systematically. After undertaking repairs as would be recommended in a 'Condition Survey', the berth can be used for another 35 to 40 years. In view of the foregoing, mechanisation of berth 3 (now renamed as berth no.2) is technically feasible for investment. Inline with the above, HDC had engaged IIT(M) for condition survey of the Berth no-3 (now renamed as berth no.2) and their recommendation in this regard. IIT(M) has already submitted their report along with repairing activity involved. They have submitted an estimate of 2.54 Crores for repairing of the Jetty. However, an escalation of 10% on the aforesaid cost has been considered in the estimate.

6. For a coal terminal, TAMP guidelines stipulates that the optimum yard capacity is 70% of maximum coal that could pass through the yard. The optimal capacity of the yard is 3.744 MTPA. The average unloading rate from vessels is 20,000 tonnes per day based on equipment proposed and the vessel parcel size.
Following TAMP Guidelines, the optimal capacity of the berth terminal is calculated as 3.744 million tonnes per annum.

7. The backup area is trapezoidal in shape with a bell mouth like shape at one end. The back-up area considered has a width of 150 m for most part of the length and has a total yard area of about 1,46,609 Sq. m. excluding the land for SILO, Loading Conveyor, jetty conveyor and Rail line. Based on conceptual layout of stack yard it will have three rows of stockpiles. Thus each row of stack yard consists of 4 stock piles. There will be two separate tracks for two yard Conveyor each having one stacker cum reclaimers and they will operate in between the three rows of stock piles parallel to each other.

8. It has been proposed to locate the stockyard in the back up area of berth No 2 as earmarked. The coal from stockyard will be evacuated through rail. 20% evacuation through road is considered keeping in the view of customer demand.

9. The proposed mechanization envisages following equipment & major work to enable full scale mechanized system of ship unloading, conveying, stock piling and evacuation by rail.

Sl. No.	Equipment	Quantity
1.	Rail Mounted Mobile Harbour Crane	2 Nos.
2.	Elevated Conveyors	1 Lot
3.	Ground Level Conveyors	1 Lot
4.	Stacker cum Reclaimers	2 Nos.
5.	Rapid Wagon Loading System including Silo	1 No.
6.	In-motion Rail Weigh bridge	1 No.
7.	Elec. Power supply and distribution system	1 Lot
8.	Dust suppression and Firefighting facilities	1 Lot
Hired equipment in the scope of the Concessionaire		
1.	Shunting Loco	1 No.
2.	Baby Dozers	4 Nos.

Sl. No.	Equipment	Quantity
3.	Bull Dozer	1 No.
4.	Excavator	1 No.
5.	Hydra (15 MT capacity)	1 No.
6.	Pay Loader (10 MT capacity)	2 Nos.

10. The total capital cost of the project is estimated at Rs. 298.26 Crores including GST. The summary of break-up of the estimate is given as under:

BLOCK COST ESTIMATE

S.No	Capital Cost	[Rs in Crore]
A.	**Cargo Handling Activity**	
(i)	**Civil Cost**	
	Revamping of the Existing Berth to accommodate the Loaders and other Machineries	2.79
	Civil Foundation for Conveyer Structure	5.00
	Civil Works for Silo System	5.00
	Long travel CR 120 RAIL 360 MTR	1.00
	Construction of New Railway Lines for Rapid Wagon Loading System	11.00
	Extension of existing Track Line of Stacker cum Reclaimer	20.32
	RCC Drain	2.00
	Compound Wall	1.50
	Land filling and compaction	0.50
	Office building	0.60
	Substation building	2.69
	Laterite Hard Standing of the Yard	8.10
	Sub Total:	60.50
	Detailed Designs & Project Supervision costs @ 2%	1.21
	Contingencies @ 3%	1.82
	GST on Civil works @ 18%	11.44
	Civil Cost including GST	**74.96**
(ii)	**Mechanical Equipment Cost**	
	1000 TPH Rail Mounted Mobile Harbour Crane with rail span of 13.687 M. including Grab and hopper with provision of Shore power	79.16
	Conveyor 2000 TPH capacity (Approx 2000 m) including transfer points	21.19
	Stacker cum Reclaimer– Stacking-2000 TPH, Reclaiming - 2000 TPH, with Boom Length-45 m	50.00
	SILO and rapid Wagon Loading system with storage capacity of minimum 800 MT and discharge rate of 2000 TPH	14.25

S.No	Capital Cost	[Rs in Crore]
	Dust suppression system and Fire Fighting facilities including water supply and distribution.	7.59
	In motion Weigh Bridge	0.95
	Sub Total:	173.14
	Detailed Designs & Project Supervision costs @ 2%	3.46
	Contingencies @ 3%	5.19
	GST on Mechanical Works @ 18% [Assumed Full ITC]	0.00
	Mechanical Cost	**181.80**
(iii)	**Electrical Works**	
	Electrical Power Supply and Distribution System including Substation (Excluding Civil)	25.00
	Illumination with High Mast Lighting System	1.00
	Sub Total:	26.00
	Detailed Designs & Project Supervision costs @ 2%	0.52
	Contingencies @ 3%	0.78
	GST on Mechanical Works @ 18% [Assumed Full ITC]	0.00
	Electrical Cost	**27.30**
	Total	**284.06**
(iv)	**Miscellaneous**	
	5% on Civil Cost and Equipment Cost	**14.20**
	Total Capital Cost for Handling Activity (i + ii + iii+iv)	**298.26**

11. The estimated annual revenue based on tariff assessed as per the tariff guidelines 2008 / Tariff orders is given below:

S.No	Particulars	Unit	As per TAMP Guidelines
1	Estimated Throughput	MTPA	3.744
2	Avg Cargo Handling Rate for Foreign Cargo	Rs. Per ton	335.90
3	Avg Cargo Handling Rate for Coastal Cargo	Rs. Per ton	201.54
4	Estimated Revenue Requirement on Cargo Handling	Rs. Cr	123.19

13. 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 (copy enclosed **at Annexure-A**). The results of the analysis are presented below.

Sensitivity Analysis (Not considering IDC)

S.No	Project Sensitivity	Project IRR	NPV@12% (in Rs. Cr)
1.	Base Case	17.48%	103.42
2.	Revenue decreased by 10%	13.52	27.20
3.	Cost increased by 10%	15.87%	79.01
4.	Both cargo decrease & cost increase by 10%	12.14%	2.79

From the above, it is evident that the FIRR of the Project at base case is 17.48% and in the least case of sensitivity gives 12.14% and hence the project is financially viable for taking up through PPP mode.

SECTION 1

INTRODUCTION

1.1 Preamble

Government of India, with its stated objective of transforming the existing ports into modern world-class ports, and develop new ports based on the trade requirement has taken up the SAGARMALA PROJECT. Towards this endeavour, a consortium of McKinsey and AECOM were appointed as Consultants to carryout origin destination study as well as prepare a National Perspective Plan by way of preparing a Master plan for all the major ports and further suggest new ports to be developed as required.

The Consultants as part of deliverables of this study developed a Draft Master Plan for Kolkata Port Trust (including Haldia Dock System) in December 2015. In this report the Consultants considered the complexity of lock gate operation for berthing/ un-berthing of vessels and need for segregation of cargo mix to be handled at various berths and optimisation of port facilities. In line with this, they have suggested shifting some of the selected liquid cargoes (cargoes to be identified by the Port) to a new berth to be developed outside the dock basin and utilise dry cargo berths inside the dock for handling dry bulk cargo (cargoes to be identified by the Port) to the extent possible. As part of this strategy they have further recommended mechanization of existing old Berth no-2 inside the dock basin.

The recommendation of M/s AECOM is reproduced below-

Quote:

"7.3.1. Mechanising Eastern Berths 2 and 3*: To start with, the eastern berth 2 & 3 could be mechanised for up-gradation and these berths shall be developed only for handling of dry bulk cargo and all the liquid cargo shall be taken away to berths outside the basin. It is proposed that the initial mechanisation be taken up at berth No.3 which was earlier used for handling iron ore exports. Berth No.2 could continue to handle the cargo using MHC, dumpers and front end loaders.*"

Unquote:

Subsequently, port has appointed M/s L&T IL for preparing the master plan upto 2040. M/s L&T has also proposed the container cargo and liquid cargo out of the dock basin to increase the parcel size of vessel inside the impounded dock. At the same time, they have recommended the Mechanization of Berth No 2 (erstwhile Berth no-3) which has already been taken up by HDC.

In the government's publication "Advantage Maritime India" the project was further defined as depicted below.

15. Project Name: Mechanisation of Berth 3 at Kolkata Port

S.No	Parameters	MIS 2016/ Cat4/ KoPT (Haldia)/4
1	Project Category-	Sagarmala - Port Modernisation
2	Project Proponent	Kolkata Port Trust- Haldia Dock
3	Project Objectives	Presently, Berth 3 is under utilised by handling small parcels of POL along with mix of other cargo, while the land and other infrastructure for handling coal is available.
4	Project Type	PPP
5	Tentative Cost Estimates	INR 150 Crore (USD 23.1 million)
6	Project Details	Berth 3 will be mechanised with two mobile harbour cranes with integrated hoppers, a conveyor system and at stack yard with stacker-reclaimers and wagon loader. With these, the berth may handle 3 MMTPA. It could be further enhanced to 4 to 4.5 MMTPA by reducing the dwell time. Capacity: 4 – 4.5 MMTPA
7	Project Status	KoPT will undertake Feasibility Study shortly.
8	Total Land Requirement	Land is available.

From the above it can be understood that the Sagaramala proposal is mechanization of berth 2 with two mobile harbour cranes with integral hoppers, a conveyor system and stack yard with stacker cum reclaimer and wagon loader to handle 3 MTPA which could be enhanced 4 to 4.5 MTPA later.

In order to *crystallise* this proposal, the Port Authority entrusted the work of "Preparation of Techno Economic Feasibility report for MECHANISATION OF BERTH NO-2" of Haldia Dock Complex to The 'Indian Ports Association' (IPA).

After detailed study, IPA submitted their TEFR considering viability of the project on PPP mode and recommended 2 nos Gantry Grab Unloader, Two nos Stacker Cum Reclaimer, Conveyor system and One SILO of 2000 Ton Capacity.

Inline with the meeting of Hon'ble Minister of Shipping of Road Transport & Highways at Vishakhapatnam on 12.07.2018, it was decided to take up the project of mechanisation of berth No. 3 on EPC basis by Haldia Dock Complex including yard development of back up area and rail connectivity.

Accordingly, DIB proposal was sent to Ministry of Shipping and in the DIB meeting held on 14.12.2018 at New-Delhi chaired by Secretary (Shipping), it was decided that the Project will be taken up on PPP mode.

Accordingly, DPR was prepared and MoS approved the proposal on 31.12.2019. In line with the feedback from the prospective bidders, the equipments has been revised. Accordingly, the project cost estimated and the financial feasibility has been worked out.

SECTION 2

PRESENT SETTING

2.1. Introduction

Kolkata Port, the oldest in India, is located on the east coast on the river Hooghly in the state of West Bengal. It became operational in the year 1870. It was declared as a Major Port under the Major Port Trust Act 1963. Subsequently in 1977, Haldia Dock Complex (HDC) was constructed as a satellite extension to Kolkata Port. The shipping activity at Haldia started with an oil jetty in the year 1968.

Haldia Dock Complex (HDC), an integral part of Kolkata Port Trust is located on the western bank of river Hooghly at Latitude: 22^0 02' N and Longitude: 88^0 06' E. It is about 104 km downstream of Kolkata and 130 km upstream from Sand heads. It handles a major share of Kolkata Port traffic. The layout of the HDC is given in the Picture. The details of berthing facilities available at HDC are presented in Table 2.1.

The pilotage distance to Haldia is about 130 km of which 75 km is sea pilotage. Remote pilotage assistance is provided through VTMS during the sea passage and in the channels. For vessels calling at Haldia, the pilot launching is undertaken south of Eden in fair weather and north of Eden during foul weather. For outward passage the same process is used in reverse order.

2.2. Hinterland

The hinterland of Kolkata/Haldia comprises of the entire Eastern India including West Bengal, Bihar, Jharkhand, eastern part of Uttar Pradesh, north east of Madhya Pradesh, Chattisgarh, Assam and other North Eastern States and the two landlocked neighboring countries viz. Nepal and Bhutan. But the primary hinterland consists of West Bengal, Jharkhand and Bihar which have major industries consuming fuel/ raw materials imported through this port. The industrial development, commerce and trade of this vast hinterland is inseparably linked to the life and development of Kolkata/ Haldia Port and vice-versa.

2.3. Connectivity

Haldia dock complex is well connected to the hinterland by road, rail and inland water ways. Haldia is accessible through NH 41 to Kolaghat where it meets NH 6. The HDC is well connected to South-Eastern railway network.

2.4. Berthing facilities

Haldia is an all-weather port having a 300.2 m long and 39.6 m wide lock gate and a 450 m dia turning basin. The Haldia dock Complex (HDC) consists of 17 berths of with 14 berths are inside the dock and the remaining 3 outside the dock which are all riverine jetties designed for handling liquid cargoes. 01 liquid cargo jetty (OT-II) is under construction in the river. 01 floating barge handling jetty has been constructed in the river. Presently all dry bulk cargo is handled in berths inside the dock. There are two berths exclusively handling Containers and some berths handle only bulk liquids like edible oils and Paraxylene. The depth inside the impounded dock system at all the berths on an average is 9.5 m. The details of berths such as designed draft, LOA and permissible DWT are presented in the table below:

Table 2.1

Berthing Facilities

Sl. No	Berth No.	Type of Berth/Cargoes normally Handled	Design Draft (Mtrs.)	Quay length (Mtrs.)	Maximum Vessel size	
					LOA (Mtrs)	DWT Designed
1	16(O)	Liquid Bulk Berth - Handling POL, Liq. Ammonia, LPG & Chemicals	12.2	290	236	90000
2	17(O)	Liquid Bulk Berth - Handling POL Crude, POL Product & LPG	12.2	330	277	150000
3	18(O)	Liquid Bulk berth - Handling POL Crude and POL Product	12.5	345	275	150000
4	1	Multipurpose Berth for handling Dry Bulk mainly Coke, Coal, Ore & Limestone	10	260	238	75000
5	2	Multipurpose Berth for handling Dry Bulk like coke, Coal, Ore & Limestone along with POL (Product), and Chemicals, mainly Paraxylene	12.2	337	239	75000
6	3	Mechanized Berth for handling Thermal Coal (Loading)	12.2	284	239	75000
7	4	Mechanized Berth for handling Coking Coal (Unloading) Operated by ISPL	12.2	245	230	75000
8	5	Multipurpose Berth for handling Dry Bulk & Break Bulk Cargo.	12.2	181	180	75000
9	6	Multipurpose Berth for handling Dry Bulk, Break Bulk & Liquid Bulk Cargo.	12.2	195	183	75000
10	7	Multipurpose Berth for handling Dry Bulk, Break Bulk & Liquid Bulk Cargo.	12.2	234	212	75000
11	8	Multipurpose Berth for handling Dry Bulk, Break Bulk & Liquid Bulk Cargo.	12.2	234	212	75000

12	9	Multipurpose Berth for handling Dry Bulk & Break Bulk Cargo.	12.2	218	220	75000
13	10	Multipurpose Berth for handling General &Dry Bulk cargo	12.2	218	210	75000
14	11	Container Handling	12.2	220	210	75000
15	12		12.2	220	210	75000
16	13	Multipurpose Berth for handling Dry Bulk& general cargo (only clean cargoes)	12.2	220	210	75000
17	14	Multipurpose Berth for handling Dry Bulk, general cargo	10	220	210	75000
18	19(O)	Coal, Gypsum		150		
Note: Vessels with a maximum beam of 32.3 meters can enter impounded dock						
Source: Administrative Reports of HDC						

2.5. Handling Capacity of impounded dock:

The handling capacity of a port/berth depends upon the length of berth, the draft, the type of cargo handled, the vessel parcel size etc. Apart from these, the single most important factor that decides the capacity calculations is the type of onshore handling facilities. The usable capacity of Haldia dock complex is assessed as 50.9 million tonnes of the impounded dock considering liquid and container cargo shifted outside. Based on the facilities available at various berths inside the Haldia dock complex, the dry cargo handling capacity is presented in the following statement. The assessment appears to be based on available onshore handling facilities and many assumptions.

Table 2.2

Assessed Capacity of Dry bulk cargo handling berths

Berth No	Predominant Cargoes handled	On-shore handling Facilities available	Assessed capacity based on facilities (million tonnes)
16(O) 17(O)	Crude , POL, LPG, Chemicals, and other liquids	Marine unloading arms & pipelines	
1	Coal ,limestone and other bulk	Two MHCs of 100 T capacity	5.73
2	Formerly an iron ore handling berth. Now caters to paraxylene, SKO, furnace oil, HSD etc.	Pipelines for liquid cargo	
		2 - 1500 TPH Wagon Tipplers,	
		2 Stacker-cum-Reclaimers,	

3	Thermal coal(Export through mechanized handling system)	2 -1500 TPH Shuttle type Ship Loaders 2 - Wagon Feeding Systems 20,000 MT per day.	5.33
4	Coal (Import through mechanized handling system)- By ISPL	2 - Stacker-cum- Reclaimers, 2 Wagon Loaders, 2 - Mechanized Grab un-loaders	4.93
5	Dry Bulk Cargo	2 MHC's at 20,000 TPD	5.73
6	Liquid bulk cargo	Pipelines	
7&8	Sulphuric acid Phosphoric acid etc.	Pipeline and floating oil jetty	2.0
9	Primarily dry bulk cargo	2 No MHC's @20,000 TPD	5.73
10	Dry and break bulk cargo	two MHC's@20,000 MTPD	
11&12	Container cargo	2 No RMQC and other associated equipment	
13	Dry bulk as well as break bulk - Operated by TMIL	Ship cranes and one MHC	2.7
14	Clean dry bulk and break bulk	TWO MHC capacity 100 tonne (recently commissioned)	5.73
	Total dry bulk handling capacity (For all dry bulk cargoes put together such as coal, Limestone, Manganese ore, Sugar, Iron ore, Fertilizer, Fertilizer raw material etc.		30.55
Compiled from data available at Port.			

3.1 Thermal Coal (Loading Cargo):

Thermal coal being brought from domestic coal mines (Raniganj) by rail for loading into ship at Berth No. 4 for shipment to Tuticorin Port as coastal cargo for use by Tamil Nadu Electricity Board Power Plant at Tuticorin.

The volume is low but is picking up slowly. In view of Govt. of India initiative to use domestic coal instead of imported coal, coastal volume will rise in coming years and will gradually rise to 3 million tonnes which can be handled at Berth No. 4 itself. However, this volume will be shown separately to know total coal volume at Haldia Port.

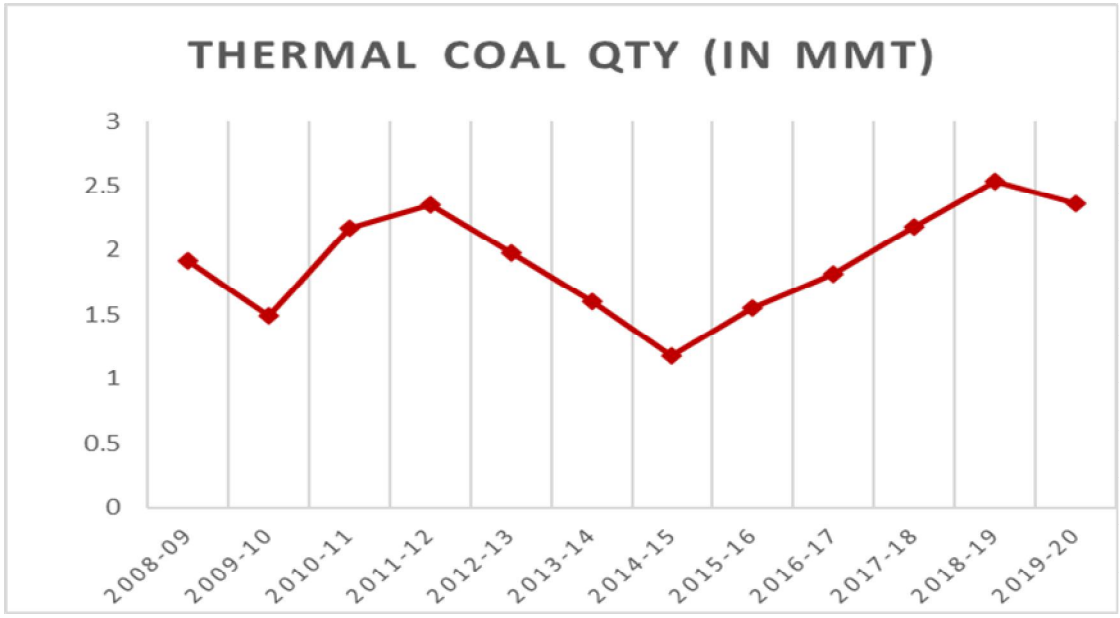


Figure 3.1

3.2 Non Coking Coal (Trans-loading Cargo):

Non coking coal/Thermal coal (import) handled from Sagar area by NTPC for its Farakka Thermal Power Plant does not come to HDC at any berth. This traffic shall not be taken into account for arriving at traffic to be handled at Haldia as this cargo moves through barges to Farakka after discharge in mid-stream. However, this volume will be shown separately.

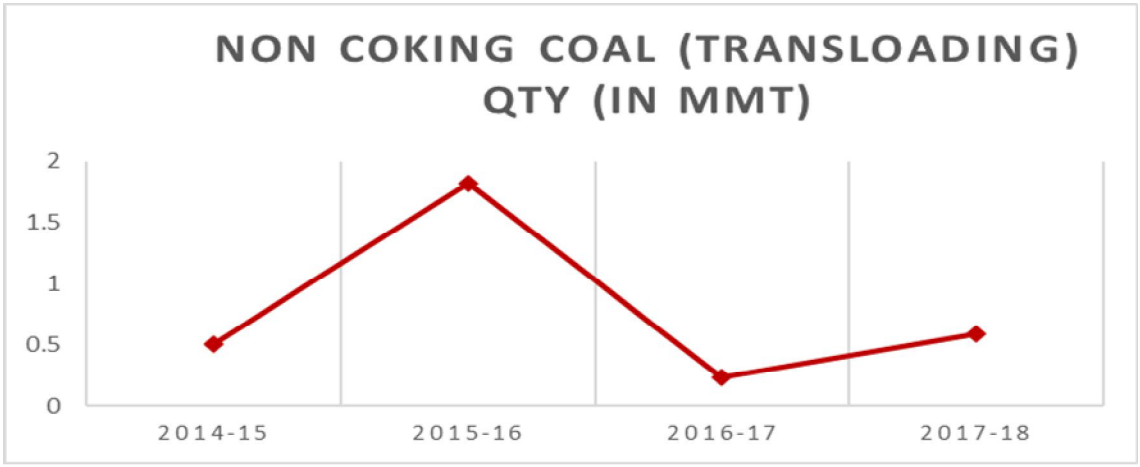


Figure 3.2

3.3 Other Non-Coking Coal (Import Cargo):

The growth trend of other non-coking coal handled in HDC for the last 6 years is depicted below.

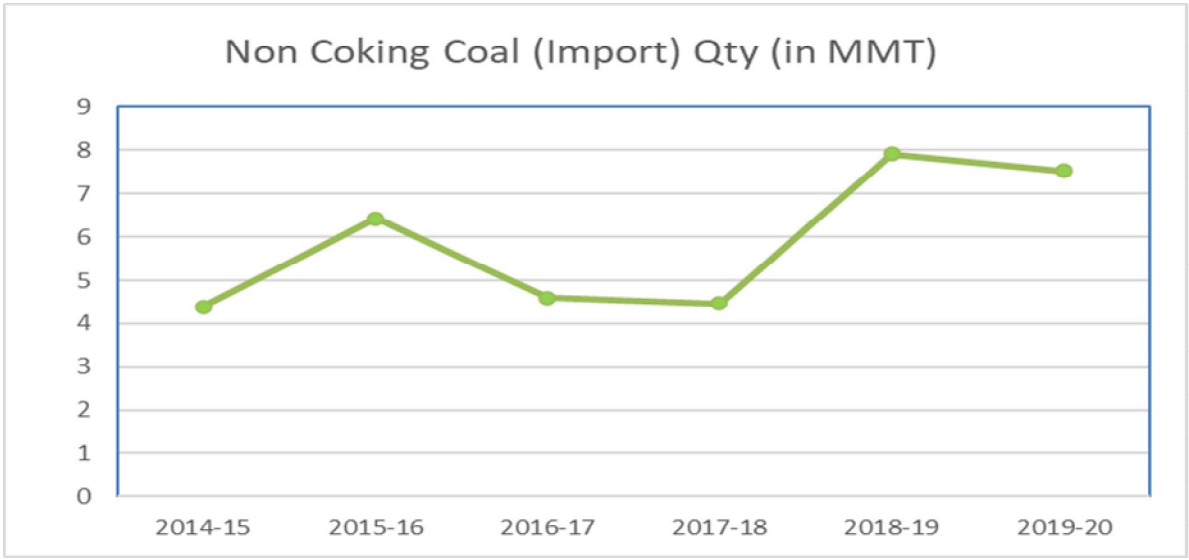


Figure 3.3

3.4. Coking Coal (Import Cargo):

Coking coal is primarily used in steel industry. In 2016, the world crude steel production reached 1628 million tonnes (mt) and showed a growth of 0.8% over 2015. China remained world's largest crude steel producer in 2016 (808 mt) followed by Japan (105 mt), India (96 mt) and the USA (79 mt). The per capita consumption of finished steel in 2015 is placed at 208 kg for world and 489 kg for China by World Steel Association.

World Steel Association has projected Indian steel demand to grow by 5.4% in 2016 and by 5.7% in 2017 while globally, steel demand has been projected to grow by 0.2% in 2016 and by 0.5% in 2017. Chinese steel use is projected to decline in both these years.

Crude steel capacity was 121.97 mt in 2015-16, up by 11% over 2014-15 and India, which emerged as the 3rd largest producer of crude steel in the world in 2015 as per ranking released by the World Steel Association, has to its credit, the capability to produce a variety of grades and that too, of international quality standards. The country is expected to become the 2nd largest producer of crude steel in the world soon. As per the New Steel Policy 2017 India aspires to achieve 300 MMT of steel-making capacity by 2030. This would translate into additional investment of Rs.10 lakh Crore by 2030-31. New Steel Policy seeks to increase per capita steel consumption to the level of 160 Kgs by 2030 from existing level of around 60 Kg.

The crude steel capacity may reach 150 MMT by 2020 requiring 110 MMT of Coking coal. Thus the total coking coal imports by 2020 are expected to be of the order of 70 MMT.

Coking Coal or Metallurgical coal to be used in manufacturing steel should have carbon to be as volatile-free and as ash-free as possible. Coking coal is also heated to produce coke, a hard porous material which is then used to blast in furnaces in steel plants for the extraction of iron from the iron ore.

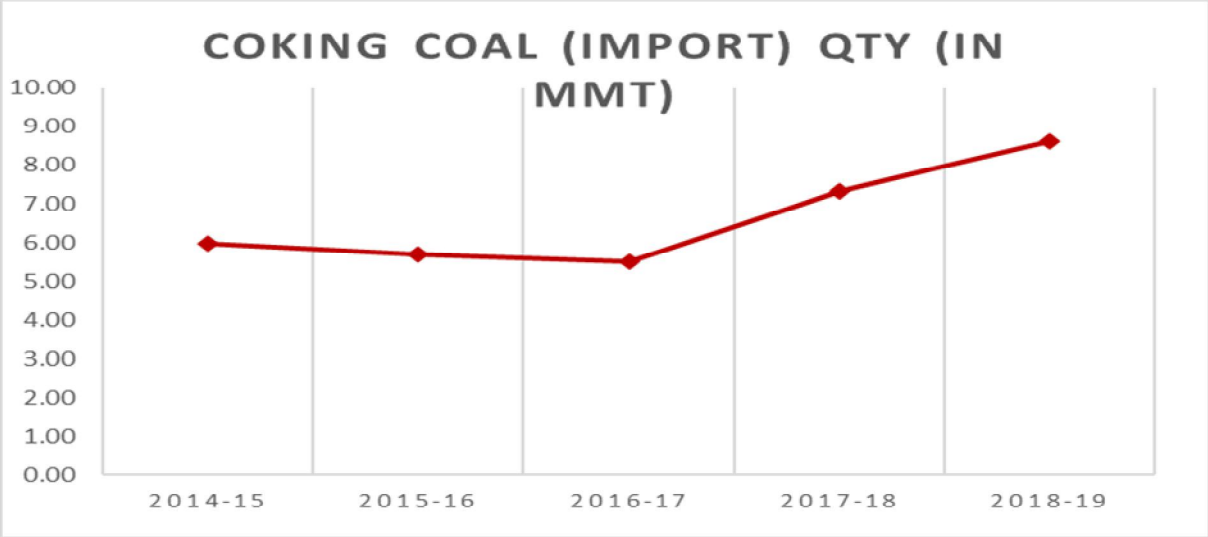


Figure 3.4

The figure above shows the trend in coking coal imports.

3.5. Cokes (Import Cargo):

Various types of cokes (RP Coke, Nut Coke, and Met Coke) handled at various berths inside HDC or to be handled at floating barge jetty will be taken into account for arriving at traffic to be handled. These cokes are used in iron & steel industries. Coke is used as a fuel and as a reducing agent in smelting iron ore in a blast furnace. As seen from traffic trend from FY 2011-12 to 2015-16, the coke traffic has risen considerably in last six years showing CAGR of 11.84%.

The trend in coke traffic for last 6 years at HDC is shown in Figure 3.5 hereunder.

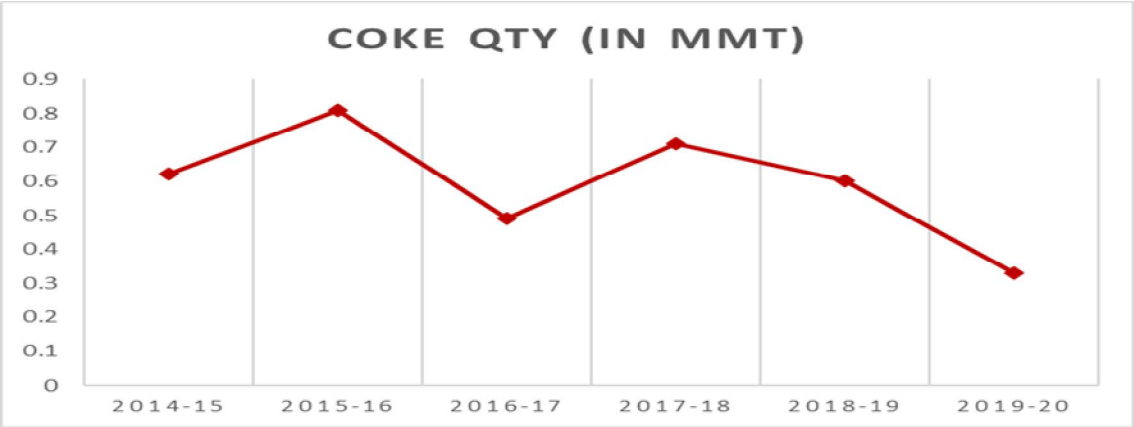


Figure 3.5

3.6 Coal Traffic Projection Based on Trend (CAGR Based):

The traffic projection for coal imported coal traffic at HDC based on CAGR trend is presented in the following Table 3.1.

Table 3.1

Traffic Projections for Coal based on CAGR Trend

Financial Year	Thermal Coal (Coastal Exports)	Trans-loading coal	Non-coking coal (Imports)	Coking coal (Imports)	Coke (Imports)	Total coal Traffic (Imports& Exports)	Projected# coal traffic (Imports)
2016-17	1.82	0.60	4.02	5.50	0.49	12.44	10.02
2017-18	1.73	0.87	4.39	5.63	0.55	13.17	10.60
2018-19	1.64	1.25	4.79	5.75	0.61	13.99	11.20
2019-20	1.56	1.80	5.23	5.88	0.69	15.16	11.80
2020-21	1.56	2.60	5.70	6.02	0.77	16.65	12.50
2021-22	1.56	2.60	6.21	6.16	0.86	17.36	13.20
2022-23	1.56	2.60	6.78	6.30	0.96	18.16	14.00
2023-24	1.56	2.60	7.39	6.44	1.07	19.06	14.90
2024-25	1.56	2.60	8.06	6.59	1.20	20.06	15.90
2025-26	1.56	2.60	8.79	6.74	1.34	21.06	16.90
2026-27	1.56	2.60	9.58	6.89	1.50	22.16	18.00
2027-28	1.56	2.60	10.45	7.05	1.68	23.36	19.20
CAGR	(- 4.98%)	44.24%	9.05%	2.28%	11.84%		

Excluding Coastal exports and Trans-loading traffic

Thermal coal exports and Trans-loading traffic purposely stagnated after 5th Year

3.7 Traffic forecast based the Govt. Policy on use of domestic coal as Substitute to imported coal:

Government is gradually trying to reduce coal import in a bid to increase domestic production and stick to 1.5 billion tonne production target by the year 2020 set by the Coal Ministry. Out of this 1 billion tonne will by Govt companies and remaining 500 million tonnes by private entities.

The statement made by the Coal Secretary, Ministry of Coal, Government of India while addressing MCC Chamber of Commerce and Industry in Kolkata in Feb 2016 re-affirms the same which is re-produced below-

Quote:

"We have done a detailed analysis on how to handle import. As we increase production, we must bring down imports, it is already coming down but should be at much faster rate. In power sector, we have engaged each of PSU power companies. We had meeting with state owned power companies on coal import. This fiscal (2015-16) import will reduce by 15 million tonne. From April next year (2016-17), they will stop placing fresh import orders. State owned power entities import about 35 to 40 million tones. The efforts are to encourage private companies to buy coal for long term from auction".

Unquote:

The above statement has turned into reality as can be seen in reduction in coal import in India during last two years as presented in the following Table 3.2.

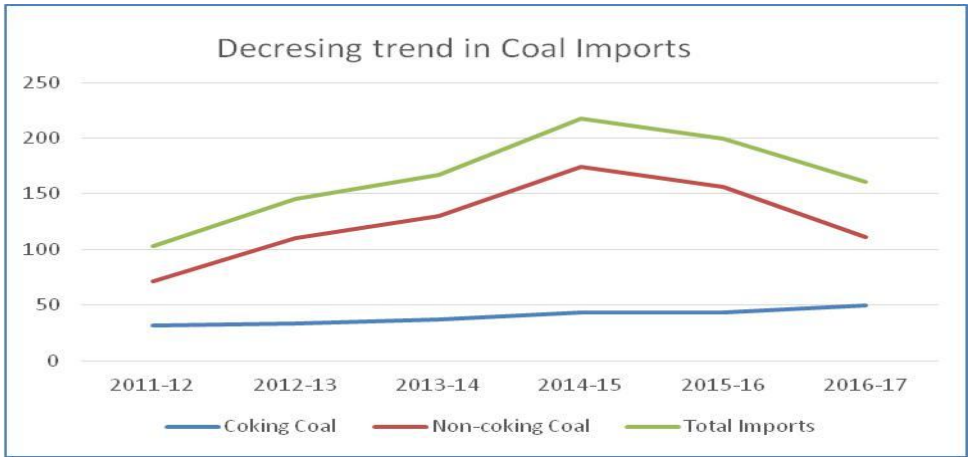
Table 3.2

Trend in Coal Imports (In Million tonnes) for the country

Type of Coal (Excluding Coke)	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Coking Coal	31.8	33.56	36.87	43.72	43.50	50.00†
Non-coking Coal	71.05	110.23	129.99	174.07	156.38	111.00†
Total Imports	102.85	145.79	166.86	217.78	199.88	161.00†

† These Figures are provisional.

The same is presented graphically which clearly depicts the drastic decreasing trend in line with government policy in the below **figure no 3.6**



Similarly coal traffic at Haldia Port declined from 14.51 million tonnes in 2015-16 to 14.42 million tonnes in 2016-17 and coal traffic at all major ports put together declined from 155.17 million tonnes in 2015-16 to 139.85 million tonnes in 2016-17.

The Govt. further stated on 1st May 2017 that it is aiming to bring down thermal coal import of power PSUs like NTPC to zero, in the current financial year, a move that would reduce the country's import bill by Rs 17,000 crores. The Govt. would also convince private companies operating in the power sector to totally stop import of fossil fuel. (PTI 1st May 2017).

Keeping in view the announcement of the above policy, the import of trans-loading coal through Sagar Island by M/s NTPC for its Farakka Power Plant will become nil. Hence traffic projection gets corrected. In line with discussion with NTPC officials, it is understood that only old orders placed with traders will be honored which is to the tune of 3 lakh tones. No fresh orders will be placed for coal import. (NTPC handled one vessel namely MV Mary Gorgias carrying 71,760 MT steam coal (transloading cargo) at Kanika Sands (within the limits of Dhamra Port) during the period from 19.05.2017 to 28.05.2017).

Accordingly, the summary of traffic forecast for coal based the Govt Policy on use of domestic coal, superimposed on past traffic trend is given in the Table 3.3 hereunder.

Table 3.3

Traffic Projections based on CAGR Trend & Govt Policy on use of Domestic Coal

Financial Year	Thermal Coal	Trans-loading coal	Non-coking coal	Coking coal	Coke	Total coal Traffic	Projected coal traffic
	Coastal exports		Imports	Imports	Imports	Imports & Exports	Imports
2016-17	1.82	0.60	4.02	5.50	0.49	12.44	10.02
2017-18	1.73	0.87	4.39	5.63	0.55	13.17	10.60
2018-19	1.64	1.25	4.79	5.75	0.61	13.99	11.20
2019-20	1.56	1.80	5.23	5.88	0.69	15.16	11.80
2020-21	1.56	2.60	5.70	6.02	0.77	16.65	12.50
2021-22	1.56	2.60	6.21	6.16	0.86	17.36	13.20
2022-23	1.56	2.60	6.78	6.30	0.96	18.16	14.00
2023-24	1.56	2.60	7.39	6.44	1.07	19.06	14.90
2024-25	1.56	2.60	8.06	6.59	1.20	20.06	15.90
2025-26	1.56	2.60	8.79	6.74	1.34	21.06	16.90
2026-27	1.56	2.60	9.58	6.89	1.50	22.16	18.00
2027-28	1.56	2.60	10.45	7.05	1.68	23.36	19.20
CAGR	(-4.98%)	44.24%	9.05%	2.28%	11.84%		

3.8 Traffic forecasted by IPA based on interaction with Users:

The traffic forecast based on major coal importing customers through Haldia is presented in the table below.

Table 3.4

Coking Coal traffic projections Based on Interaction with Major Customers of Haldia

Customers for Coking Coal	2016-17 (Actuals)	17-18	18-19	19-20	20-21	21-22	22-23	23-24	24-25	25-26	26-27
SAIL	3.55	3.70	3.70	4.00	4.00	4.25	4.25	4.25	4.25	4.25	4.25
Tata Steel	1.19	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
Jai Bajaj Industries	0.28	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
Electro steel Casting	0.36	0.36	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
Usha Martin	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
Tata Metallik	0.06	0.06	0.06	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
Raw Met Comm	0.004	0.004	0.004	0.004	0.005	0.005	0.005	0.005	0.005	0.01	0.005
Shyam Sel Ferro Alloys	0.00	0.09	0.20	0.20	0.25	0.25	0.30	0.30	0.30	0.30	0.30
Total	5.53	6.15	6.30	6.66	6.72	6.97	7.02	7.02	7.02	7.02	7.02

3.9. Interaction with Non Coking Coal Customers:

Table 3.5

Non-Coking Coal Traffic Projection Based on Customer interaction

Customer Name	2016-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	24-25	25-26	26-27
Tata Steel	0.42	0.50	0.50	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Agarwal Coal Corp	0.31	0.35	0.35	0.35	0.35	0.35	0.35	0.40	0.40	0.40	0.40
SAIL	0.28	0.3	0.50	0.50	0.60	0.60	0.60	0.60	0.60	0.60	0.60
Super Smelters	0.25	0.25	0.25	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Sarogiudyog	0.16	0.18	0.20	0.23	0.25	0.27	0.30	0.32	0.35	0.35	0.4
Anand Carbo/Godawari	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17

Jai Balaji Industries	0.12	0.12	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
HaldiaEnery Ltd	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
Raw Met Commodities	0.10	0.11	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
Electro steel castings	0.16	0.16	0.18	0.18	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Usha Martin	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
CESC Ltd	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Indian Power Corporp	0.00	0.60	1.00	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
Sub-Total	2.23	2.93	3.61	4.39	6.33	6.35	6.38	6.45	6.48	6.48	6.53
Others @ .1026 CAGR	1.79	1.97	2.18	2.40	2.65	2.92	3.22	3.55	3.91	4.31	4.75
Grand Total	4.02	4.90	5.79	6.79	8.98	9.27	9.60	10.00	10.39	10.79	11.28

Note: CAGR is derived from Sub-total column for 12 years

3.10. Interaction with Coke Customers:

Table 3.6

Coke Traffic Projection Based on Customer Interaction

Customer - Coke	2016-17 Actual	17-18	18-19	19-20	20-21	21-22	22-23	23-24	24-25	25-26	26-27
Neo-Metaliks	0.084	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085
Athir Industries	0.075	0.082	0.082	0.082	0.082	0.082	0.082	0.082	0.082	0.082	0.082
ReshmiMetaliks	0.037	0.037	0.038	0.040	0.050	0.050	0.050	0.050	0.050	0.050	0.050
ShyamSel/Ferro alloys	0.036	0.036	0.036	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
Tata Metalliks	0.02	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sub-Total	0.251	0.250	0.241	0.247	0.257	0.257	0.257	0.257	0.257	0.257	0.257
Other @ 0.0021 CAGR	0.240	0.241	0.241	0.242	0.242	0.243	0.243	0.244	0.244	0.245	0.245
Total	0.491	0.490	0.482	0.489	0.499	0.500	0.500	0.501	0.501	0.502	0.502

3.11. Interaction with Thermal coal (Loading) Customer:

Table 3.7

Thermal Coal (Coastal Loading) Traffic Projections based on Customer interaction

Customer	2016-16 Actual	17-18	18-19	19-20	20-21	21-22	22-23	23-24	24-25	25-26	28-27	27-28
TNEB (SICAL)	1.82	1.94	2.06	2.18	2.30	2.42	2.54	2.66	2.78	2.90	3.00	3.00

3.12. Interaction with Customer using Trans-loading Facility for NCC Import (NTPC):

Customer indicated that no further coal import through trans-loading facility as per GoI directive to use domestic coal. Hence this volume has been considered as Nil for future projection.

3.13. Projection based on average of "trend" and "customer indication" for coking coal, non-coking coal and cokes but Thermal Coal (loading) considered purely as per "customer indication".

3.14. Total Coal Traffic Projection (Imported+ Loading + Transloading):

Table 3.8

FINAL PROJECTION BASED ON AVERAGE OF TREND AND CUSTOMER INTERACTION (EXCEPT TNEB & NTPC COAL) IN MMT

CUSTOMERS	2016-17 Actual	17-18	18-19	19-20	20-21	21-22	22-23	23-24	24-25	25-26	26-27	27-28
Coastal Coal (Loading):TNEB	1.82	1.94	2.06	2.18	2.30	2.42	2.54	2.66	2.78	2.90	3.00	3.00
Transloading Coal: NTPC	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Non Coking Coal (Import)	4.02	4.65	5.29	6.01	7.34	7.74	8.19	8.69	9.22	9.79	10.43	11.11
Coking Coal (Import)	5.50	5.89	6.03	6.27	6.37	6.56	6.66	6.73	6.80	6.88	6.95	7.03
Coke (Import)	0.49	0.52	0.55	0.59	0.63	0.68	0.73	0.79	0.85	0.92	1.00	1.09
All Cargo	12.43	13.00	13.93	15.05	16.64	17.40	18.12	18.87	19.65	20.49	21.38	22.23
All Import (All Cargo less TNEB and Transloading)	10.01	11.06	11.87	12.87	14.34	14.98	15.58	16.21	16.87	17.59	18.38	19.23

The final projections as given in the table above is line with government's present thinking.

In case of non-coking coal import it is proposed to reckon the projection of 7.3 million tonnes for 2025-26 also keeping in view the government's policy of reducing imports.

3.15 Iron ore

India which was formerly the world's No.3 supplier of iron ore has been closing down on imports over the last two years due to court-imposed restrictions aimed at curbing illegal mining in the key producing states of Karnataka and Goa. In FY 2015, India produced 129 million tonnes of iron ore and imported 15 million tonnes of iron ore.

3.15.1 Export Policy for Iron Ore - 2016

Exports of iron ore up to 64% Fe content is freely allowed. The export of iron ore with Fe content above 64% is canalized through MMTC. High-grade iron ore (Fe content above 64%) from Bailadila in Chhattisgarh is allowed to be exported with restrictions on quantity imposed primarily, with a view to meet domestic demand on priority. About 3 million

tonnes is allowed for exports through vizag and paradeep. Though iron ore exports do take place in Haldia, the chances of increase in a big way are therefore remote.

The industries located in west Bengal source their iron ore requirements from mines in Jharkhand, Madhya Pradesh and as such iron ore exports are fluctuating through the port. In 2015-16, and 2016-17 the port handled about 0.8 miliion tonnes and 1.16 million tonnes of iron ore respectively as against 1.90 mt in 2014-15. As such, a moderate forecast of 1.3 mt to 2.3 mt is projected by 2020 and 2025 respectively
As such for iron ore Haldia will remain as an export cargo and in moderate quantities for a long time to come.

3.16. Manganese Ore (Import)

India is the second largest importer of Manganese ore in the world. India's dependence on Manganese Ore imports has increased as the Manganese Ore produced in India (apart from MOIL) is of low grade and high Iron content, and these are not suitable to produce the best quality Manganese alloys. These inferior quality of Manganese Ores produced domestically have to be blended with better variety imported ores. In view of the shortage in availability of high grade ore and imports becoming cheaper with demand from China diminishing, this trend is likely to continue.

The traffic on account of this cargo through Haldia was varying between 1.3 mt and 1.5 mt. Keeping this trend in view, 1.8 mt by 2020 and 2.3 mt by 2025 has been reckoned for this cargo.

3.17. Fertilisers and Raw materials (Imports)

The consumption of fertilizers in the country has increased by around 2.5 percent and is expected to rise at approximately 4 percent in the future. Growing agri-produce and an increase in the overall sown area will prompt greater demand for fertilizer end products—around 70 MMTPA by 2020 and around 120 MMTPA by 2035. Urea consumption in India is around 29 MMTPA, of which around 22.5 MMTPA is produced domestically and around 7 MMTPA is imported. While domestic plants are increasing capacity by around 5 MMTPA in 2020, the rising demand for urea (expected to be 35 MMTPA in 2020) will ensure that India continues to import around 7 MMTPA of urea. The volume of imports of fertilizer raw materials and finished products will grow at around 4 percent.

About 3 lakh tonnes of fertilisers and 3.4 lakh tonnes of fert. Raw materials is handled by the port in 2015-16.The traffic is estimated to grow at 5 percent per annum to reach 0.8 mtpa by 2020 and 1.2 mtpa by 2025.

3.18. Limestone

Limestone is the primary and major constituent for manufacture of cement. It is also used by the steel industry. With nearly 390 million tonnes (MT) of cement production capacity, India is the second largest cement producer in the world and accounts for 6.7 per cent of

world's cement output. The cement production capacity is estimated to touch 550 MT by FY 20. Of the total capacity, 98 per cent lies with the private sector and the rest with the public sector. The top 20 companies account for around 70 per cent of the total production.

Haldia port handled 1.5 million tonnes of lime stone in 2015-16 compared to 1.23 mill tonnes in 2012-13(CAGR 7%). Keeping in view the demand for this commodity by cement and steel industry, the traffic is estimated at 2.1 mtpa by 2020 and 2.8 mtpa by 2025.

3.19. Other commodities

These include steel, soda ash, pig iron gypsum, pet coke, m coke cement etc. The traffic on account of these cargoes was around1.2 million tonnes in 2015-16.

3.20. Summary of Traffic projections

Table 3.9
Projections for Dry Cargo (million tonnes)

Commodity	Actual in 2015-16	Projections by IPA		AECOM projections	
		2020-21	2025-26	2020-21	2025-26
Coking coal	5.72	6.4	6.9	8.0	11.2
Non -coking coal	6.43	7.3	7.3	3.3	3.3
Thermal coal	1.55	2.3	2.9	1.6	2.1
Iron ore	0.87	1.3	2.3	1.0	1.3
Manganese ore and slag	1.24	1.8	2.3	2.0	2.5
Fertilisers and FRM	0.64	0.8	1.2	1.0	1.5
Cokes	0.81	0.6	0.9	-	-
Limestone	1.52	2.1	2.8	2.0	2.8
Others Excl steel	1.20	1.8	2.6	4.0	5.2
Total Dry Cargo	**19.98**	**24.4**	**29.2**	**22.9**	**29.9**

In the Master plan submitted by L&T IL, it is projected a Dry Bulk Cargo (Import) as follows in FY-25& FY-30:

Sl no	Commodity	Projection in FY-25(In MMPA)	Projection in FY-30(In MMTPA)
01	Coking Coal	12.00	17.4
02	Non Coking Coal	11.30	14.10
03	Manganese Ore	1.69	2.29
04	Limestone	2.80	3.50
Total		27.79	37.29

3.21. Traffic Forecast & Matching Handling Facilities

As per the above tabulated traffic projections, the port is required to equip itself to handle 24.4 Million tons of dry bulk cargo by 2020-21 and 29.2 Million tons by 2025-26. Out of 29.2 million tons for Dry bulk, 17.1 million tons is coal (coking coal, non-coking coal and thermal coal.

Of the projection of 17.1 million tons in 2025-26 thermal coal is 2.9 million tons which basically is an export cargo mostly meant for TANGEDCO handled through Tamilnadu ports. For this purpose there already exists a fully mechanized coal export handling facility in operation in berth No 4.

After accounting for this, the remaining coal amounting to 14.2 million is an import cargo. Berth No 4(Erstwhile Berth no 4A) already has a captive mechanized coking coal unloading system with a capacity of 3 MTPA installed by M/s ISPL on BOT basis. This quantity of 11.2 (14.2 MTPA- 3 MTPA) in 2025-26 means a substantial incremental increase of coal, thus meriting a fully mechanized coal unloading, stacking, reclaiming and wagon loading system.

3.22. Identification of Cargoes Mechanization and its traffic projection:

3.22.1 Cargoes for Mechanization through Berth no-2

The main bulk cargoes handled in Haldia port are

Coking coal – Import

Non coking coal – Import

For any bulk cargo to merit mechanization, it need to be in substantial quantity and is handled all through the year and is not a seasonal cargo. If evacuation of such cargo is predominately by rail, then it is an added advantage as their parcels will be large viz., in rake loads rather than in Lorry loads. Also they would be consigned to fewer users in larger parcels.

Since coal is the predominant bulk cargo and bulk of it being imports it is proposed that Coal imports be mechanized through Berth no-2.

3.22.2 Assessment of Traffic Projection for identified cargoes

As already indicated earlier, the port already has a fully mechanized bulk coking coal importing system in Berth No 4A which is a BOT facility of M/s ISPL. It has a capacity of 3.5 million tons per annum and is meant as a captive facility.

Thus as seen in the previous paragraph coal imports through Haldia will be of the order of 14.2 million tons in 2025-26. After accounting for handling through Berth No 4A, the coal traffic projection is 10.7 million tons some of which can be attracted to Berth no-2.

3.23. Requirement of Mechanization:

(i) Mechanization of Berth No.2 will enable it to handle imported coal only. The said berth is expected to be commissioned in October,2023 and thus, this berth will be available for handling coal for a period of 6 months during the Financial year 2023-24. As per internal projections, 17MMT of imported coal is likely to be handled during 2020-21 while around 9.2MMT of other imported Dry Bulk Cargo is expected to be handled during the same fiscal. While imported Coking Coal will be handled at Berth No.1, 4,5 & 9, other Dry Bulk Cargo will be primarily handled at Berth No.1, 5 & 9 as well as Berth No.13. Now, the capacity of each of the Berth Nos.1,9 &14 is 5.73MMT per annum and Berth No.4 has a capacity of 4.93 MMT.

(ii) In the Master plan submitted by L&T IL, they have given a projection of 12 MMMTPA during 2025. They have also forecasted cargo specific berths for Coking coal like Berth no-2, 4, 5 & 6. Where berth no-4,5 & 6 can handle about 8 MMT per annum and balance 4 million ton can be handled at Berth no-2.

SECTION 4

BERTHING FACILITES

4.1. Berth no-2:

Earlier during 1970's the Berth no 2(erstwhile Berth no-3) was originally installed with a fully mechanized iron ore loading system. It consisted of two Wagon Tipplers with wagon feeding systems, conveyor system, four Stacker cum Reclaimers and two Ship Loaders.

With decline of iron ore traffic, the berth along with the same iron ore loading plant was used for loading thermal coal for some time. The following image depicts berth no 2 with stack yard as it used to be till in 2012 when the berth was equipped with ship loaders and the stack yard with stacker cum reclaimers.

Berth no-2 with back up area for Mechanized iron ore loading plant
(Image as during 2012)

Consequent to ban on iron ore exports imposed by GOI in 2012, the entire mechanized iron ore loading system including crane rails laid on the berth having also outlived its economic life, was decommissioned and dismantled.

The berth 2 (erstwhile berth no.3) is also having the facilities for handling Class B Petroleum Products since early eighties and tankers used to call at this berth since then and is being continued. Presently paraxylene is being handled through this berth through pipelines laid on the rear side of the berth. The back-up area is now used for stacking of bulk cargoes like coal with stacking and evacuation of such bulk cargoes done by semi-mechanized methods viz., by dumpers and pay loaders.

The satellite image presented below depicts Berth no-2 and the back-up area as it now stands.

Berth no-2 as at present with Back-up area

4.2. Present Setting of Berth

The Berth no-2 is an island type berth having 193 M (337 ft.) long berthing face for a width of about 14 M plus connected to the shore with approach ways on both ends. The overall length of the berth is about 337 M.

The berth is designed to handle 75,000 DWT Panamax vessels partly laden to 12.2 M draft up to 239 M LOA. Double cone fenders with frontal pads are provided to facilitate berthing of vessels and 60T capacity bollards are provided on the quay above the fenders for holding breast lines from the ship. Extreme bollards for moorings are about 335 M apart. The berth is also designed for operation of rail mounted shore cranes for a rail span (in transverse direction) of 13.72 M (45 ft.).

The latest image of the berth structure is presented below

Berth no-2 – Berth structure as of now

4.3. Limitations due to shorter span of crane rail gauge :

As has been noted above, the span of crane rail gauge in transverse direction was only 13.72M. As per present trend such cranes are manufactured for a much larger gauge. However, MHC can be accommodated on the existing rail span.

4.4. Berth Structure

The berth structure comprises of RCC slab, long and cross beams supported on RCC monolith type gravity structures sunk apart. The fenders are installed on monolith walls. The crane rail beams are along the vertical walls of the monoliths with deep beams bridging the gaps. There are three rows of RCC piles at the rear side of the quay driven at regular intervals along the length of the berth to support the ship unloading conveyor system.

The image shown below (present berth no-02) depicts structure that used to support the conveyor system.

4.5. Condition of the existing Berth Structure

No significant damage of the quay is noticed. However, damages of the conveyor support structure at the rear side, to the extent of spalling of concrete thereby exposing the reinforcements are noticed at several locations.

In view of the above and also considering that the berth structure is 40 years old, it would prima facie require to carry out 'Condition Survey' by experts for ascertaining the stability of the berth structure, the conveyor support structure in particular, for withstanding design load criteria.

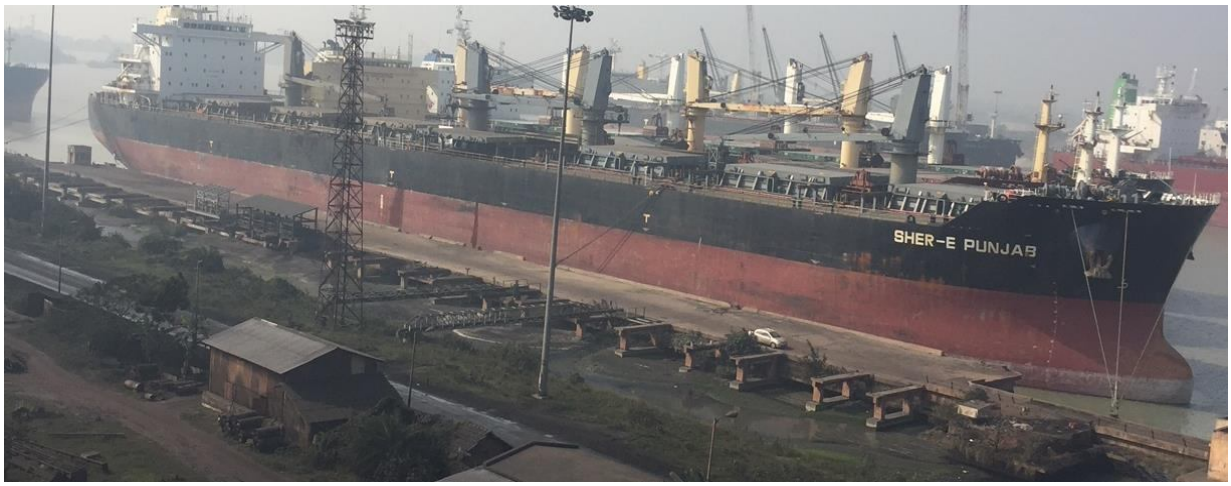
In view of the design characteristics, limited width and limited approaches from land side as noted in earlier paragraphs, it was not recommended by IPA for handling cargo using Harbour Mobile Cranes with resting pad on berth no 2. For this constrains, MHC on rail mounted has been considered to suit the existing rail gauge.

4.6. Observations of IPA on Berth Structure:

The berth structure in its present state, is suitable for installation of Rail mounted Mobile Harbour Crane. . In fact the berth was earlier having ship loaders with tripper car and conveyor on the rear side. As such it is considered that there will be no major technical problem to install ship unloaders (as against ship loaders previously). Since these are tailor made equipment the MHCs can be designed to have wheel loads similar to erstwhile loaders commensurate with the wheel span subject to undertaking repairs on civil structure as per 'Condition Survey' which has been carried out by IIT Madras. It appears the main berth structure to support the Conveyor System on the rear needs to be thoroughly repaired to revive them to original state before being used for the purpose.

4.7. Images of Present Berth no-2 Structure:

A few images of the present structure are provided below for immediate appreciation of its visual condition.



SECTION 5
Planning Parameters

5.1. From the Perspective of Existing Berth Structure

IPA observed in the feasibility study report that The physical life of berth structure can be enhanced by taking proper short and long term maintenance measures systematically. After undertaking repairs as would be recommended in the 'Condition Survey' Report, the berth can be used for another 35 to 40 years. In view of the foregoing, mechanisation of Berth 3 is technically feasible.

Accordingly, Haldia Dock Complex, SMP, Kolkata engaged IIT Madras for the condition survey of the Berth and recommend the repairing methodology of the Berth. An estimated cost as recommended by IITM has been considered.

5.2. Other Factors

Presently there are about **9 nos** harbour mobile cranes of 100 TPH capacity in operation under HDC. This apart, there is a fully mechanised coking coal unloading facility in berth no 4 (Concessionaire-ISPL) and a mechanized thermal coal loading system (owned and operated by HDC) in Berth no-2.

As indicated in the section on "Traffic Forecast" the bulk export cargoes available for loading is very small and there is already a mechanized thermal coal loading facility in berth 3 catering to such needs (which are mainly coastal thermal coal exports to Tamil Nadu electricity board), hence there is no scope for any further mechanization for export cargoes.

Therefore, any further mechanization has to be for bulk import cargoes. The commodities which have sufficient volumes are coking coal, thermal coal and limestone. The rest are highly fragmented cargoes.

5.3. Basis of Planning for Mechanization of Berth 2

a. The berth no-2 has already handled mechanized Iron Ore export and two nos of 3000 TPH rail mounted Ship loaders were installed.
b. Huge amount of import dry bulk cargoes may be handled through fully mechanized system and to provide unloading from ship to loading into wagons (complete solution) with reduced burden on the importer.
c. At present only mechanized dry bulk cargo import facility is at Berth no-4 and the age of the plant is already 20 years. So alternative option to the bidders will be created by Mechanization of Berth no-2.

Based on favourably considering factors, it is proposed to plan for mechanization of berth 2 for bulk coal imports.

5.4. Traffic to be handled

As indicated above the commodities to be handled are import cargoes of non-coking coal and coking coal. The quantity to be handled upto to 3.744 million tons per Annum.

5.5. Vessel parcel sizes

The planning parameters in respect of vessel size and parcel size of vessel for which the mechanized handling facilities are planned is presented in table 5.1 & 5.2.

Table 5.1

Details of vessels carrying coal Handled in Haldia - During 2019-20

Type of coal Total Volume Handled in Million	**Handled**	**Coking-Coal**	**Non- Coking Coal**
Tonnes	12.47	7.43	5.04
No of Ship calls	439	258	181
Deadweight Tonnage	**Maximum**	93,888	93,888
	Minimum	28,458	5,251
	Average	77,290	72,855
Length Overall in Meters	**Maximum**	229	229.07
	Minimum	169.26	91.94
	Average	223.18	217.31
Parcel size in Tonnes	**Maximum**	35,721	35,851
	Minimum	10,000	4,983
	Average	28,985	27,565
Productivity in Tonnes per day	**Maximum**	31,576	33,168
	Minimum	7,316	4,362
	Average	16,192	17,489

It is noticed that average parcel size of vessels for the year 2019-20 is 28772 MT and about 10% of total vessel calls have brought in parcels of more than 30,000 Tons. The variation of parcel size with the sailing draft is brought out in the following table 5.2.

Table-5.2

COKING COAL FY 19-20

NAME OF VESSEL	DWT	Parcel Size in Tonnes
M.V. SPITHA	75,411	20,193.00
M.V. CAPTAIN GEORGE	82,140	32,500.00
M.V. ALONISSOS	56,648	23,690.00
M.V. GRM PRINCESS	82,177	30,000.00
M.V. KIRAN EURASIA	79,158	25,975.74
M.V. DARYA MOTI	80,502	25,312.00
M.V. STAR TRADER	82,181	32,018.00
M.V. DANAE R	75,740	30,701.00
M.V. VISHVA CHETNA	81,733	31,828.00
M.V. ATLANTIC B	76,267	24,260.00
M.V. ANNA G	81,004	29,513.00

COKING COAL FY 19-20

NAME OF VESSEL	DWT	Parcel Size in Tonnes
M.V. CYMONA PROGRESS	81,918	30,185.00
M.V. EXPLORER ASIA	81,094	30,600.00
M.V. PELLA	82,163	32,769.00
M.V. VALADON	81,199	30,989.00
M.V. TYANA	82,158	31,096.00
M.V. FAME	75,912	14,000.00
M.V. ROSCO OLIVE	74,951	28,475.00
M.V. NISSAKI	81,466	29,433.00
M.V. SEAPOL ENDEAVOUR (Coastal)	45,758	16,500.00
M.V. LAKE DAWN	81,902	32,278.00
M.V. ZOI XL	82,489	30,926.00
M.V. VISHVA PREETI	80,250	29,234.00
M.V. GOLDEN ROSE	81,585	28,700.00
M.V. ALPHA PRIDE	82,032	31,285.00
M.V. VISHVA VIJAY	93,888	28,209.00
M.V. CK BLUEBELL	81,147	29,139.15
M.V. CHOLA HARMONY	73,941	27,261.00
M.V. KEY OPUS	81,863	32,073.00
M.V. YASA PIONEER	79,716	34,340.00
M.V. INCEPTION	80,327	29,128.00
M.V. EVMAR	82,039	31,192.00
M.V. PUPPIS OCEAN	81,070	32,087.00
M.V. DERBY	80,333	27,000.00
M.V. DORIC LIBERTY	82,084	30,907.00
M.V. SAITA I	81,922	28,904.00
M.V. PEACE GEM	76,430	29,384.50
M.V. JAG ROOPA	52,454	24,737.00
M.V. PRABHU DAS	76,015	16,648.00
M.V. STAR AMETHYST	82,123	31,022.00
M.V. VISHVA ANAND	80,204	31,880.00
M.V. AQUILA OCEAN	82,071	14,369.00
M.V. GOLDEN ARION	82,188	32,796.00
M.V. EVA	82,620	31,446.00
M.V. DORIC ARMOUR	81,800	15,363.00
M.V. YASA UNITY	75,580	32,519.00
M.V. KEY INTEGRITY	83,375	29,110.00
M.V. VISHVA NIDHI	57,145	24,053.00
M.V. PANSOLAR	76,343	31,304.00
M.V. GLORIOUS WIND	83,410	34,029.00
M.V. SANTORINI	81,086	19,382.00
M.V. VITAKOSMOS	82,177	33,228.00
M.V. HUAYANG PIONEER	75,813	29,203.00
M.V. YIANNIS B	82,561	34,334.00
M.V. MAHA JACQUELINE	75,592	28,822.00
M.V. PEDHOULAS ROSE	82,068	31,451.00
M.V. NEW HORIZON	55,445	25,269.00
M.V. MARGRETH PISSAREK	81,439	32,013.00
M.V. PRODIGY	76,117	29,800.00
M.V. KEY EVOLUTION	83,416	34,112.00
M.V. SBI ROCK	82,057	27,450.00
M.V. KEN STAR	61,423	29,000.00
M.V. XENOFON XL	58,578	27,000.00
M.V. PATROKLOS	81,149	29,628.00
M.V. JAG ADITI	80,325	31,347.00

COKING COAL FY 19-20

NAME OF VESSEL	DWT	Parcel Size in Tonnes
M.V. VISHVA PRERNA	57,161	24,103.00
M.V. TRANSPACIFIC	81,247	15,000.00
M.V. DORIC ARROW	75,121	33,755.31
M.V. FLORA	82,177	33,611.00
M.V. KROUSSON	81,352	32,708.00
M.V. ALKIMOS HERACLES	81,922	29,300.00
M.V. OCEAN FUTURE	55,771	24,500.00
M.V. BELGRANO	81,870	30,265.00
M.V. CAPTAIN ANTONIS	82,177	33,850.00
M.V. CEMTEX INNOVATION	81,326	31,079.00
M.V. TASOS	75,100	27,360.00
M.V. JAG AKSHAY	82,044	31,599.00
M.V. NEW HONOR	82,062	31,821.00
M.V. DANHIL	81,354	32,207.38
M.V. STAR LUNA	82,687	35,118.00
M.V. YANGZE 11	82,027	32,230.00
M.V. KYTHIRA I	81,444	32,285.00
M.V. CHRYSSA K	81,305	30,000.00
M.V. SEA GEMINI	81,716	18,247.00
M.V. PRISCILLA VENTURE	77,283	33,061.00
M.V. ASPASIA B	82,004	32,624.00
M.V. VISHVA MALHAR	56,617	24,100.00
M.V. CASSIOPEIA OCEAN	82,069	33,501.00
M.V. ECOPRIDE GO	81,883	32,769.00
M.V. AGIOS MAKARIOS	80,929	32,348.00
M.V. ANATOLI	63,467	25,000.00
M.V. SHANDONG FU YI	81,781	31,000.00
M.V. SAMOA	75,506	25,000.00
M.V. SEA PROTEUS	81,762	33,264.00
M.V. VISHVA EKTA	55,646	25,030.00
M.V. VALIANT SUMMER	81,920	34,340.00
M.V. ENERGY SUNRISE	81,793	34,388.00
M.V. THERESA JIANGSU	81,680	29,459.00
M.V. RANHIL	81,048	32,421.37
M.V. AQUAVITA SUN	81,554	32,758.00
M.V. VISHVA VIJAY	93,888	33,302.00
M.V. YANGZE 15	82,041	27,500.00
M.V. VISHVA BANDHAN	57,196	24,400.00
M.V. MOONBEAM	58,138	16,463.00
M.V. ROSCO LITCHI	82,153	32,000.00
M.V. STAR AMBER	82,023	30,000.00
M.V. MANOUSOS P	82,549	34,395.00
M.V. WOOKIE	81,755	32,577.00
M.V. BALTIA	75,776	29,350.00
M.V. BBG BRIGHT	82,042	31,530.00
M.V. C S OLIVE	82,175	34,388.00
M.V. NIKOLAS XL	82,379	35,721.00
M.V. SAKIZAYA CHAMPION	78,080	29,502.00
M.V. YASA SPARROW	55,210	25,000.00
M.V. DANAE	75,348	31,038.00
M.V. MYRTO	81,016	27,500.00
M.V. YASA H MEHMET	83,482	32,415.00
M.V. DELFIN	81,645	33,405.00
M.V. INDIA VISION	81,838	20,000.00

COKING COAL FY 19-20

NAME OF VESSEL	DWT	Parcel Size in Tonnes
M.V. CAPE KASOS	81,403	32,804.00
M.V. EPICTETUS	83,987	32,172.00
M.V. NORD DESTINY	83,684	34,073.00
M.V. NBA MILLET	81,955	34,436.00
M.V. ALPHA LEGACY	82,047	31,709.00
M.V. IKAN BAWAL	83,339	32,292.00
M.V. SAKIZAYA KALON	81,691	32,849.00
M.V. IOANNIS K	79,877	31,811.00
M.V. SHANDONG FU ZHI	81,781	30,795.00
M.V. VISHVA PRERNA	57,161	25,424.06
M.V. FIJI	81,285	31,210.00
M.V. MIRELA	58,721	25,417.94
M.V. MAHA ROOS	75,592	33,743.00
M.V. CORINNA	81,681	32,162.00
M.V. DIANA SCHULTE	79,700	32,500.00
M.V. KAVO ALKYON	75,409	33,072.00
M.V. AQUATIC	83,730	34,079.00
M.V. DARYA DEVI	81,940	32,798.00
M.V. ZHENG HUI	81,797	31,010.00
M.V. KLARA OLDENDORFF	81,262	31,268.00
M.V. SBI LAMBADA	79,115	32,100.00
M.V. TAHO AMERICA	81,788	35,534.00
M.V. TOPEKA	87,337	23,000.00
M.V. W GALAXY	76,629	31,358.00
M.V. DORIC ARMOUR	81,800	28,148.00
M.V. NAVIOS STAR	76,662	31,441.28
M.V. OCEAN GEM	75,618	25,354.00
M.V. SBI BOLERO	81,210	31,750.00
M.V. VISHVA VIJETA	56,638	23,061.52
M.V. ILIA	80,309	29,473.19
M.V. DORIC LIBERTY	82,086	30,004.00
M.V. SAITA I	81,922	31,001.00
M.V. VITAOCEAN	82,250	33,590.00
M.V. HUA XING HAI	81,108	32,252.43
M.V. LIMNOS	56,671	26,770.00
M.V. SANTA RITA	55,677	27,499.52
M.V. V AVOCET (Coastal)	51,514	25,000.00
M.V. VISHVA DIKSHA	57,133	23,550.32
M.V. INES CORRADO	81,272	27,355.00
M.V. GOLDEN SHEA	76,939	28,082.00
M.V. GLEAMSTAR	75,491	25,000.00
M.V. IC PHOENIX	62,888	28,900.00
M.V. ANDANTE	81,615	29,017.00
M.V. CSSC YUAN JING	81,618	33,582.00
M.V. STAR JENNIFER	82,209	30,033.00
M.V. CRIMSON ARK	81,765	34,019.00
M.V. NORD CORONA	81,651	10,000.00
M.V. JAG ADITI	80,325	33,207.24
M.V. JAG ROHAN	52,450	25,100.40
M.V. ALPHA VISION	81,254	32,770.00
M.V. OLYMPIC GLORY	84,091	34,468.00
M.V. DARYA MOTI	80,502	28,887.00
M.V. VENTURE LUCK	43,413	27,973.72
M.V. OCEAN TIDE	82,012	20,000.00

COKING COAL FY 19-20

NAME OF VESSEL	DWT	Parcel Size in Tonnes
M.V. PEDHOULAS FARMER	81,541	28,270.00
M.V. CAPTAIN ANTONIS	82,177	33,893.00
M.V. VISHVA CHETNA	81,733	29,575.00
M.V. STAR TRADER	82,181	28,422.00
M.V. DORIC ARROW	75,121	29,000.00
M.V. ASIA CONFIDENCE	81,129	31,848.80
M.V. LILY ATLANTIC	82,171	31,900.00
M.V. SDTR DORA	81,780	31,487.00
M.V. STAR MOIRA	82,257	20,000.00
M.V. NEW HONOR	82,061	33,740.00
M.V. MEGA BENEFIT	80,350	30,965.00
M.V. STH KURE	60,309	16,499.00
M.V. KING COAL	76,361	28,542.86
M.V. NIKOLAS D	80,902	31,294.00
M.V. ARCTURUS	76,397	32,152.46
M.V. JAG AJAY	82,094	32,363.00
M.V. OMICRON LIGHT	76,602	28,266.00
M.V. NORDIC BULKER 2 (Coastal)	28,458	20,505.82
M.V. BABITONGA	81,770	20,000.00
M.V. ALPHA CHARM	82,053	30,196.00
M.V. ALAM KUKUH	82,079	30,945.00
M.V. NORD POLLUX	81,839	33,865.00
M.V. ST DIMITRIOS	82,688	33,506.00
M.V. SEA MARATHON	81,945	30,229.00
M.V. CHOLA TREASURE	75,926	30,123.00
M.V. GIACOMETTI	81,714	20,000.00
M.V. KMAX EVDOKIA	78,932	29,970.00
M.V. GOLDEN ARION	82,188	31,529.00
M.V. FLORA	82,177	34,317.00
M.V. KOUROUPI	56,047	20,000.00
M.V. PACIFIC KINDNESS	82,177	31,971.00
M.V. CAPTAIN GEORGE	82,140	31,357.00
M.V. VISHVA VINAY	80,655	29,266.00
M.V. LONDON 2012	82,562	25,000.00
M.V. JUNE LOONG	82,250	33,049.00
M.V. SEA EXPRESS	79,252	28,766.00
M.V. GENEVA STAR	81,846	12,000.00
M.V. MAIA	82,193	32,785.00
M.V. IRIS EXPRESS	58,785	26,000.00
M.V. CORAL OPAL	78,090	28,050.00
M.V. TAHO AUSTRALIA	81,788	30,088.00
M.V. VISHVA VIKAS	57,128	23,591.23
M.V. VISHVA PREETI	80,250	28,623.00
M.V. JAG ROHAN	52,450	23,756.57
M.V. ONE OCEAN	82,654	11,000.00
M.V. LADY I	75,356	23,100.00
M.V. VISHVA ANAND	80,204	28,250.00
M.V. GLORY NAVIGATOR	82,331	29,000.00
M.V. ANTERO	56,892	26,620.00
M.V. SBI ECHO	61,258	30,150.00
M.V. NAVIOS HERAKLES I	82,036	28,905.00
M.V. TAHO AMERICA	81,788	20,905.00
M.V. RESTINGA	79,889	31,090.00
M.V. IONIC KATANA	82,936	31,201.00

COKING COAL FY 19-20

NAME OF VESSEL	DWT	Parcel Size in Tonnes
M.V. GLORIOUS WIND	83,410	27,000.00
M.V. VISHVA JYOTI	81,751	29,348.00
M.V. IONIC KIZUNA	81,868	28,233.00
M.V. DL ACACIA	81,568	27,750.00
M.V. PEDHOULAS ROSE	82,068	24,816.00
M.V. ATHINA	76,635	26,195.00
M.V. TRANSCENDEN BRIGHT	81,574	28,946.00
M.V. GREAT VICTORY	77,853	27,256.00
M.V. CEMTEX SINCERITY	82,200	30,379.00
M.V. VISHVA MALHAR	56,617	22,950.25
M.V. ZHENG HENG	81,949	27,394.00
M.V. IKAN BAWAL	83,339	29,891.00
M.V. VALADON	81,199	26,615.00
M.V. DREAM STAR	81,909	30,508.00
M.V. MITOSE	77,376	28,000.00
M.V. AM UMANG	81,788	28,927.00
M.V. ESTELA CLAIRE	81,886	15,000.00
M.V. SAM HAWK	57,599	24,350.00
M.V. YASA H MEHMET	83,482	29,881.00
M.V. FLAG LAMA	80,891	28,174.00
M.V. MAGNA GRAECIA	82,062	27,597.00
M.V. VISHVA DIKSHA	57,133	22,270.34
M.V. WEI LUN JU LONG	79,421	26,803.00
M.V. GRAECIA AETERNA	81,022	28,511.00
M.V. DORIC ARMOUR	81,800	30,435.00
M.V. JAG AJAY	82,094	29,019.00
M.V. MAJESTIC ISLAND	81,632	28,935.00
M.V. STAR DANAI	82,574	31,385.00
M.V. RB MYA	81,278	31,074.00
M.V. DORIC LIBERTY	82,086	19,650.00
M.V. VISHVA BANDHAN	57,196	21,783.68
M.V. VISHVA UDAY (Non Coking Coal)	81,696	34,158.00
M.V. TR LADY (Non Coking Coal)	82,049	30,420.00

* Highlighted in yellow colour shows full parcel size, out of which only coking coal as appended below;

28,771.07

M.V. VISHVA UDAY (Coking Coal)	9,178.00
M.V. TR LADY (Coking Coal)	1,522.00

Taking all these into considerations, the design vessel size is taken as Panamax bulk carrier of the following dimensions:

DWT 80,000; LOA 240 M; Beam 32 M; Design full Load draft: 14.5 M; Parcel size 35,000 Te for 7.5 M draft (for berth structural design). However, taking into consideration the average parcel sizes over the past couple of years, the capacity of the berth as well as the stockyard will be worked out taking a parcel size of 24,000 tons only.

5.6. Planning Parameters for Mechanization of Berth No 2:

The planning parameters for mechanization of existing berth no 2 with modifications/additions proposed is indicated below.

The berth no 2 has a length of about 337 m across extreme moorings. The loading platform has a length of about 193 M and a width of 15.75 m. The berth can handle panamax vessels with LOA up to 230 m and an average parcel size of 24,000 tonnes.

The berth will be equipped with 2 no rail mounted Mobile Harbaour Crane(MHC) with a minimum capacity of 1000 TPH each. For this purpose the existing berth no 2 structure has to be provided with rails over which the MHCs will travel on the quay. The rail span of the proposed MHCs have to be tailor made to suit its width.

The coal/coking coal unloaded by the two unloaders will discharge into hopper fixed with the MHC and then transferred to a single dock conveyor to be located on the rear side of the main berth structure on the piles and interconnecting beams. This conveyor will be an elevated one with a rated capacity of 2000 TPH commensurate with the capacity of two unloaders.
The coal from the dock conveyor will be conveyed through an elevated conveyor system to cross over the main road behind berth no 2 to the backup area of berth No 2 to the yard conveyor or to a connecting conveyor and then to another yard conveyor for stacking through Stacker cum Reclaimer installed on each yard conveyor.

The coal from the stack yard reclaimed by stacker cum reclaimer (operating in reclaiming mode) will be conveyed to a stationary silo through a Loading conveyor of capacity 2000 TPH.

Two no Stacker cum Reclaimers each having a rate capacity of 2000 TPH for stacking 2000 TPH capacity for reclaiming are planned for stock piling coal into the stack yard and then for evacuation through wagon loading.

The coal from the stationary silo will be loaded into railway wagons through a rapid wagon loading system in which the wagons will be moving.

The system will have a substation for receipt and distribution of HT and LT power for operating the mechanized system consisting of two no Mobile Harbour Crane(MHC), the belt conveyor system, two no stacker cum reclaimers, rapid wagon loading system & silo, supporting utilities etc.,

The estimated power requirement of about 1.8 MVA will be available from the port's main substation where adequate spare capacity is available.

5.7. Stack Yard:

The stack yard for transit storage of coking coal, non-coking coal will be located in the designated stack yard to be situated in the back-up area of berth no 2. This area is same as the area in which the iron ore used to be stacked when berth no 2 was an iron ore loading facility and part of back up area of Berth no-1. The backup area earmarked for berth no 2 is presented in the following figure 5.1.

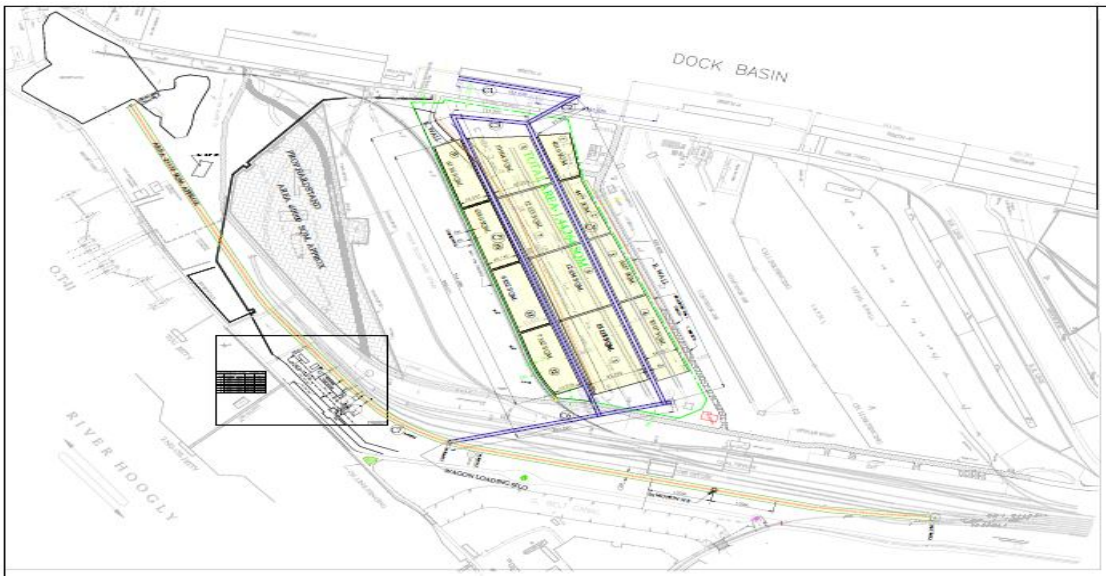


Fig-5.1. Backup area earmarked for berth no 2 (shown in hatching)

The land earmarked for the back up area (yard area) will have an area of about 1,44,264 sq.m.

5.8. Railway Yard

The railway yard for evacuating the material from the transit stack yard will be located in the existing railway yard where an old iron ore tippler was located (now dismantled). The evacuation of coal will be through a rapid in-motion wagon loading system with a silo. The proposed railway yard for berth 2 will have one railway line with a length go about of 1762 m. One line is meant for rapid wagon loading and the line is planned to accommodate two rake lengths. The one lines proposed are planned adjacent to the existing lines in a green field area. A clearly demarcated railway corridor is depicted below.

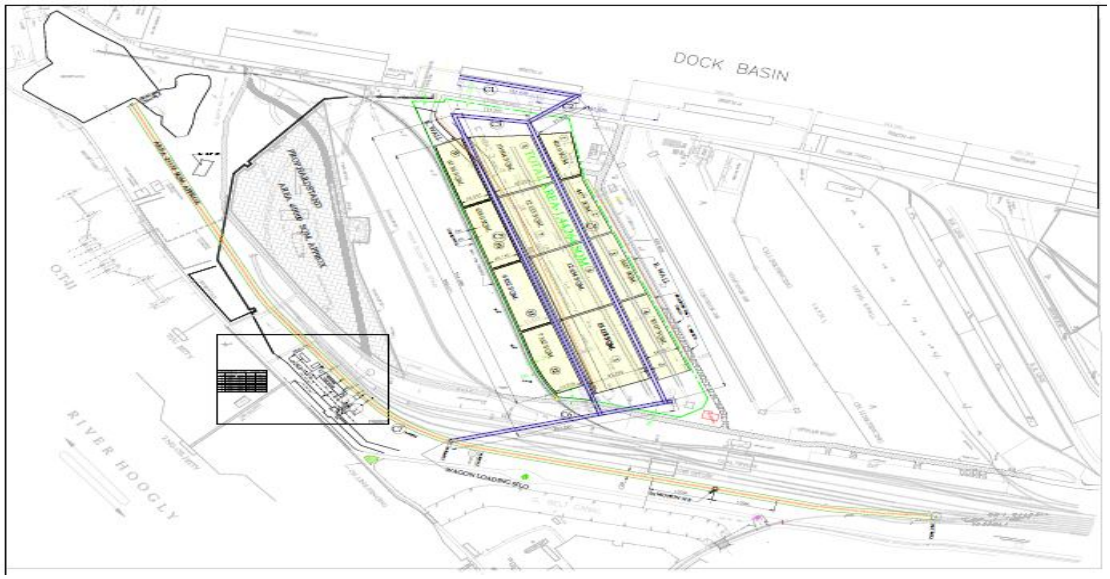


Fig-5.2.Conceptual Layout of the proposed rail lines for Berth 2

Fig-5.4. Layout of Existing Railway yard

5.9. Handling System

The material handling system has been designed as ship-shore transfer through Rail Mounted Mobile Harbour Crane, a conveyor system for transfer from berth to stack yard and handling at yard through two stacker cum reclaimer for stacking and a conveyor to carry the material from the stack yard to rapid loading silo and finally loading of coal from silo into wagons in-motion. The system will incorporate necessary pollution control measures

5.10. Handling Rates

5.10.1 Ship - Shore Transfer

Considering the capital cost, operational flexibility and proven performance, it is with proposed to equip the berths 1000 TPH Rail Mounted Mobile Harbour Crane with rail span of 13.687 M. including Grab and hopper with provision of Shore power.

It is to be noted that due to draft limitations in Haldia vessels come with part load, having discharged the top portion of the hatches at another deep draught port. Hence the quantity of coal available for the cream bite of the grab will be limited. As the hatch gets emptied, the remaining coal is to be heaped at one place by a baby dozer to be lowered into the hatch. The baby dozer moves around shifting the scattered coal into a heap sufficient for the grab to bite into and lift. This process will involve some operational time as the grab content will largely get reduced as compared to a cream bite.

Such a sequence of operations are presented in the following Figures.

Fig-5.4. – BABY DOZER HEAPING THE SCATTERED COAL

Fig-5.5. BABY DOZER FACILITATING GRAB BITE

Fig-5.6. BABY DOZER & GRAB WORKING IN TANDEM

When a fully loaded ship is discharged, the productivity will be higher as the grabs can take bite at the top of hatch with full grab content and less lifting height as compared to part discharged vessel. Thus its average discharge rate will be high. But in a partially loaded ship, the initial lift height itself will be more as the hatch content is already reduced. For clearing the last portion, the lifting height is more and the grab content is also less. All these cumulatively reduce the average productivity.

The average productivity for coking coal and non-coking coal has been 18,084 TPD & 20,834 TPD for 2016-17. For 2015-16 the corresponding figures are 16,981 TPD & 17,116 TPD. The productivity for 2017-18, 2018-19 & 2019-20 are:

Average ship day productivity

Cargo	FY 17-18	FY 18-19	FY 19-20
Coking Coal	17,548	16,907	17,947
Non Coking Coal	18,540	17,927	19,489

As Berth no-2 will be fully Mechanized with automated equipment, hence, taking the aforesaid issues into consideration, it is proposed that an average productivity of 20,000 TPD could be considered.

5.10.2 Berth - Stackyard Transfer

Keeping in mind the level of pollution that could be created due to handling by dumper and payloader system, it is planned to have a conveyor system. The MHCs planned will have integral hoppers, the coal unloaded will be conveyed through hopper and shuttle conveyor to an elevated jetty conveyor located on the rear side of unloaders. The jetty conveyor will transfer the material into another conveyor through which the coal will be transferred to the yard stacking conveyors and finally transferred through stacker cum reclaimers into the stack yard. The conveyor system will have a matching rated capacity of 2000 TPH.

5.10.3. Layout of Stackyard:

The material received through the conveyors and the stacker cum reclaimer into the stack yard will be stacked in a geometric shaped stockpiles. The stack yard is proposed to be equipped with two no stacker cum reclaimers. The conceptual layout of stack yard as proposed in this report will have an optimal capacity of about 5.00 Lakh tons

5.10.4. Evacuation

It is proposed that 80% cargo will be evacuated by rail and 20% road evacuation has been envisaged. Thus about 2 to 3 rakes per day on an average will be required for evacuation of planned annual throughput.

5.10.5. Optimum Capacity of Stockyard (*as per TAMP Guidelines)*

For a coal terminal TAMP guide line stipulates that the optimum yard capacity is 70% of maximum coal that could pass through the yard and is derived from the following formula.

Optimum Yard Capacity = 0.7 X A X Q X T tons

where A = is the stockpile area in sq. m

Q = Quantity that could be stacked per sq. m

T = Turnover ratio of the plot in a year

Total area of stockpiles = 1,00,000 m2 ,

Quantity that could be stacked per m2 = 5.2 Te

Average Dwell time of cargo= 35 days

Turnover ratio = 360/35= 10.285 days

Dwell time = 0.7 x 1,00,000 x 5.2/ 10400 = 35 days

The average Plot turnover ratio in a year would therefore be 360/35 = 10.285

Yard capacity (0.7 x 100000 x 5.2x10.285) = **3.744 MTPA,**

5.10.6. Optimum Capacity of Berth (*as per TAMP Guidelines)*

It has been observed earlier in this section that the average handling rate is 20,000 tonnes per day.

Following TAMP Guidelines, the optimal capacity of the terminal is calculated using the following formula:

Optimal capacity

$$= 0.7 \times \frac{S1}{100} \times P1 + \frac{S2}{100} \times P2 + \frac{S3}{100} \times P3 + \ldots \times 365$$

S1 - Percentage share of capacity of Cargo type 1

P1 - Handling rate of the vessel carrying Cargo type 1

S2 - Percentage share of capacity of Cargo type 2

P2 - Handling rate of the vessel carrying Cargo type 2

S1, P1, S2, P2 and so on depending on the number of different types of Cargo to be handled at the berth of the particular port.

In the present proposal, the share of Panamax vessels and Handymax vessels are considered as 80% and 20% respectively based on the current trend.

According to the formula, the optimum capacity of the new berth (where only coal will be handled), works out to

365 x 0.7 x 20,000 ≈ 5.11 MTPA say 5.00 MTPA

Therefore, the Optimum capacity of the TERMINAL: **3.74 MTPA** (*Lower of the two*)

TECHNOLOGY

6.1 SYSTEM DESCRIPTION

Berth no-2 (erstwhile Berth no.3) at Haldia Dock has a length of 337 m across extreme mooring. The loading platform has a length of 193 m and width of 15.75 m. The berth can handle Panamax vessel up to LOA 230 m and an average parcel size 24000 MT. The existing rail span is 13.687 M and wheel load 32+/-2 MT to be used for designing the rail mounted gantry type grab unloaders.

The coal/coking coal unloaded by the two Mobile harbor Crane(MHC) of capacity 1000 TPH each and will be discharged into a single dock conveyor (C1) of capacity 2000 TPH to be installed on the rear side of the main berth or existing foundation of demolished tripper conveyor. Stability of the existing berth and foundation has been checked by the Haldia Port Authorities through IIT(M).

The coal from the Dock Conveyor will be conveyed through an elevated conveyor (C2) behind berth no-2 and to be fed either to yard conveyors (C4) or to conveyor C3, which in turn will feed to yard conveyor (C5). All the conveyors shall have capacity 2000 TPH. The yard conveyors (C4 & C5) shall have two Stacker cum Reclaimer (SCR) with bypass arrangement having capacity 2000TPH stacking and reclaiming.

The bulk material handling facility at berth no.2 involves unloading from ships via MHC, stacking and reclaiming by stackers and reclaimer and loading into wagons by rapid wagon loading system with SILO including Electrical work. The material is conveyed from berth up to wagon loading system by belt conveyors and via miscellaneous safety, health and environmental accessories etc.

The MHCs will be mounted on the berth-2 for handling bulk cargo mainly coal from ships ranging up to 80,000 DWT.

The grab will pick-up the cargo from the ship's hold and will discharge onto a hopper of the MHC. Material from the hopper will be fed to the on-board cross conveyor discharging to the berth conveyor. Unloader will be provided with features to have effective control of fugitive dust emissions particularly due to sea blowing winds. On board hopper will be covered on the three sides with sheeting and at the grab entry point minimum opening size necessary for grab entry will be provided with air curtains. At belt feeder discharge point enclosure supported on rails for dust, containment will be provided. Material from the elevated berth conveyor will be transported to the plant by a system of belt conveyors.

The receipt of coal to wagon loading system shall be by either of the following paths:

- Coal evacuated by MHCs from ship shall be directly conveyed to storage silo of wagon loading system through series of conveyor bypassing stacking.

- Stacked material at yard shall be reclaimed by reclaimer mounted on C4 conveyor or stacker cum reclaimer machine mounted on C5 conveyor for conveying it to the wagon loading storage silo.

The rapid wagon loading system shall be a computer controlled-automatic and operator attended-semi-automatic, weighing and loading system capable of loading each rake at 2000 TPH. The loading station shall be located over rail track for loading of coal in rakes. System shall consist of a minimum 800 ton capacity SILO. Hydraulic system shall be provided for the operation of loading, discharge gates and telescopic chutes. The entire telescopic chute arrangement shall be made compatible for the handling of rake by Shunting Locomotive. The rapid load out system shall have arrangement such that pre-weighed quantity of coal is discharged into each wagon and the individual weighment is recorded automatically.

The system shall be capable of loading all types of BOB and BOX wagons. Each rake consists of 58-60 wagons each of maximum 71 T capacity including heap(max). The rake shall be hauled by diesel locomotive/ electric locomotive. The vertical and horizontal railway clearances shall be as per the requirement of Indian Railways.

Unidirectional shuttle / belt feeder shall be provided below the pre-weigh hopper for evacuating the residual cargo from silo to ground. Further coal dumped over ground shall be loaded into trucks by pay loaders

Dust extraction system shall be provided for suction of dust at the discharge hood of feeding conveyor and between the pre-weigh hopper and silo to allow displaced air from the weigh bin to be captured and prevent dust escaping from the system.

Air blasters may be provided on the sloping surface of silo for trouble free flow of material from silo.

Adequate no. of heat sensors shall be provided in the silo for detecting any local heating and to give a warning in the loading control room and at the main control room

Minimum clearance of 1000mm shall always be provided from any equipment / structure / pedestal inside the building. The clear distance between the floors shall be provided(bottom of beam) and the headroom shall be suitable for handling / removing the equipment.

Fire detection, alarm and firefighting system, service water, potable water, service air shall be provided by others, however provision shall be made in the rapid wagon loading system(like structural supports, inserts etc.) as per requirement for the same.

The coal from the Stack yard reclaimed by either SCR-1 or SCR-2 (in reclaiming mode) will be conveyed to loading conveyor through the respective yard conveyors. The loading conveyor shall feed to a stationery SILO of minimum 800 MT for subsequent loading in Wagon Pushed by a Locomotive (by others) in Rapid Wagon Loading system.

To meet the safety requirements necessary hydrant type firefighting system for entire battery limit, MVWS in the conveyor galleries, dust suppression system at stock yard and conveyor feed points, ventilation & air-conditioning systems in electrical substation and other buildings, service water & potable water system shall be provided.

The electrical, instrumentation & automation along with the substation for the entire Material Handling System shall be provided to suit the requirement.

Necessary rail line for the rapid loading system shall be provided as per requirement.

6.2 MECHANICAL SUPPLY

6.2.1 Mobile Harbour Crane(MHC)

The Mobile Harbour Crane of suitable capacity will transfer coal / coke from the ship to the material handling on the jetty or wharf.

6.2.1.1 SPECIFIED DESIGN DATA – Mobile Harbour Crane

Sl.No	Description	Technical specification
1	Equipment Quantity	2 No's (suitable to be installed to the rail centre span 13.687m)

2	Cargo / Material handled	Coal (as specified)
3	Rated unloading capacity	1000 TPH [for each M/C]
7	Ship size / Vessel	80,000 DWT / PANAMAX. LOA 230 m and Handymax with average parcel size 24000MT
9	No x Berth Rail size x Rail centers	2 x CR 120 or as suitable and 13.687 m centers span
10	Outreach from center of Jetty side rail	Suitable to handle Panamax Vessel upto 32.3 m beam.
14	Max. Wheel Load	32 +/- 2 Tonnes (operating/storm)
15	Design criteria for wind speed a) Normal unloading operation b) Long travel to storm anchoring c) Rail Clamp in position d) Storm anchoring in position	20 m/s 24 m/s 36 m/s Max 63 m/s
16	Stability Factor (min.)	□ Based on FEM Standard
17	Long travel track gauge	13.687 M
19	Anti-collision switch	To be provided for both machines

6.2.2 BELT CONVEYOR SYSTEM

SL No	ITEM PARTICULARS	Capacity (TPH) (RATED)	Appx. length (horizontal) for each Conv (m)
1	Dock belt Conveyor	2000	194
2	Elevated conveyor	2000	95
2	Ground Level Conveyor	2000	118
3	Yard conveyor	2000	627& 669
4	Conveyor from yard Conveyor to SILO	2000	294

6.2.4 RAPID WAGON LOADING SILO

6.2.4.1 TECHNICAL DATA

Rapid Wagon Loading type of loading system consists of RCC storage silo of minimum 800 MT, a bin below the silo and the loading chute. This silo will be constructed directly over the rail track. The rake will be moving below the loading chute at a constant speed while material will be discharged into the wagons.

SL.NO	DESCRIPTION	UNITS	DATA
A)	**Rapid Wagon Loading System**	Please refer attached scheme.	
1	Wagon loading rate	TPH	2000
2	Upstream conveyor feeding rate	TPH	2000
3	**Silo**		
a	Storage capacity	Ton	Min 800

H)	**DUST SUPPRESSION SYSTEM**		
a.	Type	-	Plain water dust suppression system
b.	Location of spray	-	At discharge of telescopic chute & at discharge of shuttle belt feeder
c.	Nozzle capacity	-	10lpm / nozzle
d.	Pressure at inlet of spray head	-	To be designed by bidder.
e.	Minimum no. of nozzles	-	Minimum 2 no of nozzles for discharge side of conveyor and 4 no of nozzles for receipt side of conveyor shall be provided
I)	**Rail weigh in-motion system**		
a	Weigh sensors	-	Embedded rail mounted strain gauge sensors.
	Design	-	Pitless type
c	Accuracy	-	±0.5% for each wagon and better than ±0.25% for complete rake
d	Weighing speed	-	Upto 15km/hr
e	Wagon ID	-	All types of 2 axle and 4 axle
f	Direction of weighment	-	Bidirectional
g	Track switches	-	Optical proximity
h	Weigh bridge	-	Suitable for CR 80 track guage.
I	Weigh rail with all necessary fixtures	-	To be provided
j	Calibration	-	Digital Auto correction

2.0 CODES AND SPECIFICATIONS

The specific codes / standards followed for the design of the system are as below:

RDSO	Research Designs and Standards Organization, Indian Weights and Measures Department
CEMA	Belt conveyors for bulk materials

IS: 1891 - 1994	Conveyor and Elevator Textile Belting - Specification - Part 1 General Purpose Belting
IS 1891 : Part 5 : 1993	Conveyor and elevator textile belting - Specification: Part 5 Fire resistant belting for surface application
IS:8531-1986	Specification for Pulleys for Belt conveyors
IS:8598 - 1987	Specification for Idlers and idlers set for belt conveyors
IS 9295 - 1983	Steel tubes for Idlers for Belt conveyors
IS 800-2007	Code of construction of structural works.
IS:2062 - 2011	Steel for general structural purposes.
IS:1239 2004 part 1	Spec for mild steel tubes tubular and other wrought steel
IS:3589 : 2001	Steel pipes for water and sewage (168.3 to 2540mm outside diameter)
IS 3832 : 2005	Manual Hoist / Chain Pulley Block
IS 3938 : 1983	Specification for Electric Wire Rope Hoists
IS 4894 : 1987	Specification for centrifugal fan
IS 7155 (part 3): 1990	Code of Recommended Practice for Conveyor Safety
IS: 4682	Code of practice for lining of vessels and equipment chemical processes.
"American Conference of Governmental Industrial Hygienists"(ACGIH)	Calculation of dust extraction capacity
IS 807	Code of practice for design, manufacture, erection and testing (structural portion) of cranes and hoists.
IS 325	Three phase induction motors.
IS 816	Code of practice for use of metal arc welding for general construction in mild steel.
IS 2266	Steel wire ropes for general engineering purposes.
ISO 8573.1	Code for Compressed air quality.
ANSI B31.3	Code for Process piping

BS- 487	Fusion Weld Steel Air Receiver
ANSI -B16.5	Code of Steel Flanges and Pipe fittings
TEMA	Standards of the Tubular Exchanger Manufacturer's Association
ASME sec VIII Div 1 : ASME	Code for Boiler & Pressure Vessel
IS 4029	Guide for testing three phase induction motors
IS 1835	Specification for Round steel wire for ropes
IS 7847	General Characteristic of Lifting hook.
IS 3815	Specification for point hook with shank
IS : 15560-2005	Specification for point Hook with Shank up to 160 tons
IS:655	Specification of metal air duct
IS:4894	Specification of centrifugal fan
IS:1940-1-1986	Mechanical vibration – Balance quality requirements of rigid Rotors-Part-1-Determination of permissible residual unbalance
OSHA	Occupational Safety & Health Administration
ASHRAE: 2007	HVAC applications

Any other Regulation and safety codes related to design, construction & operation of the rapid wagon loading system.

6.2.5 In motion rail weigh bridge

Weigh-in-motion or weighing-in-motion (WIM) bridge is designed to capture and record the gross vehicle weights as wagons drive over a measurement site. Unlike static scales, WIM systems are capable of measuring vehicles traveling at a reduced or normal traffic speed and do not require the rake to come to a stop.

Two numbers rail weigh bridge have been considered; one at the in-haul side to measure the tare weight and another at the out-haul side to measure the gross weight.

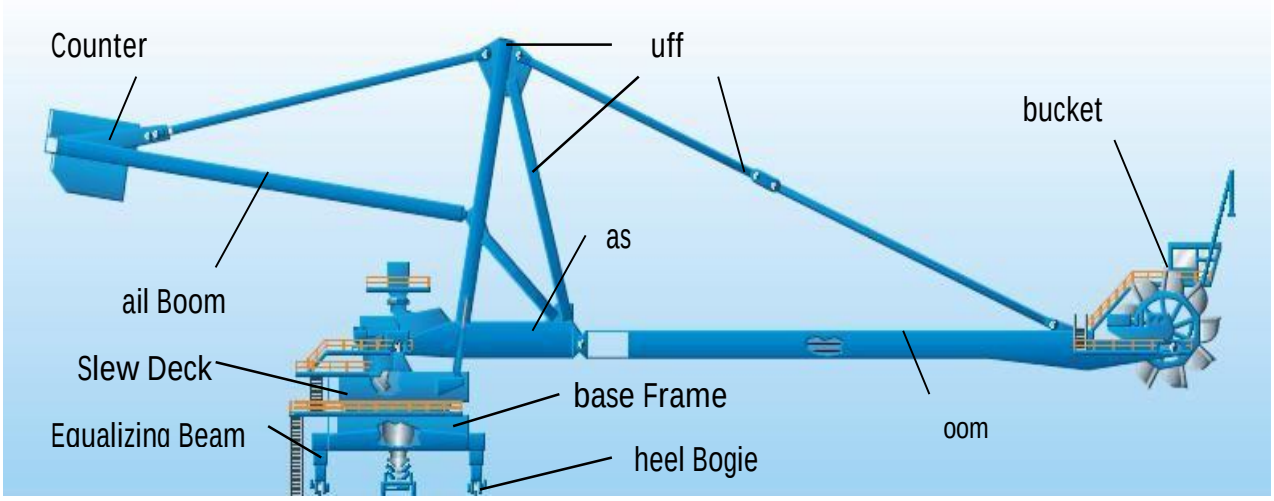
6.2.6 STACKER RECLAIMER

In Bulk Material Handling industry equipment such as Stacker, Reclaimer, Stacker cum Reclaimer etc. are essential for efficient stockpile management.

MACHINE DESCRIPTION

Stacker Reclaimer is a machine that stakes or stores materials in the stockyard and reclaim the same as and when required by means of a Bucket Wheel. The machine comprises of the following major components: Wheel Bogie system, Compensating Beam, Base Frame, Slew Deck, Mast, Boom, Bucket Wheel, Tail Boom & Tripper Structure. The total weight of the machine varies from 400 to 1000 MT depending on size & capacity.

SCHEMATIC ARRANGEMENT OF STACKER RECLAIMER



'**Technical Specification**'

1. **Technical parameters of Stacker-cum-reclaimer**:

Rail-mounted, self-propelled, luffable, slewable, Boom-type Stacker-cum-Bucket Wheel Reclaimer, complete with Electrical, etc., for operating with a unidirectional Yard Conveyor, with provision for by-pass feeding, shall be supplied as per the given specification. The main characteristics of the machine shall be as follows:

1	Type	:	Rail-mounted, self-propelled, luffable, slewable, Boom-type Stacker-cum-Bucket Wheel Reclaimer, complete with Electrical, etc., for operating with a unidirectional Yard Conveyor, with provision for by-pass feeding.
2	Quantity	:	2 (one) no.
3	Material to be handled	:	Coal Lump size: (-) 300 mm Bulk Density: 800 kg/m^3 Angle of Repose: 37°
4	Capacity (MTPH)	:	Stacking – Rated: 2000 MTPH Reclaiming – Rated: 2000 MTPH
5	Boom length (m)	:	45 m [Slew Centre to Axis of Rotation of Bucket Wheel]
6	Track Rail type & size	:	CR 80
7	Duty	:	Continuous, 20 hours a day, 350 days a year. For design criteria, please refer table below.
8	Power Supply	:	3.3 kV, 3 Phase, 50 Hz, through Flexible Cables and Cable Reeling Drums.
9	Power Cable Reeling Drum (PCRD)	:	Motor-operated, Barrel type.
10	Luffing mechanism	:	
11	Bucket Wheel	:	
	1. Type	:	Cell less
	2. Diameter	:	To suit height of the stockpile, capacity of the machine, luffing range and all other relevant parameters.

3. The speed range of the Bucket Wheel should be selected such that the reclaimed material is discharged onto the slope chute efficiently, at all speeds of the selected speed range.
4. The Cutting Edge/Lip shall be made of highly wear resistant Steel having hard faced surface. The minimum hardness of replaceable Liner shall be 350 BHN.

12	Travel mechanism	:	
	a) Type of support	:	3 (Three) Point, 4 (Four) Corner
	b) Rail Clamp	:	2 (two) nos. Electrical + 2 (two) nos. Mechanical Hydraulic release type.
	c) Buffer type	:	Spring-operated.
	d) Wind load	:	Wind pressure and loads to be calculated using the following values: a) Wind speed at **normal operating condition** – **20 m/sec**. b) Wind speed at **non-operating condition** – **56 m/sec**.

e) Jacking point shall be provided at suitable point for replacement of long travel wheel of Stacker-cum-reclaimer.

2. **Design Criteria**:

Stacker cum Reclaimer **Table No. A**

The various machineries, structures, etc. shall be designed as per FEM.1.001 – 3rd edition as detailed below:

Sl. No.	Nature of work	Class of Utilisation	Load Spectrum	Appliance/ Mechanism Class
1.	Steel structures	U8	Q4	A8
2.	Boom Conveyor drive mechanism	T9	L4	M8
3.	Bucket Wheel drive mechanism	T9	L4	M8
4.	Slew mechanism	T8	L4	M8
5.	Long travel mechanism	T7	L4	M8
6.	Luffing mechanism	T7	L4	M8

6.2.7 UTILITY SCOPE

The scope of work of utilities generally comprising of dust suppression system, ventilation system, firefighting protection, air conditioning system and the like are proposed. The types of utilities system considered are as follows:

Sl. No	Type of System	System	Description
1	Stockpile Dust Suppression	DS	Sprinkler type dust suppression system for coal/coke stockpile to arrest the airborne particles
2	Plain Water Dust Suppression System	PWDS	Dust suppression at conveyor feed and discharge points.
3	Ventilation System	VS	Dry type Pressurized Ventilation System at Electrical substation buildings for the MCC and cable vault area. Only wall mounted exhaust fan ventilation for staff rest rooms, canteens, admin building.
4	Air Conditioning System	AC	Air cooled package AC at the control room of Electrical substation building.
5	Fire FightingSystem	FFP	Hydrant type firefighting system shall be provided across the battery limit of the plant and in the buildings and transfer points under scope. Medium velocity water system (MVWS) at conveyor galleries Extinguisher at the buildings only.
6	Fire ProtectionSystem	FPS	FPS shall be provided only at the substation building along with dry type portable extinguisher.
7	Potable Water	PW	PW to be provided at specified points in the admin & canteen buildings.
8	Service Water	SW	SW to be provided at strategic location to suit the requirement.

Mechanical Engineering Codes

Sr. No.	Codes	Descriptions
1	Federation Europeenne de la Manutention (FEM)	Rules for the design of Hoisting Appliances
2	BS-2573	Specifications for Permissible Stresses in Cranes and Design Rules
3	Conveyor Equipment Manufacturer Association	Belt Conveyors for Bulk Materials
4	(CEMA) IS 11592	Selection & Design of Belt Conveyors
5	ASTM-D-2234 & ASTM-D-	Sampling
6	2013 and ISO & JIS Fire Protection Manual	Fire Fighting system
7	(Tariff Advisory Committee) IS 8598	Specifications for Idlers & Idler Sets for Belt Conveyors
8	IS 9295	Steel Tubes for Idlers
9	IS 2266	Steel Wire Ropes for General Engineering Purposes Specifications.
10	IS 3177	Code of Practice for Electric Overhead Traveling Cranes and Gantry Cranes other than Steel Work Cranes.
11	IS 1136	Preferred Sizes for Wrought Metal Products
12	IS 3443	Crane Rail Sections
13	IS 9295	Steel Tubes for Idlers for Belt Conveyors
14	IS 8598	Specification for Idlers and Idler Sets for Belt Conveyors.
15	IS 1891	Conveyor and Elevator Textile Belting
16	ISO / Metric	Screw Threads & Gearing Profiles
17	IS 210 Grade 20 excepting counter weights	Grey Iron Castings – Specification

18	IS 2644 Grade 1	High Tensile Steel Castings
19	IS 2664 Grade 4	Specification for Quenching Oil
20	IS 1030	Carbon Steel Castings for General Engineering Purpose
21	IS 2707 Grade 23-45	Carbon Steel Castings for Surface Hardening
22	IS 1570, C40, Cold Drawn Specified	Schedules for Wrought Steel
23	IS 1875	Carbon Steel Billets, Blooms, Slabs and Bars for Forgings
24	IS 276	Austenitic – Manganese Steel Castings
25	IS 2062 (Fusion Welding Quality)	Hot rolled Low, Medium and High Tensile Structural Steel
26	IS 961 (Fusion Welding Quality)	Structural Steel (High Tensile)
27	IS 1570, C14	Schedules for Wrought Steels
28	IS 1895 Grade 1	Specification for Cotton New AR
29	IS 1239	Steel Tubes, Tubulars and Other Wrought Steel Fittings
30	IS 1161	Steel Tubes for Structural Purposes
31	IS 306 Grade 2	Tin Bronze Ingots and Castings
32	IS 28	Phosphor Bronze Ingots and Castings
33	IS 305 Grade 2	Specification for Aluminum Bronze Ingots and Castings
34	IS 6911	Stainless Steel Plate, Sheet and Strip
35	IS 807	Design, Erection and Testing (Structural Portion) of Cranes & Hoists.
36	IS 875	Code of Practice for Design Loads for Buildings and Structures.

Civil Codes

Sr. No	Codes	Descriptions " Code of Practice"
1.	IS:456	for plain and reinforced concrete
2.	IS:875	of practice for design load (Part 1 to Part 5)
3.	IS:1893	criteria for earthquake resistant design of structures (Part 1 to 3)
4.	IS:4651	for planning & design of ports & harbours (Part 1 to 5)
5.	IS:1343	for pre stressed concrete
6.	IS:800-1984	for general construction in steel
7.	IS:806-1968	for use of steel tubes in general building construction
8.	IS:2911	for design & construction of pile foundation
9.	IS:2974	for design & construction of machine fdn.
10.	IS:4000-1967	for assembly of structural joints using high tensile friction grip fasteners
11.	IS:7205-1974	Safety code for erection of structural steel works
12.	IS:7215-1974	Tolerance for fabrication of steel structures

Geotechnical Codes

Sr. NO	Codes	Descriptions " Code of Practice"
1	IS:1080	For design and construction of shallow foundations in soils (other than raft, ring and shell).
2	IS:1498	Classification and identification of soils for general engineering purposes.
3	IS:1888	Method of load test on soils
4	IS:1892	for sub-surface investigation for foundation
5	IS:1904	for design and construction of foundations in soils: General Requirements
6	IS:2720	Method of test of soils
7	IS:2911	for design and construction of pile foundation
8	IS:2950	for design and construction of raft foundation
9	IS:2974	for design and construction of machine foundation
10	IS:5121	Safety code of piling and other deep foundation
11	IS:6403	for determination of breaking capacity of shallow foundation
12	IS:8009	for calculation of settlements of foundations
13	--	Guidelines on soft soils stage construction method – RDSO (Ministry of Railways).

SECTION 7

STOCK YARD, STACKING & EVACUATION

7.1 General:

The stockyard in a bulk unloading port is required for transit storage of bulk materials before evacuation for end user. The proposed mechanization of Berth No2 is planned for importing, transit storage and evacuation of coal. The volume and the number of stock piles should be commensurate with the grades of these materials handled, the throughput requirements for each grade and type of material, the rate of stacking, the rate of evacuation, vessel parcel size etc.

The required volumetric capacity of stack yard will depend on the bulk density and the angle of repose, the length, width and height of stock pile. If the height and width of stock pile are restricted, then the length has to be increased to maintain the same capacity. However, it is not always prudent to have a lengthy stack yard as that will entail too frequent travel over long distances for the yard machines. The width of stockyard has to be limited as too wide a stack will demand a long boom length for the yard machines which will increase their size and hence the cost much more than such arithmetic increase. The best way to optimise the capacity of a stack yard, therefore, is to optimise the height and width. The three aspects that impose limitation in stack height are:

1. **Load bearing capacity of the soil**: The proposed stack yard had been used for iron ore whose density is significantly more than coal for a number of years. As such no major soil improvement wok is required except dozing to make level ground. However, laterite bouldering has been considered for development of the yard.
2. **Limitation due to angle of Surcharge:** With increase in height of stockpile, the surcharge angle will increase and if increased beyond specified angle, it will cause sliding of material while negotiating an incline such as the boom conveyor of stacker/reclaimer, inclined conveyor etc., thus making it technically not feasible. Further due to the limitation imposed by the angle of repose, the capacity increase of a stockpile will not be directly proportional to increase in height. To prevent spillage of coal on to the stacker/re-claimer track, 1.25m high RCC retaining wall is proposed along both sides of each track.
3. **Pollution and Combustion due to Auto ignition:** The coal has the property of combustion due to auto ignition on account of burden of coal in high stock piles. This is more pronounced if the coal stays in the stockyard for too long. Also too much increase in stock pile height in an open stack yard may cause pollution due to windage.

The problems on account of points 2 and 3 above can be pronounced during hot and dry summer months. To limit the problem of auto ignition in case of coal and to contain pollution due to windage and optimise on the cost of improving soil for increasing the load bearing capacity of stockyard area, it is proposed to limit the height of coal stack yard to an optimal height of 10 meters. On a similar analysis the width of stock pile is planned is optimised to be 27 m, 40 m & 44 m.

It is proposed to plan for layout of stockyard with three parallel rows of stacks with a stacking capacity of 2.00 Lakh tonnes.

7.2 Stockyard Capacity Assessment

The capacity of stack yard planned depends on the annual throughput requirements, number of grades of materials, number of users, maximum vessel parcel size and rate of evacuation. In the section on Planning Parameters, the turnover ratio of stack yard per annum is taken as 10.285 days, with an average dwell time of about 35 days.

7.3 Stackyard planning:

Based on the capacity considerations as detailed above, the planning of stockyard is tabulated as below in Table 7.1

Table 7.1 - Stackyard Planning

Sl No	Description	
1	Annual Traffic	3.744 million tonnes
2	Norm for storage proposed as a Percentage of Annual Throughput	9.7 %
3	Capacity of stock pile required as per norm	364000 Te
4	Density of coal	0.8
5	Angle of Repose	37^{o}
6	Height of stock pile	10 m for coal

No	Description	
7	Width of stock pile at the bottom	42M,86M,50M m in three plots 552m in four plots
8	Length of stack proposed	
9	Quantity stacked per pile	27680 Te
10	Number of piles proposed	12 nos
11	Total Length of stock pile proposed	666 m and 626m
12	No of Rows of stock piles proposed	3
13	No of stock piles proposed in each row	4 nos
14	Total No of stock piles proposed (as shown in the drawing)	12

7.4 Locating the Stockyard

It has been proposed to locate the stockyard in the back up area of Berth no-2 which is earmarked for the purpose and as per conceptual drawing enclosed.

7.5 Stack Yard Layout

The stockyard area will be rectangular with 3 rows of stockpiles. There will be two separate tracks for the two Stacker cum reclaimers on two yard conveyor to operating independently. During ship unloading one Stacker cum Reclaimer will be deployed for stacking and the second one will be available for wagon SILO loading. Whenever there is no vessel both the stacker cum reclaimers will be available for reclaiming and depending upon operational exigencies any one of the two units can be used for reclaiming or both the reclaimer can be used for reclaiming the coal from the stack yard for wagon loading. Both the Stacker cum reclaimers will run in between the three rows of stock piles parallel to each other independently, side by side and two stock piles on either side of conveyor can be accessed by either of the stacker cum reclaimers.

7.6 Total Area of Stack yard vis a vis Area used for actual stacking:

The layout of stack yard planned is depicted in the drawing enclosed. The stock piles are laid out in three rows with two stacker cum reclaimer with two dedicated yard conveyor. Plot no-I consists of 6 stock piles and Plot- no-II & III have 5 stock piles. Each stock pile is separated from next by a gap of 10 m to avoid admixture. Thus after accounting for 525 m of length for actual stacking the remaining will be used for installing yard conveyors, two stacker cum reclaimers, for the purpose of accommodating the sloping conveyors, installing supporting facilities like dust suppression system, fire fighting system, service road, workshop facilities, admin building, workers amenities building, substation etc. In view of these operational requirements the area that can be used for actual stacking will be about 54,000 sq.m (as per concept plan in this report). The existing RCC bunkers

which are defunct need may dismantle and the area thus created may be used for locating additional stock pile and other operational requirements.

7.7 Evacuation:

The coal from stockyard will be evacuated through rail. The mechanized evacuation facilities will be in the form of a rapid in-motion wagon loading system. As the throughput the requirement is only 3.744 MTPA the rapid in-motion wagon loading system will have to cater to about three rakes per day at the most for the given throughput.

7.8 Railway Yard:

For evacuating the planned annual throughput of maximum 3.744 MTPA through in-motion wagon loading system, the existing railway yard located abutting the stack yard is proposed to be used. A rapid wagon loading silo of minimum 800 tons capacity is proposed to be installed and the railway lines proposed for the exclusive purpose of berth 3 mechanization have been conceptualised as per the drawing enclosed.

9.8.1 Railway operations

The empty rake received in the port's railway yard and earmarked for loading through the rapid wagon loading system Berth no-2 will be hauled by port railways and handed over to the berth operator in the Operator's yard. The empty wagon rake will be then moved at controlled speed to pass in the loading line under the silo. The loading will take place under controlled and specified speed to enable loading the full rake in about 2.85 hour .. Thereafter the loaded rake will be kept ready for hauling by port's loco back into the port's railway yard for eventual handing over of loaded rake to the Indian railways.

The purpose of port handing over the empty rake to the operator in his yard and then taking over loaded rake from the same private operators yard is to ensure that the BOT operator's LOCO will not have to transgress into the port railway yard unnecessarily where a number of other movements will be taking place as per port operational planning and to avoid conflict or safety issues

8.1 Capital Cost

The total capital cost of the project is estimated at Rs. 298.26 Crores. The summary break-up of the estimate is given as under:

BLOCK COST ESTIMATE

II	**Capital Cost**		[Rs in Crore]
A.			
	(i). Civil Cost		
	Revamping of the Existing Berth to accommodate the Loaders and other Machineries		2.79
	Civil Foundation for Conveyer Structure		5.00
	Civil Works for Silo System		5.00
	Long travel CR 120 RAIL 360 MTR		1.00
	Construction of New Railway Lines for Rapid Wagon Loading System		11.00
	Track Line of Stacker cum Reclaimer		20.32
	RCC Drain		2.00
	Compund Wall		1.50
	Land filling and compaction		0.50
	Office building		0.60
	Substation building		2.69
	Sub Total:		60.50
	Detailed Designs & Project Supervision costs @ 2%		1.21
	Contingencies @ 3%		1.82
	GST on Civil works @ 18%		11.44
	Civil Cost including GST		**74.96**
	(ii). Mechanical Equipment Cost		
	1000 TPH Rail Mounted Mobile Harbour Crane with rail span of 13.687 M. including Grab and hopper with provision of Shore power		79.16
	Conveyor 2000 TPH capacity (Approx 2000 m) including transfer points		21.19
	Stacker cum Reclaimer– Stacking-2000 TPH, Reclaiming - 2000 TPH, with Boom Length-45 m		50.00
	SILO and rapid Wagon Loading system with storage capacity of minimum 800 MT and discharge rate of 2000 TPH		14.25
	Dust suppression system and Fire Fighting facilities including water supply and distribution.		7.59
	In motion Weigh Bridge		0.95
	Detailed Designs & Project Supervision costs @ 2%		3.46
	Contingencies @ 3%		5.19

	GST on Mechanical Works @ 18% [Assumed Full ITC]		-
	Mechanical Cost		**181.80**
	(iii) Electrical Works		
	Electrical Power Supply and Distribution System including Substation		25.00
	Illumination with High Mast Lighting System		1.00
	Detailed Designs & Project Supervision costs @ 2%		0.52
	Contingencies @ 3%		0.78
	GST on Mechanical Works @ 18% [Assumed Full ITC]		0.00
	Electrical Cost		**27.30**
	Total		**284.06**
	(iv). Miscellaneous		
	5% on Civil Cost and Equipment Cost		**14.20**
	Total Capital Cost for Handling Activity (i + ii + iii+iv)		**298.26**
B.	**Berth Hire Activity**		**0.00**
	Total Capital Cost (A + B)		**298.26**

Note: Input Tax Credit can be availed on GST paid on Mechanical / Electrical costs. Hence not considered as Cap-ex and consequent Fixed assets

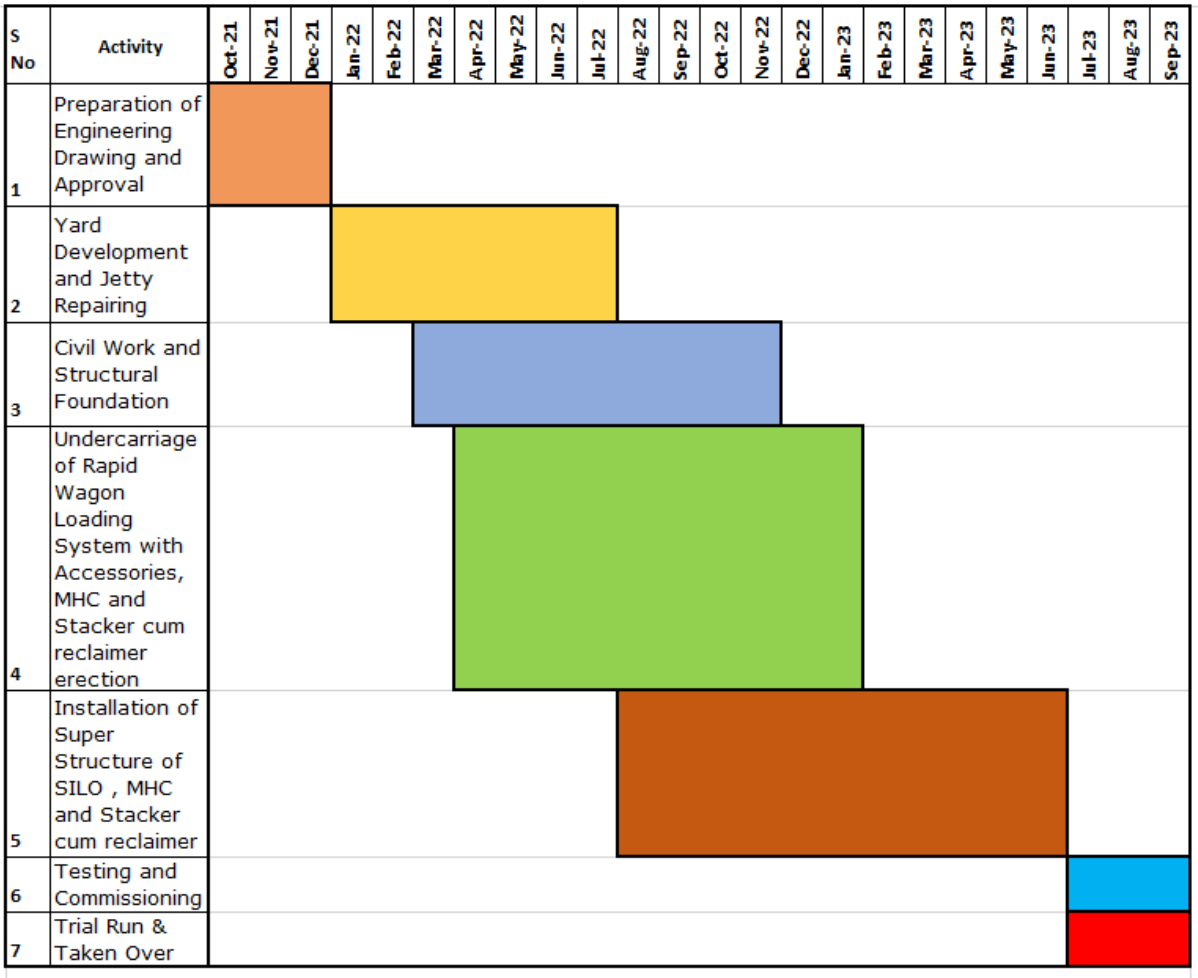
8.2 Implementation Schedule:

The project implementation period including detailed engineering for the above from the date of grant of concession is estimated at 18months. The phasing of expenditure is given as under:

(Rs. In Crores)

Year	Percent of Expenditure	Amount
2021-22	**25 %**	**74.565**
2022-23	**50 %**	**149.13**
2023-24	**25%**	**74.565**
TOTAL	**100 %**	**298.26**

8.3 Grant Chart (Tentative)



SECTION 9

OPERATION AND MAINTENANCE COST

9.1 Capital Cost Estimate of the Project given in Section-8 (without GST on Mechanical and Electrical portion in view of Input Tax Credit available to the operator) is considered as the basis for calculating the annual operation and maintenance cost.

9.2 The annual operation and maintenance cost of the proposal is estimated at Rs. 75.47 Crores as per TAMP guidelines for fixation of up-front tariff. The O&M cost as per TAMP Guidelines for fixation tariff estimated is given in the table below.

	Operating Cost for Cargo Handling Activity	In Rs. Crores
	(a) Hire Charge	
	i) One High Power Locomotive (without Fuel)	2.72
	ii) Four Baby Dozers (All inclusive rate)	2.315
	iii) One Excavator (All Inclusive Rate)	0.49
	iv) One Hydra (All inclusive rate)	0.22
	v) Two 10 MT Pay Loaders for road evacuation (All inclusive)	2.96
	(b). Power Cost	6.24
	1.4 units/ tonne, Effective Levy-Rs 11.91 per KWH (Energy Charge- Rs 7.15 per KWH, Demand Charge-Rs 384.00 per KVA for 1600 KVA, Govt Duty- 17.5%, Line Loss-2.6% , KOPT's Overhead Charge-19.25%]	
	(c). Fuel Cost	
	Locomotive (30 ltrs per hour * Rs.75.03 per litre *2508.48 hours p. a	0.56
	(d). Repair & Maintenance	
	- Civil Assets (1% on civil work)	0.79
	- Mechanical & Electrical Equipment including spares (7% on equipment cost)	15.37
	(e). Insurance (1% on Gross fixed assets)	2.98
	(f). Depreciation	
	- Civil Work @ 3.17%	2.50

	- Mechanical Work @ 6.33%	12.08
	- Electrical Assets @ 9.5%	2.72
	(g). License [168888 sqm bare land @ 28.4463 per sqm per month + 42752 sq.m hard stand & Jetty area @ Rs 44.2281 per sqm per month]	8.03
	(h). Other Expenses towards salaries and overheads (5% on gross value of assets)	14.91
	Total Operating Cost	**75.47**

9.3 The key assumptions for estimation of annual Operation and Maintenance expenditure are as follows.

9.3.1 Optimal Capacity Terminal:

The Optimal Capacity of the proposed Mechanised berth -3 is determined at 3.74 MTPA based on the norms prescribed in Upfront Tariff Guidelines 2008 / Tariff Orders considering the circumstances at Haldia Dock complex and the Lock gate constraints. The optimal quay capacity is working out to 5.11 MTPA at ship day output of 20000 tons for Panamax and Handymax vessels respectively considering 80% and 20% share. The Optimal Yard capacity is considered at 3.74 MTPA. Hence the least of the two i.e. 3.74 MTPA is considered to be the optimal capacity of the terminal.

9.3.2 Repairs & Maintenance Cost:

As per norms specified in Upfront Tariff guidelines 2008, the Repairs & Maintenance cost is estimated at 1% of Civil assets and 7% of all Mechanical and Electrical equipment.

9.3.3 Power cost for Operation and Illumination:

a) Power Cost:

As per norms specified in Upfront Tariff guidelines, the power consumption for operation and illumination is taken at 1.4 units per tonne of cargo handled for the optimal capacity of 3.74 MTPA. The unit rate of power is considered at 1.4 units/ tonne, Effective Levy-Rs 11.91 per KWH (Energy Charge- Rs 7.15 per KWH, Demand Charge-Rs 384.00 per KVA for 1600 KVA, Govt Duty- 17.5%, Line Loss-2.6% , KOPT's Overhead Charge-19.25%].

b) Fuel Cost:

1) Loco:

The fuel cost for Loco is calculated at 30 litres per hour (Rate established at Haldia Dock Complex Rs 75509.00 per day as per HDC's current work oder dtd 12.03.2020) with the prevailing cost per litre of Rs. 75.03 at Haldia as on 25th September,2020. For handling 80% of 3.744 MTPA by rail, at the rake capacity of 4000 tons with the time of 2.85 hrs taken for handling each rake and adding 0.5 hrs for placement , the number of hours required for loco to be used works out to 2508 hours per annum which has been considered for calculating fuel consumption of Loco.

d) Loading of cargo for road evacuation:

It has been considered that 20% cargo will be evacuated through road. The cost of road evacuation as per two high capacity front end loader@ Rs 24696 per shift per Loader has been considered as per the ongoing TAMP approved rate for stevedoring and Shore Handling **.**

e) Hiring of Equipments:

Baby Dozer, Bull Dozer, Excavator , Locomotive, Payloader and Hydra have been considered as taking on hiring basis as mentioned below:

i) **Locomotive:** Hiring of Locomotive of High Power Locomotive for hauling of 5500 MT @ Rs 75,509 per month has been considered and the hiring rate of HDC order dated -- 12.03.2020 has been considered.

ii) **Baby Dozer**: Hiring of four nos baby dozer has been considered as per the rate of Rs 13,230./- per hour as per existing TAMP order of stevedoring and Shore handling at HDC has been considered.

iii) **Excavator:** Hiring of excavator has been considered as per the rate of Rs 1,690/- per hour for 360 days per year operation as per existing order of HDC dated 19.06.2020.

iv) **Hydra:** Hiring of Hydra of 15 MT capacity has been considered and the hiring rate of HDC's existing order rate of Rs 760 per hour has been considered for 360 days.

v) **Bull Dozer :** Hiring of Bull Dozer has been considered as per the rate of Rs 2,050/- per hour for 350 days in a year as per existing order of HDC.

vi) **Pay Loader :** Hiring of Pay Loader for road evacuation has been considered as per the rate of Rs 24969/- per shift - as per existing TAMP approval for shore handling of HDC for a period of 300 days per year.

e) Other expenses:

As per norms specified in Upfront Tariff guidelines, other expenses are estimated at the rate of 5% of original capital cost of assets of Cargo Handling activity which include the following:

(i) Salaries and wages of operating and maintenance staff including welfare and other expenses towards them.

(ii) Management and general overheads and other miscellaneous cost.

f) Insurance:

As per Upfront Tariff guidelines, Insurance cost is estimated @ 1% of the total gross capital cost.

g) License Fee:

License Fee payable for the land area of the project is estimated as per applicable lease rental rates of HDC @ Rs.28.44 per sqm per month as on September 2020. The area of land is taken from the technical sections of the Feasibility report of IPA for the Stock yard, Railway yard and the area required for the conveyor trestle, service roads, truck loading area etc.

h) Depreciation:

As per Upfront Tariff guidelines, Depreciation is estimated at 3.17% on Civil Assets, 6.33% of the capital cost of the Mechanical equipment and at 9.50% of Electrical and Communication systems on Straight line method as per the Companies Act 2013.

9.3.6 Depreciation

As per Upfront Tariff guidelines, Depreciation is estimated at 3.17% on Civil Assets, 6.33% of the capital cost of the Mechanical equipment and at 9.50% of Electrical and Communication systems on Straight line method as per the Companies Act 2013. However, the same is not considered in the cash flows being non cash expenditure for calculating IRR.

SECTION 10

ANNUAL REVENUE ESTIMATES

10.1. The Project is planned to be taken up through PPP Basis. Since the Project is going to be constructed & operated by the PPP operator for a period of 30 years, the Berth hire also accrues to the port besides the other Marine & Railway related charges. The tariff shall be determined under Revised Reference Tariff guidelines 2013 or under Upfront Tariff guidelines 2008 in case no reference tariff is available for the given cargo profile in the port concerned or in any other Major Port. As such, the financial analysis has been carried out considering the entire project is taken up through PPP.

10.2 The estimated annual revenue based on Preliminary tariff assessed as per the upfront tariff guidelines 2008 / Tariff orders is given below:

Activity		**Amount**
a) Cargo Handling Charges	98%	120.73
b) Storage Charges	1%	1.23
c) Miscellaneous Charges	1%	1.23
d) Total Revenue Requirement	**100%**	**123.19**

10.3 The broad assumptions for the estimating the revenue are as follows.

10.3.1. The anticipated Handling charges are worked out based on the preliminary calculations of annual revenue requirement and capacity as per the TAMP Guidelines for determination of upfront tariff (2008.) / Tariff orders.

10.3.2 : The cargo handling charges are proposed to be as under:

S. No.	Commodity	Unit Rate in Rs. per Metric Tonne	
		Foreign	Coastal
1.	All Types of Coal & Coke, Limestone and other Dry Bulk Cargoes (Other than Thermal Coal, Iron Ore & Iron Ore Pellets)	335.90	201.54
2.	Thermal Coal, Iron Ore & Iron Ore Pellets	335.90	335.90

10.3.3 Miscellaneous charges

All cargo Rs 3.29/MT.

10.3.4 Storage charges

	Description	Rate in Rs. per MT per day or part thereof
1	Free Period	25 days
2	First Five days after expiry of Free period	1.39
3	6th day to 10th day after expiry of Free period	2.08
4	From 11th day onwards	2.77

SECTION 11

FINANCIAL VIABILITY AND SENSITIVITY ANALYSIS

11.1 The Financial viability of the project, considering the 20 years' life period from the date of award of the construction of the project and considering the Tariff worked out in accordance with TAMP guidelines, works out to 17.48%. For arriving at FIRR, the Tariff is kept fixed and all the O&M expenses are also escalated at 3%. The Operating income and the variable O&M expenditure are calculated based on the Cargo handled in the respective years ranging from 1.5 MTPA during the first year of operation i.e 2023-24. Overhauling of major portion of Mechanical & Electrical assets is considered at the end of every 10 years and then of at the end of 15 years.

11.2 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 analysis are presented below. The detailed Cash flow statement is given below:

Table 11.1 (Not considering IDC)

S.No	Project IRR	IRR	NPV@12% (in Cr.)
1.	Base Case	17.48%	103.42
2.	Revenue decreased by 10%	13.52	27.20
3.	Cost increased by 10%	15.87%	79.01
4.	Both cargo decrease & cost increase by 10%	12.14%	2.79

From the above, it is evident that the FIRR of the Project at base case is 17.48% and in the least case of sensitivity gives 12.14% and hence the project is financially viable.

CALCULATION OF PROJECT IRR OF THE PROJECT UNDER PPP MODE

CALCULATION OF PROJECT IRR OF THE PROJECT UNDER PPP MODE

[WITHOUT CONSIDERING INTEREST LEVERAGE] **[Rs in Crore]**

	Cash Outflow [Without considering Revenue Sharing]							Net Cash Flow		
Period	**Capital Cost of the Project**	**O&M [Without Depreciation and License Fee]**	**License Fee**	**Replacement Cost of Mechanical & Electrical Equipment**	**Total Cash Outflow**	**Income from the Project**	**Net Cash Inflow [Before Tax]**	**If Capital Cost increases by 10%**	**If Income decreases by 10%**	**If Capital cost increases by 10% as well as Income decreases by 10%**
Year 1	**119.31**		8.03412		127.34	0	-127.34	-139.27	-127.34	-139.27
Year 2	**119.31**		8.19480309		127.50	0	-127.50	-139.43	-127.50	-139.43
Year 3	**59.65**	35.59	8.35869915		103.60	92.40	-11.21	-17.17	-20.45	-26.41
Year 4		50.14	8.52587313		58.66	123.19	64.53	64.53	52.21	52.21
Year 5		50.14	8.69639059		58.83	123.19	64.36	64.36	52.04	52.04
Year 6		50.14	8.8703184		59.01	123.19	64.19	64.19	51.87	51.87
Year 7		50.14	9.04772477		59.18	123.19	64.01	64.01	51.69	51.69
Year 8		50.14	9.22867927		59.36	123.19	63.83	63.83	51.51	51.51
Year 9		50.14	9.41325285		59.55	123.19	63.64	63.64	51.33	51.33
Year 10		50.14	9.60151791		59.74	123.19	63.46	63.46	51.14	51.14
Year 11		50.14	9.79354827		59.93	123.19	63.26	63.26	50.94	50.94
Year 12		50.14	9.98941923		60.13	123.19	63.07	63.07	50.75	50.75
Year 13		50.14	10.1892076		60.32	123.19	62.87	62.87	50.55	50.55
Year 14		50.14	10.3929918		60.53	123.19	62.66	62.66	50.35	50.35
Year 15		50.14	10.6008516		60.74	123.19	62.46	62.46	50.14	50.14
Year 16		50.14	10.8128686		60.95	123.19	62.24	62.24	49.93	49.93
Year 17		50.14	11.029126	209.10	270.26	123.19	-147.07	-147.07	-159.39	-159.39
Year 18		50.14	11.2497085		61.39	123.19	61.81	61.81	49.49	49.49
Year 19		50.14	11.4747027		61.61	123.19	61.58	61.58	49.26	49.26
Year 20		50.14	11.7041968		61.84	123.19	61.35	61.35	49.03	49.03
Year 21		50.14	11.9382807		62.07	123.19	61.12	61.12	48.80	48.80
Year 22		50.14	12.1770463		62.31	123.19	60.88	60.88	48.56	48.56
Year 23		50.14	12.4205872		62.56	123.19	60.64	60.64	48.32	48.32
Year 24		50.14	12.668999		62.80	123.19	60.39	60.39	48.07	48.07
Year 25		50.14	12.922379		63.06	123.19	60.14	60.14	47.82	47.82
Year 26		50.14	13.1808265		63.32	123.19	59.88	59.88	47.56	47.56
Year 27		50.14	13.4444431		63.58	123.19	59.61	59.61	47.29	47.29
Year 28		50.14	13.7133319		63.85	123.19	59.34	59.34	47.03	47.03
Year 29		50.14	13.9875986		64.12	123.19	59.07	59.07	46.75	46.75
Year 30		50.14	14.2673505		64.40	123.19	58.79	58.79	46.47	46.47
						IRR	**17.48%**	**15.87%**	**13.52%**	**12.14%**
						NPV (12%)	**₹ 103.42**	**₹ 79.01**	**₹ 27.20**	**₹ 2.79**

Notes:

1. The increase in operating cost has not been factored as operator would get protection against the same by increase in tariff to the extent of 60% of WPI increase and expected to bridge the gap of 40% by efficiency. On the same analogy, increase in rate for income calculation has also not been considered.

2. The Electrical equipments are estimated to be overhauled/replaced after 15 years at Original Cost.

3. Terminal Value at which the project is to be transferred to KoPT has been taken as NIL

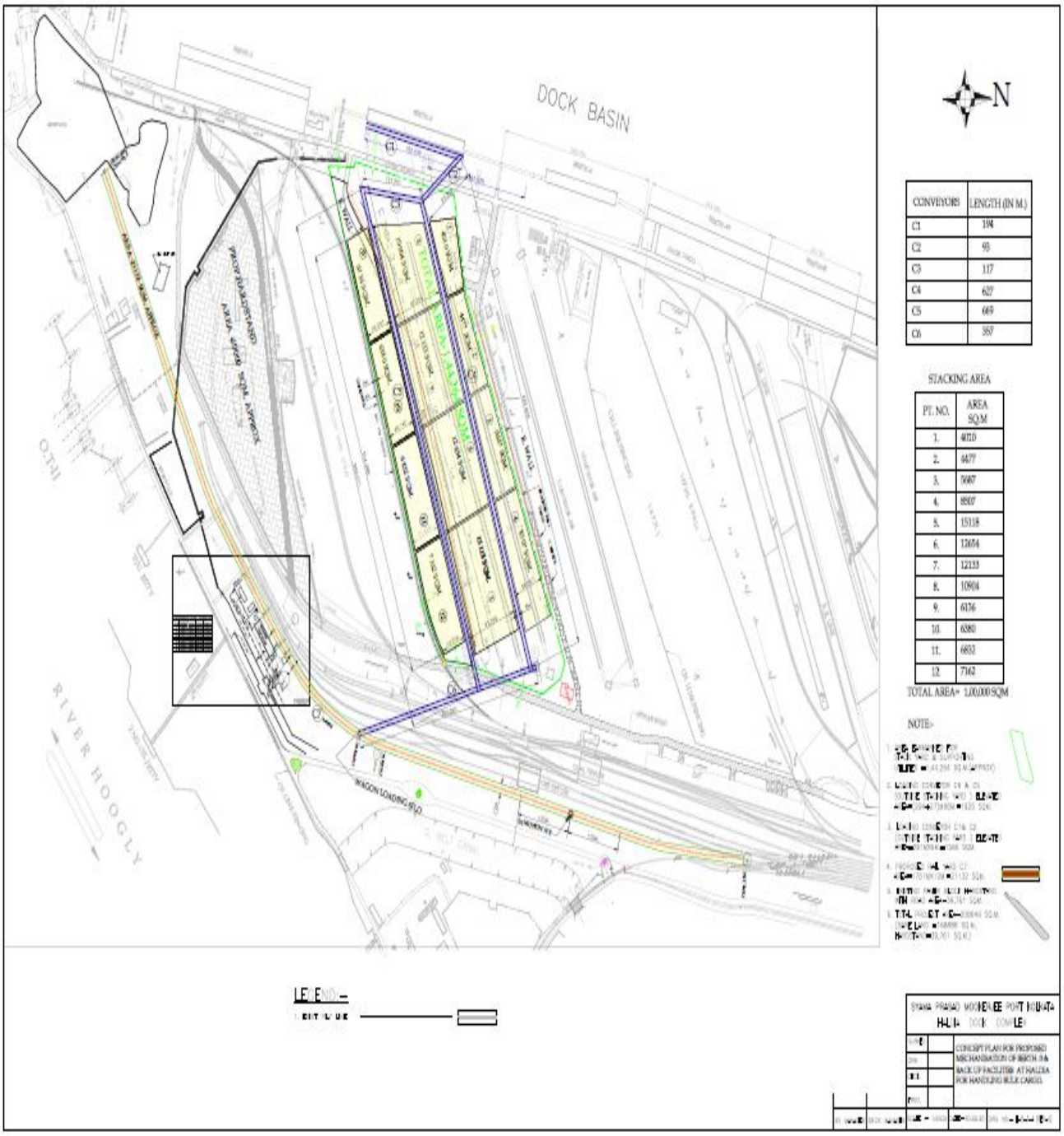
4. The payment towards Project Cost has been considered at 40% in 1st year, 40% in 2nd year and balance 20% in 3rd year.

5. Capacity utilisation in the first year of operation has been assumed at 75%.

6. The Calculation of NPV (12% discounting) and IRR has been made without considering Income Tax element as Tax incidence would depend on Revenue Share which is an admissible cost.

PROJECT EIRR CALCULATION

	Cash Outflow [Without considering Revenue Sharing]					Economic Benefit of the Project			
Period	Payment towards Project Cost to be made by BOT Operator from own resources	O&M [Without Depreciation & License Fee]	License Fee	Replacement Cost of Mechanical & Electrical Equipment	Total Cash Outflow	Cargo Handling Income	Avoidance of dead freight loss due to optimum loading	Gross Economic Benefit	Net Economic Benefit [Before Tax]
Year1	**119.31**		**8.03**		**127.34**				**-127.34**
Year 2	**119.31**		**8.19**		**127.50**				**-127.50**
Year3	**59.65**	**35.59**	**8.36**		**103.60**	**92.40**	**14.32**	**106.71**	**3.11**
Year4		**50.14**	**8.53**		**58.66**	**123.19**	**19.09**	**142.29**	**83.62**
Year5		**50.14**	**8.70**		**58.83**	**123.19**	**18.04**	**141.24**	**82.40**
Year6		**50.14**	**8.87**		**59.01**	**123.19**	**18.04**	**141.24**	**82.23**
Year7		**50.14**	**9.05**		**59.18**	**123.19**	**18.04**	**141.24**	**82.05**
Year8		**50.14**	**9.23**		**59.36**	**123.19**	**18.04**	**141.24**	**81.87**
Year9		**50.14**	**9.41**		**59.55**	**123.19**	**18.04**	**141.24**	**81.69**
Year10		**50.14**	**9.60**		**59.74**	**123.19**	**18.04**	**141.24**	**81.50**
Year11		**50.14**	**9.79**		**59.93**	**123.19**	**18.04**	**141.24**	**81.31**
Year12		**50.14**	**9.99**		**60.13**	**123.19**	**18.04**	**141.24**	**81.11**
Year13		**50.14**	**10.19**		**60.32**	**123.19**	**18.04**	**141.24**	**80.91**
Year14		**50.14**	**10.39**		**60.53**	**123.19**	**18.04**	**141.24**	**80.71**
Year15		**50.14**	**10.60**		**60.74**	**123.19**	**18.04**	**141.24**	**80.50**
Year16		**50.14**	**10.81**		**60.95**	**123.19**	**18.04**	**141.24**	**80.29**
Year17		**50.14**	**11.03**	**209.10**	**270.26**	**123.19**	**18.04**	**141.24**	**-129.02**
Year18		**50.14**	**11.25**		**61.39**	**123.19**	**18.04**	**141.24**	**79.85**
Year19		**50.14**	**11.47**		**61.61**	**123.19**	**18.04**	**141.24**	**79.63**
Year20		**50.14**	**11.70**		**61.84**	**123.19**	**18.04**	**141.24**	**79.40**
Year21		**50.14**	**11.94**		**62.07**	**123.19**	**18.04**	**141.24**	**79.16**
Year22		**50.14**	**12.18**		**62.31**	**123.19**	**18.04**	**141.24**	**78.92**
Year23		**50.14**	**12.42**		**62.56**	**123.19**	**18.04**	**141.24**	**78.68**
Year24		**50.14**	**12.67**		**62.80**	**123.19**	**18.04**	**141.24**	**78.43**
Year25		**50.14**	**12.92**		**63.06**	**123.19**	**18.04**	**141.24**	**78.18**
Year26		**50.14**	**13.18**		**63.32**	**123.19**	**18.04**	**141.24**	**77.92**
Year27		**50.14**	**13.44**		**63.58**	**123.19**	**18.04**	**141.24**	**77.66**
Year28		**50.14**	**13.71**		**63.85**	**123.19**	**18.04**	**141.24**	**77.39**
Year29		**50.14**	**13.99**		**64.12**	**123.19**	**18.04**	**141.24**	**77.11**
Year30		**50.14**	**14.27**		**64.40**	**123.19**	**18.04**	**141.24**	**76.83**
							EIRR		**22.85%**


DOCK BASIN
RIVER HOOGLY
WAGON LOADING SID
N
CONVEYORS
LENGTH (IN M.)
C1
194
C2
93
C3
117
C4
627
C5
669
C6
357
STACKING AREA
PT. NO.
AREA SQ.M
1.
4010
2.
6477
3.
5687
4.
8807
5.
15118
6.
12654
7.
12133
8.
10904
9.
6176
10.
6280
11.
6832
12.
7162
TOTAL AREA= 1,00,000 SQM
NOTE:
LEGEND –
CONCEPT PLAN FOR PROPOSED MECHANISATION OF BERTH 19A AND UP FACILITIES AT HALDIA FOR HANDLING BULK CARGO.