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16.0 ENVIRONMENTAL CLEARANCE REQUIREMENT

16.1 Introduction

The terminal at Sahibganj is proposed to be developed for Phase-1 initially catering to the traffic potential of 2.24 MTPA. The development of Phase-1 terminal includes construction of jetty in river, shore protection works, dredging, site grading, storage areas, roads, ramps, buildings, sewerage, water supply, and other utilities.

As per Ministry of Environment and Forests (MoEF) notification dated 14th September, 2006, the required construction of new projects or activities listed in the Schedule to this notification shall be undertaken in any part of India only after the prior environmental clearance from the Central Government or as the case may be, by the State Level Environment Impact Assessment Authority, duly constituted by the Central Government under sub-section (3) of section 3 of the said Act, in accordance with the procedure specified in the notification.

The said notification is attached in **Appendix-F**.

16.2 Requirement of Prior Environmental Clearance

The Schedule of the said notification does not specify the category for development of inland waterways projects and therefore there may not be requirement of prior environmental clearance for the development of terminal for Phase-1 at Sahibganj. Further vide MoEF&CC's Notification dated 15.01.2016, dredging and de-silting of dams, reservoirs, weirs, barrages, river and canals for the purpose of their maintenance, upkeep and disaster management has been exempted from prior environmental clearance.

IWAI may take a final view on requirement of prior environmental clearance. However, if the requirement of prior environmental clearance arises, the following process shall be followed for obtaining the same.

16.3 Application for Prior Environmental Clearance

For seeking prior environmental clearance, an application shall be made in prescribed Form-1 along with a copy of Detailed Project Report. The Form-1 is enclosed in **Appendix-F**.

16.4 Stages in Pre-Environmental Clearance

The process of environmental clearance for development of Phase-1 of terminal shall comprise of following four stages as given below:

- Screening (only for Category B Project)
- Scoping
- Public Consultation
- Appraisal

Stage-1: Screening

The application made in Form 1 shall be scrutinized by State level Expert Appraisal Committee (SEAC) for determining whether or not the project or activity requires further environmental studies for preparation of an Environmental Impact Assessment (EIA) for its appraisal prior to the grant of environmental clearance depending on the nature and





location specificity of the project. The projects requiring an Environmental Impact Assessment report shall be termed Category 'B1' and remaining projects shall be termed Category 'B2' and will not require an Environment Impact Assessment report. For categorization of projects into B1 or B2 except item 8 (b), the Ministry of Environment and Forests issues appropriate guidelines from time to time.

Stage-2: Scoping

- i. In scoping stage, State level Expert Appraisal Committee in the case of Category 'B1' projects, determine detailed and comprehensive Terms Of Reference (TOR) addressing all relevant environmental concerns for the preparation of an Environment Impact Assessment (EIA) Report in respect of the project or activity for which prior environmental clearance is sought. The State level Expert Appraisal Committee shall determine the Terms of Reference on the basis of the information furnished in the prescribed application Form 1 including Terns of Reference proposed by the applicant, a site visit by a sub- group of State level Expert Appraisal Committee only if considered necessary by the State Level Expert Appraisal Committee, Terms of Reference suggested by the applicant if furnished and other information that may be available with the State Level Expert Appraisal Committee.
- ii. The Terms of Reference (TOR) shall be conveyed to the applicant by the State Level Expert Appraisal Committee within sixty days of the receipt of Form 1. If the Terms of Reference are not finalized and conveyed to the applicant within sixty days of the receipt of Form 1, the Terms of Reference suggested by the applicant shall be deemed as the final Terms of Reference approved for the EIA studies. The approved Terms of Reference shall be displayed on the website of the Ministry of Environment and Forests and the concerned State Level Environment Impact Assessment Authority.
- iii. Applications for prior environmental clearance may be rejected by the regulatory authority concerned on the recommendation of the SEAC at this stage itself. In case of such rejection, the decision together with reasons for the same shall be communicated to the applicant in writing within sixty days of the receipt of the application.

Stage-3: Public Consultation

After EIA Report is prepared, the public consultation shall be carried out which comprises of following:

- i. A public hearing at the site or in its close proximity- district wise, to be carried out for ascertaining concerns of local affected persons;
- ii. Obtain responses in writing from other concerned persons having a plausible stake in the environmental aspects of the project or activity.

The public hearing at, or in close proximity to, the site(s) in all cases shall be conducted by the State Pollution Control Board (SPCB) and forward the proceedings to the regulatory authority concerned within 45 (forty five) of a request to the effect from the applicant.

In case the State Pollution Control does not undertake and complete the public hearing within the specified period, and/or does not convey the proceedings of the public hearing within the prescribed period directly to the regulatory authority concerned as above, the regulatory authority shall engage another public agency or authority which is not subordinate to the regulatory authority, to complete the process within a further period of forty five days.

If the public agency or authority nominated reports to the regulatory authority concerned that owing to the local situation, it is not possible to conduct the public hearing in a





manner which will enable the views of the concerned local persons to be freely expressed, it shall report the facts in detail to the concerned regulatory authority, which may, after due consideration of the report and other reliable information that it may have, decide that the public consultation in the case need not include the public hearing.

For obtaining responses in writing from other concerned persons having a plausible stake in the environmental aspects of the project or activity, the concerned regulatory authority and the State Pollution Control Board (SPCB) shall invite responses from such concerned persons by placing on their website the Summary EIA report prepared by the applicant along with a copy of the application in the prescribed form , within seven days of the receipt of a written request for arranging the public hearing. Confidential information including non-disclosable or legally privileged information involving Intellectual Property Right, source specified in the application shall not be placed on the web site. The regulatory authority shall, however, make available on a written request from any concerned person the Draft EIA report for inspection at a notified place during normal office hours till the date of the public hearing.

After completion of the public consultation, the applicant shall address all the material environmental concerns expressed during this process, and make appropriate changes in the draft EIA and EMP. The final EIA report, so prepared, shall be submitted by the applicant to the concerned regulatory authority for appraisal.

Stage-4: Appraisal

The process of appraisal involves the detailed scrutiny by the State Level Expert Appraisal Committee of the application and other documents like the Final EIA report, outcome of the public consultations including public hearing proceedings, submitted by the applicant to the regulatory authority concerned for grant of environmental clearance. This appraisal shall be made by State Level Expert Appraisal Committee concerned in a transparent manner in a proceeding to which the applicant shall be invited for furnishing necessary clarifications in person or through an authorized representative. On conclusion of this proceeding, the State Level Expert Appraisal Committee concerned shall make categorical recommendations to the regulatory authority concerned either for grant of prior environmental clearance on stipulated terms and conditions, or rejection of the application for prior environmental clearance, together with reasons for the same.

The appraisal of an application shall be completed by the State Level Expert Appraisal Committee concerned within sixty days of the receipt of the final Environment Impact Assessment report and other documents and the recommendations of the State Level Expert Appraisal Committee shall be placed before the competent authority for a final decision within the next fifteen days.

Grant or Rejection of Prior Environmental Clearance (EC)

The regulatory authority shall consider the recommendations of the EAC or SEAC concerned and convey its decision to the applicant within forty five days of the receipt of the recommendations of the State Level Expert Appraisal Committee concerned or in other words within one hundred and five days of the receipt of the final Environment Impact Assessment Report, except as provided below.

The regulatory authority shall normally accept the recommendations of the State Level Expert Appraisal Committee concerned. In cases where it disagrees with the recommendations of the State Level Expert Appraisal Committee concerned, the regulatory authority shall request reconsideration by the State Level Expert Appraisal





Committee concerned within forty five days of the receipt of the recommendations of the State Level Expert Appraisal Committee concerned while stating the reasons for the disagreement. An intimation of this decision shall be simultaneously conveyed to the applicant. The State Level Expert Appraisal Committee concerned, in turn, shall consider the observations of the regulatory authority and furnish its views on the same within a further period of sixty days. The decision of the regulatory authority after considering the views of the State Level Expert Appraisal Committee concerned shall be final and conveyed to the applicant by the regulatory authority concerned within the next thirty days.

In the event that the decision of the regulatory authority is not communicated to the applicant within the period specified above, as applicable, the applicant may proceed as if the environment clearance sought for has been granted or denied by the regulatory authority in terms of the final recommendations of the State Level Expert Appraisal Committee concerned.

On expiry of the period specified for decision by the regulatory authority above, as applicable, the decision of the regulatory authority, and the final recommendations of the State Level Expert Appraisal Committee concerned shall be public documents.

Clearances from other regulatory bodies or authorities shall not be required prior to receipt of applications for prior environmental clearance of projects or activities, or screening, or scoping, or appraisal, or decision by the regulatory authority concerned, unless any of these is sequentially dependent on such clearance either due to a requirement of law, or for necessary technical reasons.

Deliberate concealment and/or submission of false or misleading information or data which is material to screening or scoping or appraisal or decision on the application shall make the application liable for rejection, and cancellation of prior environmental clearance granted on that basis. Rejection of an application or cancellation of a prior environmental clearance already granted, on such ground, shall be decided by the regulatory authority, after giving a personal hearing to the applicant, and following the principles of natural justice.

16.5 Social Impact Assessment

Social Impact Assessment (SIA) is carried out to ascertain the impacts, which would occur due to implementation of the project. The exercise facilitates identifying types and extent of impacts and also identifying impacts that can be minimized by good engineering practices. Efforts are made to mitigate impacts, which cannot be minimized during the planning stage.

Accordingly, the Social Impact Assessment for development of proposed terminal in phase-1 at Sahibganj shall be carried out.





17.0 TERMINAL ADMINISTRATION AND MANAGEMENT

17.1 General

The IWT terminal at Sahibganj is proposed to be developed in phases catering to traffic till phase-3. Accordingly, the terminal is planned to handle various types of cargo for which suitable handling equipment and storage facilities are planned for initial phase and for subsequent phases. The terminal in all the phases, shall be controlled and managed by IWAI with organisation structure and manpower as discussed below.

17.2 Terminal Operations and Organisation Structure

The terminal operations shall be carried out by IWAI by employing personnel with necessary expertise and experience. The Director will be the overall in-charge of various functional departments like Engineering, Finance, Marketing, Operation & Maintenance and Human Resources. The proposed organization structure is given below in **Figure 17.1**.



Figure 17.1: Proposed Organization Chart of the Terminal

17.3 Manpower Estimates

The operations at the terminal shall be organized in shifts to support 24-hour productivity. The manpower required for the proposed terminal in all the phases is assessed in Table 17.1 below:





| S No. | Nome of Devectorial | Total Staff | | | | | | | | |
|--------|--|-------------|---------|---------|--|--|--|--|--|--|
| 5.100. | Name of Personnel | Phase-1 | Phase-2 | Phase-3 | | | | | | |
| A. Ma | nning for Terminal Administration | | | | | | | | | |
| 1. | Director | 1 | 1 | 1 | | | | | | |
| 2. | Dy. Director-Terminal Operations | 1 | 1 | 1 | | | | | | |
| 3. | Dy. Director-Commercial & Business Development | 1 | 1 | 1 | | | | | | |
| 4. | Dy. Director- Finance & Accounts | 1 | 1 | 1 | | | | | | |
| 5. | Dy. Director- Planning & Engineering | 1 | 1 | 1 | | | | | | |
| 6. | Dy. Director-HR & Administration | 1 | 1 | 1 | | | | | | |
| 7. | Assistant Director-Civil | 1 | 1 | 1 | | | | | | |
| 8. | Assistant Director-Mechanical | 0 | 1 | 1 | | | | | | |
| 9. | Assistant Director-Electrical | 0 | 1 | 1 | | | | | | |
| 10. | Assistant Director-Safety & Environment | 1 | 1 | 1 | | | | | | |
| 11. | Assistant Director-HR & Administration | 0 | 1 | 1 | | | | | | |
| 12. | Assistant Director-Security | 1 | 1 | 1 | | | | | | |
| 13. | Assistant Director-IT | 0 | 1 | 1 | | | | | | |
| | Total Management and Administrative staff | 9 | 13 | 13 | | | | | | |
| B. Ma | anning for Operation of Terminal | | | | | | | | | |
| S.No. | Name of Equipment | Phase-1 | Phase-2 | Phase-3 | | | | | | |
| 1 | Barge Loader | 10 | 20 | 40 | | | | | | |
| 2 | Mobile Harbour Crane | 3 | 3 | 3 | | | | | | |
| 3 | Pay Loaders / Front End Loaders | 24 | 24 | 24 | | | | | | |
| 4 | Conveyor system with Transfer Towers | 15 | 36 | 48 | | | | | | |
| 5 | Stacker cum Reclaimer | 0 | 6 | 12 | | | | | | |
| 6 | Reclaimer | 0 | 3 | 6 | | | | | | |
| 7 | Dumpers | 32 | 0 | 0 | | | | | | |
| 8 | Trucks | 0 | 32 | 32 | | | | | | |
| 9 | Wagon Tippler | 0 | 17 | | | | | | | |
| 10 | Wagon Shifter | 0 | | 20 | | | | | | |
| 11 | Track Hopper | 0 | 0 | | | | | | | |

Table 17.1: Manning for IWT Terminal at Sahibganj





| B. Ma | nning for Operation of Terminal | | | |
|-------|---|---------|---------|---------|
| S.No. | Category | Phase-1 | Phase-2 | Phase-3 |
| 12 | Mainteanance Crew for Mobile Harbour Crane & Others | 4 | 4 | 4 |
| 13 | Shift supervisors | 4 | 4 | 4 |
| | Total Manning for Terminal | 92 | 149 | 193 |
| C. Ma | nning for Common Utilities | | | |
| S.No. | Category | Phase-1 | Phase-2 | Phase-3 |
| 1 | Staff for Central Control Room | 8 | 8 | 8 |
| 2 | Security Staff | 14 | 27 | 27 |
| 3 | Manning of substations | 7 | 7 | 7 |
| 4 | Fire service station | 10 | 14 | 14 |
| 5 | Medical Assistance | 8 | 12 | 12 |
| 6 | Water supply | 4 | 4 | 4 |
| 7 | Support Staff | 10 | 20 | 20 |
| | Total Manning for Common Utilities | 61 | 92 | 92 |

| Total O&M Personnel at Terminal | | | | | | | | | |
|--|---------|---------|---------|--|--|--|--|--|--|
| Descriptions | Phase-1 | Phase-2 | Phase-3 | | | | | | |
| A. Manning for Terminal Administration | 9 | 13 | 13 | | | | | | |
| B. Manning for Operation of Terminal | 92 | 88 | 111 | | | | | | |
| C. Manning for Common Utilities | 61 | 92 | 92 | | | | | | |
| Total | 162 | 254 | 298 | | | | | | |





18.0 IMPLEMENTATION SCHEDULE

18.1 General

It is proposed to develop IWT terminal at Sahibganj for Phase 1 initially. As the traffic gets build up and IWT sector gets momentum over the coming years, the terminal shall be developed for Phase II and further for Phase 3with all the required infrastructure and support system as discussed in the previous sections.

The main components for the terminal development in Phase 1 comprise of 270 m long jetty construction with approach trestle, road connectivity, Procurement of Mobile harbour cranes, Barge loaders, Levelling of the backup area for open storage, storage sheds, buildings and other onshore infrastructure and marine support systems. The schedule of the critical project items is discussed below.

18.2 Road Connectivity

Before start of construction activity at the terminal, it is necessary to make and construct the road providing connectivity to the terminal from Gate no 54 so that the material, machinery and manpower can reach to the terminal to facilitate the construction of terminal facilities.

18.3 Site Grading

The onshore terminal area to be developed in Phase 1 is undulating with levels varying from 28 m to 56 m and significant amount of cutting and filling would be required for site grading to 37 m. Therefore, it is necessary to carry out site grading work immediately after construction of road work as the onshore terminal area shall be used for storage of building material brought for construction of berth and approach trestle.

18.4 Berth Construction

The approach to the coal berth as well as stone chips/ other cargo berth would be taken up and the berth piling would be commenced using piling gantries.

The construction of berth including approaches is expected to take about 24 months from the commencement of their construction.

18.5 Equipment and Onshore Development

It is envisaged that the delivery and installation of cargo handling equipment as well as the onshore development will not have any impact on the implementation schedule of the project. Only important thing will be to ensure synchronization of the handling equipment with that of the various components of the berth construction.

18.6 Implementation Schedule

Based on the above it could be seen that the terminal construction could be completed within a time frame of 30 months. The project implementation schedule is shown in **Error!** Not a valid bookmark self-reference.





Table 18.1: Implementation Schedule for Phase-1 of Terminal

| S.No. | ltem | Year 1 Year 2 | | | | | | | | | | Year 3 | | | | | | | | | | | | | | | | | | | |
|-------|---|---------------|---|---|---|---|---|---|---|---|----|--------|----|----|----|----|----|----|----|----|----|----|----|------|----|----|----|----|----|----------|----|
| | Month | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 2 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| | Zero Date | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Detailed Design | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Site Development Works including Site Grading | | | | | | | | | - | | | | | | | | | | | | | | | | | | | | | |
| 3 | Dredging & Aids to Navigation | | | | | | | | | | | | | | | | | | | | | | | | | _ | | | | | |
| 4 | Jetty Construction | | | | | | | | | | | | | | | | | | | | | - | _ | + | | | - | | _ | | |
| 5 | Buildings and Sheds | | | | | | | | | | | | | | | | | | | | | _ | _ | | - | | | | | | |
| 6 | Internal Roads, Ramps and Paved Areas | | | | | | | | | | | | | | | | • | | | | | | | | | | | | | | |
| 7 | Mechanical Eqquipments | | | | | | | | | | | | | | | | | | | | | | | - | | | | | | | |
| 8 | Water Supply, Electrical Works, Drainage and Other Utilities | | | | | | | | | | | | | | | | | | | | | - | - | - | | | | | | <u> </u> | |





19.0 COST ESTIMATES

19.1 Capital Cost Estimates

The capital cost estimates have been prepared for the Phase-1 development of IWT Terminal at Sahibganj as per Layout provided in **Drawing I-521/ST/209**. These are based on the project descriptions and drawings given under the relevant sections of the present report. The drawings were prepared after carrying out preliminary design of various components of the project. The quantities have been calculated from the drawings for cost estimation purpose. These will need to be developed, revised, and refined during the design phase.

The following is to be noted with respect to the cost estimates:

- The cost estimates of civil works have been prepared on the basis of CPWD Schedule of Rates 2014 and Market Rates for various items of work prevailing in the region.
- The costs of equipment is based on the quotations received from manufacturers, wherever applicable and also in-house data, and include manufacture, supply, installation and commissioning.
- All costs towards overheads, labour, tools, materials etc. are covered in the rates for individual items.
- The price level used for the estimates is as of the second quarter of 2019.

The estimates given here do not include the following items:

• Financing costs including IDC and other reserves

The capital cost estimates for Phase-1 of the Terminal is worked out to be **Rs.345 crores** and summary is presented in Table 19.1 below: The break-up of major components of the capital cost estimates for Phase-1 of the Terminal are furnished in Table 19.2 to 19.6 respectively:

| S. No. | Item | Capital Cost (Rs. In Crores) | | | |
|--------|---|---------------------------------|--|--|--|
| 1 | Site Grading and Dredging | 56.38 | | | |
| 2 | Shore Protection Works | 9.65 | | | |
| 3 | Berths including Approach Trestles | 101.43 | | | |
| 4 | Buildings | 2.56 | | | |
| 5 | Storage Areas | 8.69 | | | |
| 6 | Internal Roads including Ramp | 24.54 | | | |
| 7 | External / Approach Roads | 14.00 | | | |
| 8 | Road Over Bridge | 38.00 | | | |
| 9 | Equipments | 33.40 | | | |
| 10 | Belt Conveyor System | 28.00 | | | |
| 11 | Utilities and Others, Navigational Aids | 18.27 | | | |
| | Sub-total | 334.92 | | | |
| Co | ontingency @ 3% as per CPWD norms | 10.05 | | | |
| | Total | 344.97 | | | |
| | Say | 345 Crores | | | |

Table 19.1: Summary of Capital Cost Estimates for Phase-1 of Terminal





| S. No. | | Item | Quantity | Unit | Rate (Rs.) | Capital Cost (Rs. in Crores) | Reference |
|----------|---------|----------------------------------|----------|------|-------------|---------------------------------|------------------|
| 1. | LAND & | | | | | 51.88 | |
| | 1.1 | Studies and Investigations | | LS | | 1.50 | |
| | 1.2 | Site Grading | | LS | | 50.38 | Refer Table 19.3 |
| 2. | DREDG | ING | 1,50,000 | cum | 300 | 4.50 | |
| 3. | SHORE | PROTECTION WORKS | | | | 9.65 | Refer Table 19.4 |
| 4. | JETTY I | NCLUDING APPROACH TRESTLES | | | | 101.43 | |
| | 4.1 | Berths | | | | 88.11 | Refer Table 19.5 |
| | 4.2 | Approach Trestle | | | | 13.32 | Refer Table 19.6 |
| 5. | BUILDI | NGS | | | | 2.56 | |
| | 5.1 | Terminal Administration Building | 520 | sqm | 25,000 | 1.30 | |
| | 5.2 | Worker's Amenity Building | 108 | sqm | 25,000 | 0.27 | |
| | 5.3 | Electrical Substation Building | 360 | sqm | 25,000 | 0.90 | |
| | 5.4 | Weigh Bridge Building | 25 | sqm | 18,000 | 0.05 | |
| | 5.5 | Security Office | 25 | sqm | 18,000 | 0.05 | |
| 6. | STORA | GE AREAS | | | | 8.69 | |
| | 6.1 | Coal Stockyard | 11,200 | sqm | 1,200 | 1.34 | |
| | 6.2 | Stone-chips Stockyard | 8,750 | sqm | 1,200 | 1.05 | |
| | 6.3 | Storage Shed | 4,200 | sqm | 15,000 | 6.30 | |
| 7. | INTERN | AL ROADS INCLUDING RAMPS | | | | 24.54 | |
| | 7.1 | Roads to Operational Areas | 21,952 | sqm | 3,000 | 6.59 | |
| | 7.2 | Parking Area | 10,000 | sqm | 700 | 0.70 | |
| | 7.3 | Retaining Wall | | | | | |
| | i | For 7.5m high wall | 902 | m | 1,40,000 | 12.63 | |
| | ii | For 8.5m high wall | 179 | m | 1,80,000 | 3.22 | |
| | iii | For 10.5m high wall | 50 | m | 2,80,000 | 1.40 | |
| 8. | EXTERN | NAL / APPROACH ROAD | | | | 14.00 | |
| 9. | RAIL O | VER BRIDGE | | | | 38.00 | |
| 10. | EQUIPN | IENTS | | | | 33.40 | |
| | 10.1 | Mobile Barge Loader | 1 | No. | 400,00,000 | 4.00 | |
| | 10.2 | Mobile Harbour Crane | 1 | No. | 1550,00,000 | 15.50 | |
| | 10.3 | Front End Loader | 8 | No. | 80,00,000 | 6.40 | |
| | 10.4 | Road Weigh Bridge | 2 | No. | 25,00,000 | 0.50 | |
| | 10.5 | Dumpers | 10 | No. | 70,00,000 | 7.00 | |
| 11. | BELT C | ONVEYOR SYSTEM | | | | 28.00 | |
| 12. | UTILITI | ES AND OTHERS | | | | 17.50 | |
| | 12.1 | Electrical Distribution System | | LS | | 10.00 | |
| | 12.2 | Fire Fighting System | | LS | | 1.50 | |
| | 12.3 | Dust Suppression System | | LS | | 2.00 | |
| | 12.4 | Water Supply and Distribution | | LS | | 1.00 | |
| <u> </u> | 12.5 | Drainage | | LS | | 1.00 | |
| | 12.6 | Sewerage | | LS | | 1.00 | |
| | 12.7 | Communication and IT | | LS | | 1.00 | |
| 13. | AIDS TO | D NAVIGATION | 17 | No. | 4,50,000 | 0.77 | |
| Total (| 1+2+3+4 | +5+6+7+8+9+10+11+12+13) | | | | 334.91 | |

Table 19.2 : Detailed Capital Cost Estimate for Phase-1 of Terminal





| Description | Quantity (cum) | Rate (in Rs) | Amount (Rs. In Crores) |
|--|-------------------|-----------------|---------------------------|
| Earthwork in Excavation by mechanical means (Hydraulics Excavator over areas including disposal of excavated earth lead upto 1 km and lift upto 1.5 m, disposed earth to be levelled and neatly dressed. | 215000 | 280 | 6.02 |
| Earthwork in Excavation by mechanical means (Hydraulics Excavator over areas including disposal of excavated earth lead upto 5 km and lift upto 1.5 m, disposed earth to be levelled and neatly dressed. | 1210000 | 340 | 41.14 |
| Earthwork in Filling | 215000 | 150 | 3.23 |
| Total | 50.39 | | |

Table 19.3 : Capital Cost Estimate for Site Grading in Phase-1 of Terminal

Table 19.4 : Cost Estimate for Shore Protection Works in Phase-1 of Terminal

| S.No. | Item of Work | Unit | Quantity | Rate (In Rs.) | Amount (Rs. In Crore) |
|-------|---|------|-----------|------------------|--------------------------|
| 1 | Loading and unloading of stone boulder / stone aggreagates weighing not less than 40 kg | Cum | 53,760 | 162.00 | 0.87 |
| 2 | Cost of haulage excluding loading & unloading to the terminal location | t-km | 2,040,000 | 9.50 | 1.94 |
| 3 | Providing and laying Pitching on slopes laid over prepared filter media & laid in wire crates made with 4mm dia GI wire conforming to IS: 280 & IS:4826 in 100mm x 100mm mesh (weaved diagonally) including 10% extra for laps and joints laid with stone boulders weighing not less than 40 kg each.) | Cum | 16,800 | 1,260.36 | 2.12 |
| 4 | Providing and laying Filter material underneath pitching in slopes complete as per drawing and Technical specification | Cum | 3,360 | 1,446.12 | 0.49 |
| 5 | Providing and laying boulders apron on river bed for protection against scour with stone boulders laid in wire crates made with 4mm dia GI wire conforming to IS: 280 & IS:4826 in 100mm x 100mm mesh (weaved diagonally) including 10% extra for laps and joints laid with stone boulders weighing not less than 40 kg each.)each complete as per drawing and Technical specification. | Cum | 33,600 | 1,260.36 | 4.23 |
| | | | | TOTAL COST | 9.65 Crores |





| ltem No | Description of Item | Quantity | Unit | Rate (Rs.) | Amount (Rs in Crores) |
|------------|--|----------|------|---------------|--------------------------|
| 1. | Mobilisation of all plant and equipment for the jetty construction and demobilisation of the same | 1 | LS | (1(3.) | 6.29 |
| | after completion of the works. | | | | |
| 2. | Construction of 1200 mm dia bored cast-in-situ piles for berth with m.s. liner, boring in all types of | | | | |
| | soil /Hard strata stablising unlined soil using any other approved method during excavation, | | | | |
| | providing reinforcement as per design/ drawing providing and placing M40 grade concrete by means | | | | |
| | of tremie or any other approved method, providing all necessary labour, materials, plant tools etc. | | | | |
| i | Shift & set up piling plant & equipment at each pile location | 180 | No. | 50,000 | 0.90 |
| ii | Supply, fabricate and driving mild steel liner (8 mm thick) including transport, alignment, pitching in | 1,840 | т | 55,000 | 10.12 |
| | position as required | | | | |
| 111 | Driving the steel liners (8 mm thick) upto the required depth below bed level | 4,500 | m | 2,500 | 1.13 |
| iv | Boring through all types of soil strata | 4,500 | m | 3,500 | 1.58 |
| v | Boring through all types of Hard strata | 900 | m | 6,500 | 0.59 |
| vi | Cut & dress pile head to required lines & levels | 180 | No | 5,500 | 0.10 |
| 3. | Supply & placing in position design mix cement concrete grade M40 in pile shaft by means of tremie | 9.751 | cum | 8.000 | 7.80 |
| | or any other approved method including cost of all labour and materials but excluding the cost of steel reinforcement. | -, | | -, | |
| 4. | Supplying High Yield Strength deformed bars such as grade Fe 500, cutting, bending, tying with | 1,463 | т | 72,000 | 10.53 |
| | annealed binding wire & placing in position reinforcement cage including cleaning, straightening, tack/ lap/ butt welding with approved electrodes, etc. with all labour and materials complete for | | | | |
| 5 | pries. Construction of 1000 mm dia bored cast-in-situ piles for berth with mis liner, boring in all types of | | | | |
| 5. | soil /Hard strata stablising unlined soil using any other approved method during excavation, | | | | |
| | providing reinforcement as per design/ drawing providing and placing M40 grade concrete by means | | | | |
| | of tremie or any other approved method, providing all necessary labour, materials, plant tools etc. | | | | |
| i | Shift & set up niling plant & equipment at each nile location | 45 | No | 50.000 | 0.23 |
| ii | Supply, fabricate and driving mild steel liner (8 mm thick) including transport, alignment, pitching in | 290 | T | 55,000 | 1.60 |
| | position as required | | | | |
| iii | Driving the steel liners (8 mm thick) upto the required depth below bed level | 1,125 | m | 2,500 | 0.28 |
| iv | Boring through all types of soil strata | 1,125 | m | 3,500 | 0.39 |
| v | Boring through all types of Hard strata | 225 | m | 6,500 | 0.15 |
| vi | Cut & dress pile head to required lines & levels | 45 | No | 5,500 | 0.02 |
| 6. | Supply & placing in position design mix cement concrete grade M40 in pile shaft by means of tremie | 1,322 | cum | 8,000 | 1.06 |
| | or any other approved method including cost of all labour and materials but excluding the cost of | | | | |
| | | | | | |
| 7. | Supplying High Yield Strength deformed bars such as grade Fe 500, cutting, bending, tying with | 198 | Т | 72,000 | 1.43 |
| | annealed binding wire & placing in position reinforcement cage including cleaning, straightening, | | | | |
| | tack/ lap/ butt weiding with approved electrodes, etc. with all labour and materials complete for | | | | |
| | pines. | 44.047 | | 0.000 | 10.10 |
| 8. | supply & place in position to lines & levels cast in-situ design & precast units mix cement concrete or | 11,317 | cum | 9,000 | 10.18 |
| | grade M40 for deck stab and beams including providing formwork shuttering, machine mixing, | | | | |
| | champhering where required and rendering if required to give a smooth and even surface in any | | | | |
| | shape etc. complete as directed with all labour and materials but excluding the cost of steel | | | | |
| | reinforcement. | | | | |
| 0 | Supply & place in position to lines & loyals east in situ design mix compaticonstate for wearing coat | 675 | cum | 6.000 | 0.41 |
| 9. | of average thickness 100 mm including provision of formwork machine mixing placing in papels | 075 | cum | 6,000 | 0.41 |
| | compacting, curing, etc. complete with all labour and materials. | | | | |
| 10 | Supplying High Viold Strongth deformed have such as grade to 500 cutting bending tring with | 1 0 1 1 | т | 72.000 | 12.04 |
| 10. | annealed hinding wire & placing in position reinforcement cage including cleaning strengthening | 1,011 | | 72,000 | 15.04 |
| | tack/ lap/ butt welding with approved electrodes, etc. with all labour and materials complete for deck | | | | |
| | slab and beams. | | | | |
| | | 45 | N | 150.000 | 0.69 |
| 11. | of appropriate length puts washers, etc. including grouting with compart constrate MAD under base | 45 | NO. | 150,000 | 0.08 |
| | plate, filling the cavity with concrete grade M15, painting etc. complete | | | | |
| 12. | Design, supply, assemble and fix in position in the required lines and levels arch type AN 800 E 3.0 | 135 | No. | 1,350,000 | 18.23 |
| | grade rubber fenders of Trellborg or equivalent make of length 3m with stainless steel fixtures | | | | |
| | manufactured as per manufacturer's specifications as directed by the Engineer. | | | | |
| 13. | Carrying out load test of pile including construction of test caps, accessories and dismantling same | | | | |
| | after test etc. | | | | |
| i | Initial test | 2 | No. | 1,000,000 | 0.20 |
| ii | Routine test | 2 | No. | 1,000,000 | 0.20 |
| 14. | Supplying, fabricating, painting, welding, drilling, grouting with 1:2 (1 Cement: 2 Sand) mortar & fixing | | LS | | 1.00 |
| | in position etc. complete various miscellaneous items such as steel inserts, hand railing, coping | | | | |
| | fender, ladders, handlhold, expansion joints, mooring rings, nut, bolts, washers, bituminous filler etc | | | | |
| | In precast & in-situ concrete components in accordance with the drawings & as directed by the | | | | |
| | LINGINGEL. | | | | |
| | | | | Total | 88.11 |
| 1 | | | | | |

Construction of IWT Terminal at Sahibganj in Jharkhand on River Ganga (National Waterway–1) Detailed Project Report July 2019





| ltem No. | Description of Item | Quantity | Unit | Rate (Rs.) | Amount (Rs. in Crores) |
|-------------|---|----------|------|---------------|---------------------------|
| 1. | Mobilisation of all plant and equipment for the jetty construction and demobilisation of the same after completion of the works. | 1 | LS | | 1.21 |
| 2. | Construction of 1200 mm dia bored cast-in-situ piles for berth with m.s. liner, boring in all types of soil /Hard strata stablising unlined soil using any other approved method during excavation, providing reinforcement as per design/drawing providing and placing M40 grade concrete by means of tremie or any other approved method, providing all necessary labour, materials, plant tools etc. | | | | |
| i | Shift & set up piling plant & equipment at each pile location | 46 | No. | 50,000 | 0.23 |
| ii | Supply, fabricate and driving mild steel liner (8 mm thick) including transport, alignment, pitching in position as required | 470 | Т | 55,000 | 2.59 |
| 111 | Driving the steel liners (8 mm thick) upto the required depth below bed level | 1150 | m | 2,500 | 0.29 |
| iv | Boring through all types of soil strata | 1150 | m | 3,500 | 0.40 |
| v | Boring through all types of Hard strata | 138 | m | 6,500 | 0.09 |
| vi | Cut & dress pile head to required lines & levels | 46 | No | 5,500 | 0.03 |
| 3. | Supply & placing in position design mix cement concrete grade M40 in pile shaft by means of tremie or any other approved method including cost of all labour and materials but excluding the cost of steel reinforcement. | 2,388 | cum | 8,000 | 1.91 |
| 4. | Supplying High Yield Strength deformed bars such as grade Fe 500, cutting, bending, tying with annealed binding wire & placing in position reinforcement cage including cleaning, straightening, tack/ lap/ butt welding with approved electrodes, etc. with all labour and materials complete for piles. | 358 | Τ | 72,000 | 2.58 |
| 5. | Supply & place in position to lines & levels cast in-situ design & precast units mix cement concrete of grade M40 for deck slab and beams including providing formwork shuttering, machine mixing, compacting, curing of concrete, centering, including providing pockets, openings, recesses, champhering where required and rendering if required to give a smooth and even surface in any shape etc. complete as directed with all labour and materials but excluding the cost of steel reinforcement. | 1577 | cum | 9,000 | 1.42 |
| 6. | Supply & place in position to lines & levels cast in-situ design mix cement concrete for wearing coat of average thickness 100 mm including provision of formwork, machine mixing, placing in panels, compacting, curing, etc. complete with all labour and materials. | 100 | cum | 6,000 | 0.06 |
| 7. | Supplying High Yield Strength deformed bars such as grade Fe 500, cutting, bending, tying with annealed binding wire & placing in position, reinforcement cage including cleaning, strengthening tack/ lap/ butt welding with approved electrodes, etc. with all labour and materials complete for deck slab and beams. | 252 | Т | 72,000 | 1.82 |
| 8. | Carrying out load test of pile including construction of test caps, accessories and dismantling same after test etc., | | | | |
| i | Initial test | 1 | No. | 1,000,000 | 0.10 |
| ii | Routine test | 1 | No. | 1,000,000 | 0.10 |
| 9. | Supplying, fabricating, painting, welding, drilling, grouting with 1:2 (1 Cement: 2 Sand) mortar & fixing in position etc. complete various miscellaneous items such as steel inserts, hand railing, ladders, handlhold, expansion joints, nut, bolts, washers, bituminous filler etc in precast & in- situ concrete components in accordance with the drawings & as directed by the Engineer. | | LS | | 0.50 |
| | | | | Total | 13.32 |

Table 19.6 : Capital Cost Estimate for Approach Trestle in Phase-1 of Terminal





The capital cost estimate for Phase-2 and Phase-3 is worked out to be **Rs. 633 crores and Rs. 325 crores** respectively. The cost does not incude the creation of LNG storage, which will be developed at the LNG operators cost.

The capital cost estimate for Phase-2 includes development of rail connectivity & rail siding in the terminal with railway equipments. Accordingly, the summary of the capital cost for Phase-2 of the Terminal with railway component and without railway component are presented in Table 19.7 and Table 19.8 respectively below:

| S. No. | Item | Capital Cost (Rs. In Crores) |
|--------|--|---------------------------------|
| 1 | Site Grading and Dredging | 83.50 |
| 2 | Shore Protection Works | 9.65 |
| 3 | Berths Including Approach Trestles and foundation for conveyor gallery | 53.50 |
| 4 | Storage Areas | 16.14 |
| 5 | Internal Roads Including Ramp | 50.09 |
| 6 | Rail Connectivity and Rail Siding in the Terminal | 148.0 |
| 7 | Equipments | 164.40 |
| 8 | Belt Conveyor System | 57.37 |
| 9 | Utilities and Others | 32.00 |
| | Sub-total | 614.63 |
| | Contingency @ 3% as per CPWD norms | 18.44 |
| | Total | 633.07 |
| | Say | 633 Crores |

 Table 19.7 : Summary of Capital Cost Estimates for Phase-2 of Terminal (with railway)





| S No | Itom | Capital Cost |
|---------------|--|-----------------|
| 5. NO. | | (Rs. In Crores) |
| 1 | Site Grading and Dredging | 83.50 |
| 2 | Shore Protection Works | 9.65 |
| 3 | Berths Including Approach Trestles and foundation for conveyor gallery | 53.50 |
| 4 | Storage Areas | 16.14 |
| 5 | Internal Roads Including Ramp | 50.09 |
| 7 | Equipments | 62.40 |
| 8 | Belt Conveyor System | 57.37 |
| 9 | Utilities and Others | 32.00 |
| | Sub-total | 364.65 |
| | Contingency @ 3% as per CPWD norms | 10.94 |
| | Total | 375.59 |
| | Say | 376 Crores |

Table 19.8 : Summary of Capital Cost Estimates for Phase-2 of Terminal (without railway)

The break-up of major components of the capital cost estimates for Phase-2 of the Terminal (with railway) are furnished in Table 19.9 to Table 19. respectively.





| Int Int <thint< th="" th<=""><th>S. No.</th><th colspan="2">. Item</th><th>Quantity</th><th>Unit</th><th>Rate (Rs.)</th><th>Capital Cost (Rs. in Crores)</th><th>Reference</th></thint<> | S. No. | . Item | | Quantity | Unit | Rate (Rs.) | Capital Cost (Rs. in Crores) | Reference |
|--|----------|---------|--|----------|------|---------------|------------------------------------|-------------------|
| 1.1Budea and westigationsI.NI.SI.OI.O.OI.O.O1.2NordarigationsI.O.OI.O.OI.O.OI.O.OI.O.OIIO2.IPUT INTRANCIAI.O.OI.O.OI.O.OI.O.OIIO <tdiio< td="">IIOIIO<th>1.</th><td>LAND &</td><td>SITE DEVELOPMENT</td><td></td><td></td><td></td><td>82.00</td><td></td></tdiio<> | 1. | LAND & | SITE DEVELOPMENT | | | | 82.00 | |
| 1.2 Sier oraging Los Ket with the set of the s | | 1.1 | Studies and Investigations | | LS | | 2.00 | |
| 1 Pic>IDE Second Pic | | 1.2 | Site Grading | | LS | | 80.00 | Refer Table 19.10 |
| A.SINT FUNCTION WORKSIntermation of the sector of t | 2. | DREDG | NG | 50,000 | cum | 300 | 1.50 | |
| 4. JETT FUELUNG APPROACH TRESTLES Image: Marging and State | 3. | SHORE | PROTECTION WORKS | | | | 9.65 | Refer Table 19.11 |
| 4.1 Borths Image: second | 4. | JETTY I | NCLUDING APPROACH TRESTLES | | | | 53.5 | |
| 4.2 Approach Trestie Internation for Conveyor Gallery Internatin for Conversion for Conveyor Gallery </th <th></th> <td>4.1</td> <td>Berths</td> <td></td> <td></td> <td></td> <td>44.68</td> <td>Refer Table 19.12</td> | | 4.1 | Berths | | | | 44.68 | Refer Table 19.12 |
| 4.3 Foundation for Conveyor Gallery In In In Gall Refer Table 19.14 5. STOR KeAS 50.00 sign 11.200 16.10 6.1 Coal Stockyard 32.000 sign 11.200 6.00 6.2 Stone-bips Stockyard 32.000 sign 11.200 6.00 6.1 Stone-bips Stockyard 32.000 sign 10.200 6.00 6.1 Stone-bips Stockyard 32.000 sign 10.200 6.00 6.1 Stone-bips Stockyard 33.000 sign 10.200 6.00 6.1 Redistring Area 8.000 sign 30.000 24.90 7.1 Retaining Wall 10.0 10.0 10.10 7.2 Retainal connectivity 43.0 11.0 10.00 7.3 Retarratic connectivity 55.5 fm< 60.000 10.00 7.4 Retarratic connectivity 55.5 fm< 60.000 10.00 7.5 Rick and Reclaimer 10.4 No. 20.000.00 40.00 7.4 Retarratic connectivity 55.5 fm 60.000 60.00 7.5 Retarratic connectivity 51.5 | | 4.2 | Approach Trestle | | | | 5.50 | Refer Table 19.13 |
| SIDE FREAS Interpretation Interpretation Interpretation Interpretation 6.1 Sales Sale | | 4.3 | Foundation for Conveyor Gallery | | | | 3.31 | Refer Table 19.14 |
| 1.1Cal Stockyard50,00sqm1,2006,005.2Stone-chips Stockyard32,000sqm1,2003.846.1NET+ | 5. | STORA | GE AREAS | | | | 16.14 | |
| 15.2Stone-chips Stockyard32,000sqm1.2003.846.INTERV-KORS INCLUDING RAMPSKKSGM5.006.006.1Rods to Operational Areas83.000sqm3.00024.9076.2Parking Area80.00sqm7.0024.906.3Retaining WallGK7.001.0007.4For 4.0m high wall3.30M45.001.1497.6For 4.0m high wallGM180.0007.747.7For 5.0m high wallGM280.000114.007.8For 4.0m high wallGM140.000114.007.9Internal rail connectivityGM1.0000114.008.8For 1.0m high wallGNo.200.000.00114.007.1External rail connectivityGNo.200.000.00140.008.8Forternal rail connectivityGNo.200.000.00140.008.8Forternal rail connectivityGNo.200.000.00140.008.8Forternal rail connectivityGNo.200.000.00140.009.9Internal rail connectivityGNo.200.000.00140.009.10External rail connectivityGNo.200.000.00140.009.11External rail connectivityGNo.200.000.00140.009.11External rail connectivityGNo.150.00.000160.00 | | 5.1 | Coal Stockyard | 50,000 | sqm | 1,200 | 6.00 | |
| 1.3. Biorage Shed 4,200 sqm 15,000 6,000 6. INTERVIENCADS INCLUDING RAMPS 1500 50,000 50,000 6.1 Readio Operational Areas 83,000 sqm 3,000 24.90 10.1 Bakis Operational Areas 83,000 sqm 3,000 24.90 10.1 Parking Area 0.000 sqm 3,000 24.90 10.1 For 4.0m high wall 0.00 1.000 1.010 1.010 10.1 For 4.0m high wall 0.00 1.000 7.74 1.0000 1.010 11.1 For 10.5m high wall 0.00 1.010 1.010 1.010 1.010 11.1 For 10.5m high wall 0.01 1.00 1.010 1.010 1.010 11.1 For 10.5m high wall 0.01 1.010 1.010 1.010 1.010 11.1 For 10.5m high wall 0.01 1.010 0.010 1.010 1.010 11.1 For 10.5m high wall 0.01 0.010 0.010 0.010 0.010 11.1 Bio F | | 5.2 | Stone-chips Stockyard | 32,000 | sqm | 1,200 | 3.84 | |
| INTERVE ROADS INCLUDING RAMPS Image: style | | 5.3 | Storage Shed | 4,200 | sqm | 15,000 | 6.30 | |
| 6.1Roads to Operational Areas83,000sqm3,00024.906.2Parking Area8,000sqm7000.566.3Retaining Wall1001001.406.4For 4.0m ligh wall330m45,0001.497.For 4.0m ligh wall430m180,0007.747.For 5.5m high wall105M280,000114.007.Returnertial connectivity11LS1,140,000,000114.007.External rail connectivity51.5Km66,000,000440.007.Returnertial connectivity51.5Km66,000,000440.008.1Stacker cum Reclaimer104No.2,500,000140.008.2Fixed hopper14No.2,500,00014.008.3Fortend loader18No.8,000,0006.008.4ExcurerRetaiderNo.13,000,00013.008.5Rotaside Wagon Tippler14No.13,000,00040.008.6Mobile Barge Loader14No.13,000,00040.009.8Ext-FVEY SYSTEM14No.13,000,00010.009.8Ext-Fighting System14No.14,000,00040.009.9Fighting System1515140,000,000140.009.0Fighting System1515140,000,000140.009.0Fighting System15151515.00 <t< th=""><th>6.</th><th>INTERN</th><th>AL ROADS INCLUDING RAMPS</th><th></th><th></th><th></th><th>50.09</th><th></th></t<> | 6. | INTERN | AL ROADS INCLUDING RAMPS | | | | 50.09 | |
| 6.2 Parking Area 8,000 sqm 700 0.6.6 6.3 Retaining Wall 1 1 1 1 6.3 Retaining Wall 330 7m 4.5.000 1.4.9 1 For 4.0m high wall 330 7m 180.000 7.7.4 1 For 8.5m high wall 4.500 7m 180.000 7.7.4 7.0 Rati Connectivity & Rati Siding in the Terminal 1 1.5 1,140.000.00 114.00 7.1 Extemal rail connectivity 5.15 Km 66.000.00 34.0 7.2 Internal rail connectivity 5.15 Km 66.000.00 34.0 8.8 Excurver 1.4 No. 200,000,00 40.00 8.4 Internal rail connectivity 1.4 No. 200,000,00 40.00 8.5 Ford hopper 4.4 No. 200,000,00 40.00 40.00 8.5 Rotatioe Wagon Tippler 1.4 No. 15,000,00 6.00 40.00 8.6 Mobile Barge Loader 1.1 No. 10,00,00 <th></th> <td>6.1</td> <td>Roads to Operational Areas</td> <td>83,000</td> <td>sqm</td> <td>3,000</td> <td>24.90</td> <td></td> | | 6.1 | Roads to Operational Areas | 83,000 | sqm | 3,000 | 24.90 | |
| 6.3 Retaining Wall \overline | | 6.2 | Parking Area | 8,000 | sqm | 700 | 0.56 | |
| ii For 4.0m high wall 330 m 45,000 1.49 iii For 8.5m high wall 430 m 180,000 7.74 iii For 10.5m high wall 550 m 280,000 15.40 7. Rail Connectivity & Rail Siding in the Terminal Image Side Side Side Side Side Side Side Sid | | 6.3 | Retaining Wall | | | | | |
| iii For 8.5m high wall 430 m 180,000 7.74 iii For 10.5m high wall 550 m 280,000 15.40 7. Rail Connectivity & Rail Siding in the Terminal 1 LS 1,140,000,000 114.00 7.1 External rail connectivity 5.15 km 66,000,000 34.0 8.1 Stacker cum Reclaimer 2 No. 200,000,000 40.00 8.2 Fixed hopper 4 No. 2,500,000 1.00 8.3 Front end loader 8 No. 8,000,000 6.40 8.4 Excavator 4 No. 15,000,00 6.00 8.4 Excavator 4 No. 15,000,00 6.00 8.5 Rotaide Wagon Tippler 1 No. 130,000,00 13.00 8.6 Mobile Barge Loader 1 No. 700,000,00 70.00 8.7 Yakayon Shifter with pusher 1 No. 700,000,00 70.00 8 | | i | For 4.0m high wall | 330 | m | 45,000 | 1.49 | |
| iii For 10.5m high wall 550 m 280,000 15.40 7. Rail Connectivity & Rail Siding in the Terminal Image: Connectivity 1 LS 1,140,000,000 114.00 7.1 External rail connectivity 5.15 Km 66,000,000 34.0 8. EQUIPENTS Image: Connectivity 5.15 Km 66,000,000 40.00 8.1 Stacker cum Reclaimer 2 No. 200,000,000 40.00 8.2 Fixed hopper 4 No. 2,500,000 1.00 8.3 Font end loader 8 No. 8,000,000 6.00 8.4 Excavator 4 No. 15,000,000 6.00 8.5 Rotaside Wagon Tippler 1 No. 13,000,000 4.00 8.6 Mobile Barge Loader 1 No. 40,000,000 6.00 8.8 Tack Hopper 1 No. 700,000,000 70.00 8.9 Civil works for equipments 1 LS <td< th=""><th></th><td>ii</td><td>For 8.5m high wall</td><td>430</td><td>m</td><td>180,000</td><td>7.74</td><td></td></td<> | | ii | For 8.5m high wall | 430 | m | 180,000 | 7.74 | |
| Rail Connectivity & Rail Siding in the Terminal 148.0 7.1 Extemal rail connectivity 1 LS 1,140,000,00 114.00 7.2 Internal rail connectivity 5.15 km 66,000,000 34.0 8. EQUIPMENTS 164.40 164.40 8.1 Stacker cum Reclaimer 2 No. 200,000,000 40.00 8.2 Fixed hopper 4 No. 2,500,000 1.00 8.3 Front end loader 8 No. 8,000,000 6.40 8.4 Excavator 4 No. 15,000,000 6.00 8.5 Rotaside Wagon Tippler 1 No. 130,000,000 13.00 8.6 Mobile Barge Loader 1 No. 40,000,000 6.00 8.7 Wagon Shifter with pusher 1 No. 700,000,000 70.00 8.8 Track Hopper 1 No. 700,000,00 70.00 9. BELT OVEYOR SYSTEM LS 18.00 14.00 | | iii | For 10.5m high wall | 550 | m | 280,000 | 15.40 | |
| 7.1 External rail connectivity 1 LS 1,140,000,000 114.00 7.2 Internal rail connectivity 5.15 km 66,000,000 34.0 8. EQUIPENTS 1 1 164.40 164.40 8.1 Stacker cum Reclaimer 2 No. 200,000,000 40.00 8.2 Fixed hopper 4 No. 2,500,000 1.00 8.3 Front end loader 8 No. 3,000,000 6.40 8.4 Excavator 4 No. 15,000,000 6.40 8.5 Rotaside Wagon Tippler 1 No. 130,000,000 13.00 8.6 Mobile Barge Loader 1 No. 40,000,000 40.00 8.7 Wagon Shifter with pusher 1 No. 60,000,000 6.00 8.8 Track Hopper 1 No. 18,000,000 6.00 8.8 Track Hopper 1 No. 18,000,000 18.00 9. BLT COVEYOR SYSTEM LS 18,000,000 18.00 10.1 Electrical D | 7. | Rail Co | nnectivity & Rail Siding in the Terminal | | | | 148.0 | |
| 7.2 Internal rail connectivity 5.15 km 66,000,000 34.0 8. EQUIPETS Image: Constraint of the c | | 7.1 | External rail connectivity | 1 | LS | 1,140,000,000 | 114.00 | |
| 8. EQUIP™TS Image: state sta | | 7.2 | Internal rail connectivity | 5.15 | km | 66,000,000 | 34.0 | |
| 8.1 Stacker cum Reclaimer 2 No. 200,000,000 40.00 8.2 Fixed hopper 4 No. 2,500,000 1.00 8.3 Front end loader 8 No. 8,000,000 6.40 8.4 Excavator 4 No. 15,000,000 6.00 8.4 Excavator 4 No. 130,000,000 13.00 8.5 Rotaside Wagon Tippler 1 No. 40,000,000 4.00 8.6 Mobile Barge Loader 1 No. 40,000,000 6.00 8.7 Wagon Shifter with pusher 1 No. 60,000,000 6.00 8.8 Track Hopper 1 No. 700,000,000 70.00 8.9 Civil works for equipments 1 LS 180,000,000 18.00 9. BELT CVVEYOR SYSTEM LS 12.00 10.1 10.1 Electrical Distribution System LS 8.00 10.2 Fire Fighting System LS 6.50 1.50 | 8. | EQUIPN | IENTS | | | | 164.40 | |
| 8.2 Fixed hopper 4 No. 2,500,000 1.00 8.3 Front end loader 8 No. 8,000,000 6.40 8.4 Excavator 4 No. 15,000,000 6.00 8.5 Rotaside Wagon Tippler 1 No. 130,000,000 13.00 8.6 Mobile Barge Loader 1 No. 40,000,000 4.00 8.7 Wagon Shifter with pusher 1 No. 60,000,000 6.00 8.8 Track Hopper 1 No. 700,000,000 70.00 8.8 Track Hopper 1 No. 700,000,000 70.00 8.9 Civil works for equipments 1 LS 180,000,000 18.00 9. BELT UNEYOR SYSTEM ILS 180,000,000 18.00 10.10 10.1 Electrical Distribution System LS 12.00 10.10 10.10 10.2 Fire Fighting System LS 8.00 1.00 1.00 10.4 Water Supply and Distribution LS 1.50 1.50 1.00 1.00 | | 8.1 | Stacker cum Reclaimer | 2 | No. | 200,000,000 | 40.00 | |
| 8.3Front end loader88No.8,000,0006.408.4ExcavatorI.4No.15,000,0006.008.5Rotaside Wagon TipplerI.1No.130,000,00013.008.6Mobile Barge LoaderI.1No.40,000,0004.008.7Wagon Shifter with pusherI.1No.60,000,0006.008.8Track HopperI.1No.700,000,00070.008.9Civil works for equipmentsI.1LS180,000,00018.009.BELT UVEYOR SYSTEMI.1LS180,000,00018.0010.1Electrical Distribution SystemI.1LS12.0012.0010.2Fire Fighting SystemI.SI.S12.0012.0010.3Dust Suppression SystemI.SI.S15.003.0010.4Water Supply and DistributionI.SI.S3.001.5010.5DrainageI.SI.SI.S3.001.5010.6Communication and ITI.SI.SI.001.00Total (+±+3++±+5+t+5+t+5+t+5+t)5t4.63I.SI.001.00 | | 8.2 | Fixed hopper | 4 | No. | 2,500,000 | 1.00 | |
| 8.4Excavator4No.15,000,0006.008.5Rotaside Wagon Tippler1No.130,000,00013.008.6Mobile Barge Loader1No.40,000,0004.008.7Wagon Shifter with pusher1No.60,000,0006.008.8Track Hopper1No.700,000,00070.008.9Civil works for equipments1LS180,000,00018.009.BELT VEYOR SYSTEMIS757.3710.JTILITE AND OTHERSILS12.0010.1Electrical Distribution SystemLS1.018.0010.2Fire Fighting SystemLSI.S6.5010.3Dust Suppression SystemLSI.S6.5010.4Water Supply and DistributionLSI.S3.0010.5DrainageLSLS3.0010.6Communication and ITLSLS1.00Total (+2+3++5+6+7+8+9+10)LSI.S1.00 | | 8.3 | Front end loader | 8 | No. | 8,000,000 | 6.40 | |
| 8.5 Rotaside Wagon Tippler 1 No. 130,000,000 13.00 8.6 Mobile Barge Loader 1 No. 40,000,000 4.00 8.7 Wagon Shifter with pusher 1 No. 60,000,000 6.00 8.8 Track Hopper 1 No. 700,000,000 70.00 8.8 Track Hopper 1 No. 700,000,000 70.00 9. BELT COVEYOR SYSTEM LS 180,000,000 18.00 10. UTILITES AND OTHERS ILS 180,000,000 12.00 10.1 Electrical Distribution System LS 12.00 12.00 10.2 Fire Fighting System LS 8.00 6.50 10.3 Dust Suppression System LS 6.50 10.50 10.4 Water Supply and Distribution LS 3.00 1.50 10.5 Drainage LS 1.00 3.00 10.6 Communication and IT LS 1.00 1.00 | | 8.4 | Excavator | 4 | No. | 15,000,000 | 6.00 | |
| 8.6 Mobile Barge Loader 1 No. 40,000,000 4.00 8.7 Wagon Shifter with pusher 1 No. 60,000,000 6.00 8.8 Track Hopper 1 No. 700,000,000 70.00 8.9 Civil works for equipments 1 LS 180,000,000 18.00 9. BELT COVEYOR SYSTEM 1 LS 180,000,000 18.00 10. UTILITES AND OTHERS 1 LS 12.00 10. Electrical Distribution System LS 12.00 10.1 Electrical Distribution System LS 6.50 10.2 Fire Fighting System LS 6.50 10.3 Dust Suppression System LS 1.50 10.4 Water Supply and Distribution LS 3.00 10.5 Drainage LS 3.00 10.6 Communication and IT LS 1.00 Total (+±+3+4+5+6+7+8+9+10) LS 1.00 | | 8.5 | Rotaside Wagon Tippler | 1 | No. | 130,000,000 | 13.00 | |
| 8.7 Wagon Shifter with pusher 1 No. 60,000,000 6.00 8.8 Track Hopper 1 No. 700,000,000 70.00 8.9 Civil works for equipments 1 LS 180,000,000 18.00 9. BELT CVVEYOR SYSTEM 1 LS 180,000,000 18.00 10. UTILITE AND OTHERS 1 LS 32.00 10.1 Electrical Distribution System LS 12.00 10.2 Fire Fighting System LS 8.00 10.3 Dust Suppression System LS 6.50 10.4 Water Supply and Distribution LS 3.00 10.5 Drainage LS 3.00 10.6 Communication and IT LS 1.01 Total (1+2+3+4+5+6+7+8+9+10) LS 1.00 | | 8.6 | Mobile Barge Loader | 1 | No. | 40,000,000 | 4.00 | |
| 8.8 Track Hopper 1 No. 700,000,000 70.00 8.9 Civil works for equipments 1 LS 180,000,000 18.00 9. BELT COVEYOR SYSTEM IS 180,000,000 18.00 10. UTILITES AND OTHERS IS 32.00 10.1 Electrical Distribution System LS 12.00 10.2 Fire Fighting System LS 8.00 10.3 Dust Suppression System LS 6.50 10.4 Water Supply and Distribution LS 3.00 10.5 Drainage LS 3.00 10.6 Communication and IT LS 1.01 Total (1+2+3+4+5+6+7+8+9+10) LS 614.63 | | 8.7 | Wagon Shifter with pusher | 1 | No. | 60,000,000 | 6.00 | |
| 8.9 Civil works for equipments 1 LS 180,000,000 18.00 9. BELT OVVEYOR SYSTEM 1 100 57.37 10. UTILITES AND OTHERS 1 100 32.00 10.1 Electrical Distribution System LS 12.00 10.2 Fire Fighting System LS 8.00 10.3 Dust Suppression System LS 6.50 10.4 Water Supply and Distribution LS 1.50 10.5 Drainage LS 3.00 10.6 Communication and IT LS 1.00 Total (1+2+3+4+5+6+7+8+9+10) 614.63 | | 8.8 | Track Hopper | 1 | No. | 700,000,000 | 70.00 | |
| 9. BELT CONVEYOR SYSTEM Image: Conversion of the system State of the system 10. UTILITES AND OTHERS Image: Conversion of the system State of the system State of the system 10.1 Electrical Distribution System LS 112.00 10.2 Fire Fighting System LS 8.00 10.3 Dust Suppression System LS 6.50 10.4 Water Supply and Distribution LS 1.50 10.5 Drainage LS 3.00 10.6 Communication and IT LS 1.00 Total (1+2+3+4+5+6+7+8+9+10) 614.63 1.61 | | 8.9 | Civil works for equipments | 1 | LS | 180,000,000 | 18.00 | |
| 10.UTILITIES AND OTHERSImage: Sector of the sector o | 9. | BELT C | ONVEYOR SYSTEM | | | | 57.37 | |
| 10.1 Electrical Distribution System LS 12.00 10.2 Fire Fighting System LS 8.00 10.3 Dust Suppression System LS 6.50 10.4 Water Supply and Distribution LS 1.50 10.5 Drainage LS 3.00 10.6 Communication and IT LS 1.00 Total (1+2+3+4+5+6+7+8+9+10) | 10. | UTILITI | ES AND OTHERS | | | | 32.00 | |
| 10.2 Fire Fighting System LS 8.00 10.3 Dust Suppression System LS 6.50 10.4 Water Supply and Distribution LS 1.50 10.5 Drainage LS 3.00 10.6 Communication and IT LS 1.00 Total (1+2+3+4+5+6+7+8+9+10) 614.63 | | 10.1 | Electrical Distribution System | | LS | | 12.00 | |
| 10.3 Dust Suppression System LS 6.50 10.4 Water Supply and Distribution LS 1.50 10.5 Drainage LS 3.00 10.6 Communication and IT LS 1.00 Total (1+2+3+4+5+6+7+8+9+10) 614.63 | | 10.2 | Fire Fighting System | | LS | | 8.00 | |
| 10.4 Water Supply and Distribution LS 1.50 10.5 Drainage LS 3.00 10.6 Communication and IT LS 1.00 Total (1+2+3+4+5+6+7+8+9+10) 614.63 614.63 | | 10.3 | Dust Suppression System | | LS | | 6.50 | |
| 10.5 Drainage LS 3.00 10.6 Communication and IT LS 1.00 Total (1+2+3+4+5+6+7+8+9+10) 614.63 | | 10.4 | Water Supply and Distribution | | LS | | 1.50 | |
| 10.6 Communication and IT LS 1.00 Total (1+2+3+4+5+6+7+8+9+10) 614.63 | | 10.5 | Drainage | | LS | | 3.00 | |
| Total (1+2+3+4+5+6+7+8+9+10) 614.63 | | 10.6 | Communication and IT | | LS | | 1.00 | |
| | Total (1 | +2+3+4+ | -5+6+7+8+9+10) | | | | 614.63 | |

Table 19.9 : Detailed Capital Cost Estimates for Phase-2 of Terminal (with railway)





| Description | Quantity (cum) | Rate (in Rs) | Amount (Rs. In Crores) |
|--|-------------------|-----------------|---------------------------|
| Earthwork in Excavation by mechanical means (Hydraulics Excavator over areas including disposal of excavated earth lead upto 1 km and lift upto 1.5 m, disposed earth to be levelled and neatly dressed. | 673605.7 | 280.0 | 19 |
| Earthwork in Excavation by mechanical means (Hydraulics Excavator over areas including disposal of excavated earth lead upto 5 km and lift upto 1.5 m, disposed earth to be levelled and neatly dressed. | 1496420.1 | 340.0 | 51 |
| Earthwork in Filling | 673605.7 | 150.0 | 10 |
| Total | 80 | | |

Table 19.10 : Capital Cost Estimate for Site Grading in Phase-2 of Terminal

Table 19.11 : Cost Estimate for Shore Protection Works in Phase-2 of Terminal

| S.No. | Item of Work | Unit | Quantity | Rate (In Rs.) | Amount (Rs. In Crore) |
|-------|---|------|-----------|------------------|--------------------------|
| 1 | Loading and unloading of stone boulder / stone aggreagates weighing not less than 40 kg | Cum | 53,760 | 162.00 | 0.87 |
| 2 | Cost of haulage excluding loading & unloading to the terminal location | t-km | 2,040,000 | 9.50 | 1.94 |
| 3 | Providing and laying Pitching on slopes laid over prepared filter media & laid in wire crates made with 4mm dia GI wire conforming to IS: 280 & IS:4826 in 100mm x 100mm mesh (weaved diagonally) including 10% extra for laps and joints laid with stone boulders weighing not less than 40 kg each.) | Cum | 16,800 | 1,260.36 | 2.12 |
| 4 | Providing and laying Filter material underneath pitching in slopes complete as per drawing and Technical specification | Cum | 3,360 | 1,446.12 | 0.49 |
| 5 | Providing and laying boulders apron on river bed for protection against scour with stone boulders laid in wire crates made with 4mm dia GI wire conforming to IS: 280 & IS:4826 in 100mm x 100mm mesh (weaved diagonally) including 10% extra for laps and joints laid with stone boulders weighing not less than 40 kg each.)each complete as per drawing and Technical specification. | Cum | 33,600 | 1,260.36 | 4.23 |
| | | | | TOTAL COST | 9.65 Crores |





| Item No | Description of Item | Quantity | Unit | Rate (Rs.) | Amount (Rs. in Crores.) |
|------------|---|----------|------|---------------|----------------------------|
| 1. | Mobilisation of all plant and equipment for the jetty construction and demobilisation of the same after completion of the works. | 1 | LS | (13) | 4.06 |
| 2. | Construction of 1200 mm dia bored cast-in-situ piles for berth with m.s. liner, boring in all types of soil /Hard strata stablising unlined soil using any other approved method during excavation, providing reinforecement as per design/ drawing providing and placing M40 grade concrete by means of tremie or any other approved method, providing all necessary labour, materials, plant tools etc. | | | | |
| i | Shift & set up piling plant & equipment at each pile location | 88 | No. | 50,000 | 0.44 |
| ii | Supply, fabricate and driving mild steel liner (8 mm thick) including transport, alignment, pitching in position as required | 900 | Т | 55,000 | 4.95 |
| iii | Driving the steel liners (8 mm thick) upto the required depth below bed level | 2,200 | m | 2,500 | 0.55 |
| iv | Boring through all types of soil strata | 2,200 | m | 3,500 | 0.77 |
| v | Boring through all types of Hard strata | 440 | m | 6,500 | 0.29 |
| vi | Cut & dress pile head to required lines & levels | 88 | No | 5,500 | 0.05 |
| 3. | Supply & placing in position design mix cement concrete grade M40 in pile shaft by means of tremie or any other approved method using 20 mm MSA including cost of all labour and materials but excluding the cost of steel reinforcement. | 4,767 | cum | 8,000 | 3.81 |
| 4. | Supplying corrosion resistant deformed bars grade Fe 500, cutting, bending, tying with 1.5 mm dia annealed binding wire & placing in position reinforcement cage including cleaning, straightening, tack/ lap/ butt welding with approved electrodes, etc. with all labour and materials complete for piles. | 715 | T | 72,000 | 5.15 |
| 5. | Construction of 1000 mm dia bored cast-in-situ piles for berth with m.s. liner, boring in all types of soil /Hard strata stablising unlined soil using any other approved method during excavation, providing reinforecement as per design/ drawing providing and placing M40 grade concrete by means of tremie or any other approved method, providing all necessary labour, materials, plant tools etc. | | | | |
| i | Shift & set up piling plant & equipment at each pile location | 22 | No. | 50,000 | 0.11 |
| ii | Supply, fabricate and driving mild steel liner (8 mm thick) including transport, alignment, pitching in position as required | 188 | Т | 55,000 | 1.03 |
| iii | Driving the steel liners (8 mm thick) upto the required depth below bed level | 550 | m | 2,500 | 0.14 |
| iv | Boring through all types of soil strata | 550 | m | 3,500 | 0.19 |
| v | Boring through all types of Hard strata | 110 | m | 6,500 | 0.07 |
| vi | Cut & dress pile head to required lines & levels | 22 | No | 5,500 | 0.01 |

Table 19.12 : Capital Cost Estimate for Berth in Phase-2 of Terminal





| 6. | Supply & placing in position design mix cement concrete grade M40 in pile shaft by means of tremie or any other approved method using 20 mm MSA including cost of all labour and materials but excluding the cost of steel reinforcement. | 646 | cum | 8,000 | 0.52 |
|-----|---|-------|-----|-----------|-------|
| 7. | Supplying corrosion resistant deformed bars grade Fe 500, cutting, bending, tying with 1.5 mm dia annealed binding wire & placing in position reinforcement cage including cleaning, straightening, tack/ lap/ butt welding with approved electrodes, etc. with all labour and materials complete for piles. | 97 | Т | 72,000 | 0.70 |
| 8. | Supply & place in position to lines & levels cast in-situ design & precast units mix cement concrete of grade M40 for deck slab and beams including providing formwork shuttering, machine mixing, compacting, curing of concrete, centering, including providing pockets, openings, recesses, champhering where required and rendering if required to give a smooth and even surface in any shape etc. complete as directed with all labour and materials but excluding the cost of steel reinforcement. | 5,463 | cum | 9,000 | 4.92 |
| 9. | Supply & place in position to lines & levels cast in-situ design mix cement concrete for wearing coat of average thickness 100 mm including provision of formwork, machine mixing, placing in panels, compacting, curing, etc. complete with all labour and materials. | 325 | cum | 6,000 | 0.20 |
| 10. | Supplying corrosion resistant deformed bars grade Fe 500, cutting, bending, tying with 1.5 mm dia annealed binding wire & placing in position reinforcement cage including cleaning, strengthening tack/ lap/ butt welding with approved electrodes, etc. with all labour and materials complete for deck slab and beams. | 874 | Т | 72,000 | 6.29 |
| 11. | Providing and fixing cast steel bollards of 30 T capacity complete with base plate & H.T. anchor bolts of appropriate length, nuts washers, etc. including grouting with cement concrete M40 under base plate, filling the cavity with concrete grade M15, painting etc. complete. | 22 | No. | 150,000 | 0.33 |
| 12. | Design, supply, assemble and fix in position in the required lines and levels arch type AN 800 E 3.0 grade rubber fenders of Trellborg or equivalent make of length 3m with steel plates manufactured as per manufacturer's specifications as directed by the Engineer. | 66 | No. | 1,350,000 | 8.91 |
| 13. | Carrying out load test of pile including construction of test caps, accessories and dismantling same after test etc. | 2 | No. | 1,000,000 | 0.20 |
| 14. | Supplying, fabricating, painting, welding, drilling, grouting & fixing in position etc. complete various miscellaneous items such as steel inserts, hand railing, coping fender, ladders, handlhold, expansion joints, mooring rings, nut, bolts, washers, bituminous filler etc in precast & in-situ concrete components in accordance with the drawings & as directed by the Engineer. | | LS | | 1.00 |
| | | | | Total | 44.68 |





| ltem No. | Description of Item | Quantity | Unit | Rate (Rs.) | Amount (Rs. in Crores) |
|-------------|---|----------|------|---------------|---------------------------|
| 1. | Mobilisation of all plant and equipment for the jetty construction and demobilisation of the same after completion of the works. | 1 | LS | | 0.50 |
| 2. | Construction of 1200 mm dia bored cast-in-situ piles for berth with m.s. liner, boring in all types of soil /Hard strata stablising unlined soil using any other approved method during excavation, providing reinforecement as per design/drawing providing and placing M40 grade concrete by means of tremie or any other approved method, providing all necessary labour, materials, plant tools etc. | | | | |
| i | Shift & set up piling plant & equipment at each pile location | 18 | No. | 50,000 | 0.09 |
| ii | Supply, fabricate and driving mild steel liner (8 mm thick) including transport, alignment, pitching in position as required | 107 | Т | 55,000 | 0.59 |
| iii | Driving the steel liners (8 mm thick) upto the required depth below bed level | 450 | m | 2,500 | 0.11 |
| iv | Boring through all types of soil strata | 450 | m | 3,500 | 0.16 |
| v | Boring through all types of Hard strata | 54 | m | 6,500 | 0.04 |
| vi | Cut & dress pile head to required lines & levels | 18 | No | 5,500 | 0.01 |
| 3. | Supply & placing in position design mix cement concrete grade M40 in pile shaft by means of tremie or any other approved method using 20 mm MSA including cost of all labour and materials but excluding the cost of steel reinforcement. | 934 | cum | 8,000 | 0.75 |
| 4. | Supplying corrosion resistant deformed bars grade Fe 500, cutting, bending, tying with 1.5 mm dia annealed binding wire & placing in position reinforcement cage including cleaning, straightening, tack/ lap/ butt welding with approved electrodes, etc. with all labour and materials complete for piles. | 140 | Т | 72,000 | 1.01 |
| 5. | Supply & place in position to lines & levels cast in-situ design & precast units mix cement concrete of grade M40 for deck slab and beams including providing formwork shuttering, machine mixing, compacting, curing of concrete, centering, including providing pockets, openings, recesses, champhering where required and rendering if required to give a smooth and even surface in any shape etc. complete as directed with all labour and materials but excluding the cost of steel reinforcement. | 785 | cum | 9,000 | 0.71 |
| 6. | Supply & place in position to lines & levels cast in-situ design mix cement concrete for wearing coat of average thickness 100 mm including provision of formwork, machine mixing, placing in panels, compacting, curing, etc. complete with all labour and materials. | 50 | cum | 6,000 | 0.03 |
| 7. | Supplying corrosion resistant deformed bars grade Fe 500, cutting, bending, tying with 1.5 mm dia annealed binding wire & placing in position, reinforcement cage including cleaning, strengthening tack/ lap/ butt welding with approved electrodes, etc. with all labour and materials complete for deck slab and beams. | 126 | Т | 72,000 | 0.90 |
| 8. | Carrying out load test of pile including construction of test caps, accessories and dismantling same after test etc., | 1 | No. | 1,000,000 | 0.10 |
| 9. | Supplying, fabricating, painting, welding, drilling, grouting & fixing in position etc. complete various miscellaneous items such as steel inserts, hand railing, ladders, handlhold, expansion joints, nut, bolts, washers, bituminous filler etc in precast & in-situ concrete components in accordance with the drawings & as directed by the Engineer. | | LS | | 0.50 |
| | | | | Total | 5.49 |

Table 19.13 : Capital Cost Estimate for Approach Trestle in Phase-2 of Terminal





Table 19.14 : Capital Cost Estimate for Conveyor Gallery Foundation in Phase-2 of Terminal

| ltem No. | Description of Item | Quantity | Unit | Rate (Rs.) | Amount (Rs. in Crores) |
|-------------|---|----------|------|---------------|---------------------------|
| 1. | Mobilisation of all plant and equipment for the jetty construction and demobilisation of the same after completion of the works. | 1 | LS | | 0.30 |
| 2. | Construction of 1200 mm dia bored cast-in-situ piles for berth with m.s. liner, boring in all types of soil /Hard strata stablising unlined soil using any other approved method during excavation, providing reinforecement as per design/drawing providing and placing M40 grade concrete by means of tremie or any other approved method, providing all necessary labour, materials, plant tools etc. | | | | |
| i | Shift & set up piling plant & equipment at each pile location | 10 | No. | 50,000 | 0.05 |
| ii | Supply, fabricate and driving mild steel liner (8 mm thick) including transport, alignment, pitching in position as required | 60 | Т | 55,000 | 0.33 |
| iii | Driving the steel liners (8 mm thick) upto the required depth below bed level | 429 | m | 2,500 | 0.11 |
| iv | Boring through all types of soil strata | 429 | m | 3,500 | 0.15 |
| v | Boring through all types of Hard strata | 30 | m | 6,500 | 0.02 |
| vi | Cut & dress pile head to required lines & levels | 10 | No | 5,500 | 0.01 |
| 3. | Supply & placing in position design mix cement concrete grade M40 in pile shaft by means of tremie or any other approved method using 20 mm MSA including cost of all labour and materials but excluding the cost of steel reinforcement. | 519 | cum | 8,000 | 0.42 |
| 4. | Supplying corrosion resistant deformed bars grade Fe 500, cutting, bending, tying with 1.5 mm dia annealed binding wire & placing in position reinforcement cage including cleaning, straightening, tack/ lap/ butt welding with approved electrodes, etc. with all labour and materials complete for piles. | 78 | Т | 72,000 | 0.56 |
| 5. | Supply & place in position to lines & levels cast in-situ design & precast units mix cement concrete of grade M40 for deck slab and beams including providing formwork shuttering, machine mixing, compacting, curing of concrete, centering, including providing pockets, openings, recesses, champhering where required and rendering if required to give a smooth and even surface in any shape etc. complete as directed with all labour and materials but excluding the cost of steel reinforcement. | 375 | cum | 9,000 | 0.34 |
| 6. | Supply & place in position to lines & levels cast in-situ design mix cement concrete for wearing coat of average thickness 100 mm including provision of formwork, machine mixing, placing in panels, compacting, curing, etc. complete with all labour and materials. | 0 | cum | 6,000 | 0.00 |
| 7. | Supplying corrosion resistant deformed bars grade Fe 500, cutting, bending, tying with 1.5 mm dia annealed binding wire & placing in position, reinforcement cage including cleaning, strengthening tack/ lap/ butt welding with approved electrodes, etc. with all labour and materials complete for deck slab and beams. | 60 | Т | 72,000 | 0.43 |
| 8. | Carrying out load test of pile including construction of test caps, accessories and dismantling same after test etc., | 1 | No. | 1,000,000 | 0.10 |
| 9. | Supplying, fabricating, painting, welding, drilling, grouting & fixing in position etc. complete various miscellaneous items such as steel inserts, hand railing, ladders, handlhold, expansion joints, nut, bolts, washers, bituminous filler etc in precast & in-situ concrete components in accordance with the drawings & as directed by the Engineer. | | LS | | 0.50 |
| | | | | Total | 3.31 |





The summary of the capital cost for Phase-3 of the Terminal is presented in Table 19.15 below:

| S No | Itom | Capital Cost |
|--------|---------------------------------------|-----------------|
| 5. NO. | | (Rs. In Crores) |
| 1. | Site Grading | 1.00 |
| 2. | Berths | 87.50 |
| 3. | Storage Areas | 22.92 |
| 4. | Internal Roads Including Parking Area | 5.33 |
| 5. | Equipments | 73.00 |
| 6. | Belt Conveyor System | 96.00 |
| 7. | Utilities and Others | 30.00 |
| | Sub-total | 315.74 |
| | Contingency @ 3% as per CPWD norms | 9.47 |
| | Total | 325.21 |
| | Say | 325 Crores |

Table 19.15 : Summary of Capital Cost Estimates for Phase-3 of Terminal

The break-up of major components of the capital cost estimates for Phase-3 of the Terminal are furnished in Table 19.16 to 19.17 respectively.





| S. No. | Item | | Quantity | Unit | Rate (Rs.) | Capital Cost (Rs. in Crores) | Reference |
|---------|----------|---------------------------------|----------|------|-------------|------------------------------------|-------------------|
| 1. | LAND 8 | SITE DEVELOPMENT | | | | 1.00 | |
| | 1.1 | Studies and Investigations | | LS | | 1.00 | |
| | 1.2 | Site Grading | | LS | | - | |
| 2. | JETTY | | | | | 87.5 | |
| | 2.1 | Berths | | | | 87.5 | Refer Table 19.17 |
| 3. | STORA | GE AREAS | | | | 22.92 | |
| | 3.1 | Coal Stockyard | 50,000 | sqm | 1,200 | 6.00 | |
| | 3.2 | Stone-chips Stockyard | 36,000 | sqm | 1,200 | 4.32 | |
| | 3.3 | Storage Shed | 8,400 | sqm | 15,000 | 12.60 | |
| 4. | INTERN | AL ROADS INCLUDING PARKING AREA | | | | 5.33 | |
| | 4.1 | Roads to Operational Areas | 15,000 | sqm | 3,000 | 4.50 | |
| | 4.2 | Parking Area | 11,800 | sqm | 700 | 0.83 | |
| 5. | EQUIPM | MENTS | | | | 73.00 | |
| | 5.1 | Stacker cum Reclaimer | 2 | No. | 200,000,000 | 40.00 | |
| | 5.2 | Reclaimer | 1 | No. | 150,000,000 | 15.00 | |
| | 5.3 | Mobile Barge Loader | 2 | No. | 40,000,000 | 8.00 | |
| | 5.4 | Civil works for equipments | 1 | LS | 100,000,000 | 10.00 | |
| 6. | BELT C | ONVEYOR SYSTEM | | | | 96.00 | |
| 7. | UTILITI | ES AND OTHERS | | | | 30.00 | |
| | 7.1 | Electrical Distribution System | | LS | | 15.00 | |
| | 7.2 | Fire Fighting System | | LS | | 6.00 | |
| | 7.3 | Dust Suppression System | | LS | | 5.00 | |
| | 7.4 | Water Supply and Distribution | | LS | | 1.00 | |
| | 7.5 | Drainage | | LS | | 2.00 | |
| | 7.6 | Communication and IT | | LS | | 1.00 | |
| Total (| (1+2+3+4 | l+5+6+7) | | | | 315.74 | |

Table 19.16 : Detailed Capital Cost Estimates for Phase-3 of Terminal





| Item | Description of Item | Quantity | Unit | Rate | Amount |
|------------------|---|----------|------|--------|--------------------------|
| <u>No.</u> 1. | Mobilisation of all plant and equipment for the jetty construction and demobilisation of the same after completion of the works. | 1 | LS | (RS.) | (RS. In Crores) 7.95 |
| 2. | Construction of 1200 mm dia bored cast-in-situ piles for berth with m.s. liner, boring in all types of soil /Hard strata stablising unlined soil using any other approved method during excavation, providing reinforecement as per design/ drawing providing and placing M40 grade concrete by means of tremie or any other approved method, providing all necessary labour, materials, plant tools etc. | | | | |
| i | Shift & set up piling plant & equipment at each pile location | 176 | No. | 50,000 | 0.88 |
| ii | Supply, fabricate and driving mild steel liner (8 mm thick) including transport, alignment, pitching in position as required | 1,799 | Т | 55,000 | 9.90 |
| iii | Driving the steel liners (8 mm thick) upto the required depth below bed level | 4,400 | m | 2,500 | 1.10 |
| iv | Boring through all types of soil strata | 4,400 | m | 3,500 | 1.54 |
| v | Boring through all types of Hard strata | 880 | m | 6,500 | 0.57 |
| vi | Cut & dress pile head to required lines & levels | 176 | No | 5,500 | 0.10 |
| 3. | Supply & placing in position design mix cement concrete grade M40 in pile shaft by means of tremie or any other approved method using 20 mm MSA including cost of all labour and materials but excluding the cost of steel reinforcement. | 9,535 | cum | 8,000 | 7.63 |
| 4. | Supplying corrosion resistant deformed bars grade Fe 500, cutting, bending, tying with 1.5 mm dia annealed binding wire & placing in position reinforcement cage including cleaning, straightening, tack/ lap/ butt welding with approved electrodes, etc. with all labour and materials complete for piles. | 1,430 | Т | 72,000 | 10.30 |
| 5. | Construction of 1000 mm dia bored cast-in-situ piles for berth with m.s. liner, boring in all types of soil /Hard strata stablising unlined soil using any other approved method during excavation, providing reinforecement as per design/ drawing providing and placing M40 grade concrete by means of tremie or any other approved method, providing all necessary labour, materials, plant tools etc. | | | | |
| i | Shift & set up piling plant & equipment at each pile location | 44 | No. | 50,000 | 0.22 |
| ii | Supply, fabricate and driving mild steel liner (8 mm thick) including transport, alignment, pitching in position as required | 284 | Т | 55,000 | 1.56 |
| iii | Driving the steel liners (8 mm thick) upto the required depth below bed level | 1,100 | m | 2,500 | 0.28 |
| iv | Boring through all types of soil strata | 1,100 | m | 3,500 | 0.39 |
| v | Boring through all types of Hard strata | 220 | m | 6,500 | 0.14 |
| vi | Cut & dress pile head to required lines & levels | 44 | No | 5,500 | 0.02 |

Table 19.17 : Capital Cost Estimate for Berths in Phase-3 of Terminal





| Supply & placing in position design mix cement concrete grade M40 in pile shaft by means of tremie or any other approved method using 20 mm MSA including cost of all labour and materials but excluding the cost of steel reinforcement. | 1,293 | cum | 8,000 | 1.03 |
|--|--------|-----|-----------|-------|
| Supplying corrosion resistant deformed bars grade Fe 500, cutting, bending, tying with 1.5 mm dia annealed binding wire & placing in position reinforcement cage including cleaning, straightening, tack/ lap/ butt welding with approved electrodes, etc. with all labour and materials complete for piles. | 194 | Т | 72,000 | 1.40 |
| 8. Supply & place in position to lines & levels cast in-situ design & precast units mix cement concrete of grade M40 for deck slab and beams including providing formwork shuttering, machine mixing, compacting, curing of concrete, centering, including providing pockets, openings, recesses, champhering where required and rendering if required to give a smooth and even surface in any shape etc. complete as directed with all labour and materials but excluding the cost of steel reinforcement. | 10,925 | cum | 9,000 | 9.83 |
| Supply & place in position to lines & levels cast in-situ design mix cement concrete for wearing coat of average thickness 100 mm including provision of formwork, machine mixing, placing in panels, compacting, curing, etc. complete with all labour and materials. | 650 | cum | 6,000 | 0.39 |
| Supplying corrosion resistant deformed bars grade Fe 500, cutting, bending, tying with 1.5 mm dia annealed binding wire & placing in position reinforcement cage including cleaning, strengthening tack/ lap/ butt welding with approved electrodes, etc. with all labour and materials complete for deck slab and beams. | 1,748 | Т | 72,000 | 12.59 |
| 11. Providing and fixing cast steel bollards of 30 T capacity complete with base plate & H.T. anchor bolts of appropriate length, nuts washers, etc. including grouting with cement concrete M40 under base plate, filling the cavity with concrete grade M15, painting etc. complete. | 44 | No. | 150,000 | 0.66 |
| 12. Design, supply, assemble and fix in position in the required lines and levels arch type AN 800 E 3.0 grade rubber fenders of Trellborg or equivalent make of length 3m with steel plates manufactured as per manufacturer's specifications as directed by the Engineer. | 132 | No. | 1,350,000 | 17.82 |
| 13. Carrying out load test of pile including construction of test caps, accessories and dismantling same after test etc. | 2 | No. | 1,000,000 | 0.20 |
| 14. Supplying, fabricating, painting, welding, drilling, grouting & fixing in position etc. complete various miscellaneous items such as steel inserts, hand railing, coping fender, ladders, handlhold, expansion joints, mooring rings, nut, bolts, washers, bituminous filler etc in precast & in-situ concrete components in accordance with the drawings & as directed by the Engineer. | | LS | | 1.00 |
| | | | Total | 87.5 |





The cost for developing the Sahibganj terminal in Phase-1 shall be borne by IWAI. The Sahibganj terminal is proposed to be developed under PPP mode for Phase-2 and Phase-3, if feasible, at that time.

19.2 Operation and Maintenance Costs

Operation and Maintenance costs have been calculated under various heads, as described in the subsequent paras:

- 1% of Civil Works
- 3% of Utilities
- 3% of Mechanical and Electrical Works

The summary of the annual operation and maintenance costs of the facilities for Phase-1 of terminal is presented in Table 19.18 below:

| S. No. | Item Quantity Unit Rate | | Unit | Annual Costs | | | |
|--------|-------------------------|---|-----------|------------------|------|-----------------------|-----------------|
| | | | | | | | (Rs. in Crores) |
| А. | REPA | REPAIR AND MAINTENANCE COSTS | | | | | |
| | 1. | Civil Works | 251 | Rs. in crores | 1% | % of Cost | 2.51 |
| | 2. | Mechanical, Electrical Works and other Utilities | 79 | Rs. in crores | 3% | % of Cost | 2.37 |
| В. | OPERATION COSTS | | | | | | |
| | 1. | Maintenance Dredging | 150,000 | cum per annum | 300 | Rs. Per cum | 4.50 |
| | 2. | Manpower Costs | | | LS | | 3.50 |
| | 3. | Electricity | | | | | |
| | a. | Electricity Consumption | 3,472,000 | kWH | 6.50 | Rs. Per kWH | 2.26 |
| | b. | Fixed Charges on Demand Load | 900 | kVA | 400 | Rs. Per kVA Per month | 0.43 |
| | 4. | Fuel | 380,000 | litres | 65 | Rs./litre | 2.47 |
| C. | SUBT | TOTAL | | | | | 18.03 |
| | Insur and N | ance, Administrative Expenses ⁄liscellaneous | | | LS | | 1.50 |
| D. | ΤΟΤΑ | L ANNUAL OPERATION AND MAIN | NTENANCE | COSTS | | | 19.53 |
| | | | | | | Say (Rs. in Crores) | 20.00 |

Table 19.18 : O&M Cost Estimates for Phase-1 of Terminal





20.0 FINANCIAL AND ECONOMIC ANALYSIS

20.1 Introduction

Financial feasibility is a key determinant in a business oriented investment decision. In case of the projects of public/national interest like development of Inland Water Terminal, the viability of the project depends on the economic feasibility which act as the deciding factor. The financial and economic viability is carried out for development of all phases of proposed terminal at Sahibganj.

20.2 Financial Analysis

The primary objective of the financial analysis is to evaluate the financial viability and to ascertain whether the project is attractive from the investor's point.

20.2.1 General Assumptions

Following are the key assumptions considered in the financial model

- The inputs are taken from the technical studies and traffic study carried out for the project.
- The financial analysis is carried out for Phase 1, Phase 2, Phase 3 individually, Phase 2 + Phase 3 consolidated & Phase 1 + Phase 2 + Phase 3 consolidated respectively.
- The base year for capital costs is 2014-15.
- The inflation rate of 5% per annum is considered in the model
- Depreciation rates and tax rates applicable to infrastructure projects have been taken as per the guidelines of Companies Act and Income Tax Act.

20.2.2 Construction Period and Project Life

As per the proposed schedule of implementation, the construction for the first phase is assumed to begin from 01st January 2017. The construction period, including post construction activities like commissioning, is assumed to be requiring 30 months. Therefore, for the Phase-1 development, the operation may be assumed as 01st October 2019.

| Construction Start Date for Phase 1 | 1-January-2017 |
|--|----------------|
| Construction period for Phase 1 (months) | 30 |
| Operation Start (Phase 1) | 1-October-2019 |
| Project Life considered (Years) | 30 |
| End Date | 31-March-2049 |

Table 20.1: Phase-1 : Project Development Schedule

20.2.3 Means of Finance

The financial analysis is carried out assuming debt-equity ratio as 70:30 for the entire capital expenditure that will be invested by the Client.





20.2.4 Income Tax Calculations

IWAI is registered with the Income Tax Department, Ghaziabad under section 12 A (a) and has got exemption of income tax under section 10(23) (c) (iv) of Income Tax Act. Therefore, income tax is not considered in the Financial Analysis.

20.2.5 Project Cost

The estimated cost of the project for Phase-1 is given below.

| S. No. | Item | Capital Cost (Rs. In Crores) |
|--------|---|---------------------------------|
| 1 | Site Grading and Dredging | 56.38 |
| 2 | Shore Protection Works | 9.65 |
| 3 | Berths including Approach Trestles | 101.43 |
| 4 | Buildings | 2.56 |
| 5 | Storage Areas | 8.69 |
| 6 | Internal Roads including Ramp | 24.54 |
| 7 | External / Approach Roads | 14.00 |
| 8 | Road Over Bridge | 38.00 |
| 9 | Equipments | 33.40 |
| 10 | Belt Conveyor System | 28.00 |
| 11 | Utilities and Others, Navigational Aids | 18.27 |
| | Total | 334.92 |

Table 20.2: Landing Cost for Phase-1 Development

20.2.6 Revenue Estimation

Prevailing IWAI charges

The following Tariff charges published by Inland Waterways Authority of India (IWAI) has been considered for Sahibganj Terminal.

Table 20.3: Storage Charges

| Storage Charges | Unit | Open Storage | Closed Storage |
|-----------------------|-------------|--------------|----------------|
| First 3 days | INR/Ton/day | 0 | 0 |
| From 4th - 15th day | INR/Ton/day | 12 | 15 |
| From 16th - 30th day | INR/Ton/day | 22 | 27 |
| From 31st day onwards | INR/Ton/day | 44 | 54 |





| Type of Cargo | Unit | Handling Charges |
|---------------------------------|--------|------------------|
| Construction Materials (Bulk) | Rs/MT | 170 |
| Construction Materials (Bagged) | Rs/MT | 210 |
| Consumer good | Rs/MT | 170 |
| Containers | Rs/TEU | 4500 |
| Food and Food Stuff | Rs/MT | 170 |
| Project Cargo | Rs/MT | 170 |

Table 20.5: Berthing Charges

| Vessel related charges | | |
|------------------------|-----------|------|
| Berthing Charges | Rs/ 24hrs | 1000 |

20.2.7 Expenses

Expenses would be incurred on day to day basis which includes Operating expenses, Administration expenses, Repairs & Routine Maintenance expenses, Expenses on electricity, Insurance premium, Salaries etc. The operation & maintenance cost is considered as mentioned in Chapter 19.

20.2.8 Key Results - Financial Analysis

Based on the financial analysis carried out taking into consideration of the above mentioned factors, the financial IRR has be worked out to be **14.77%** for Phase-1 development.





Table 20.6: Financial IRR for Phase-1 of Terminal

| Year | | | 1 | 6 | 11 | 16 | 21 | 26 | 30 |
|-----------------------------------|-----------|-----------|----------|--------|--------|--------|---------|---------|---------|
| FY | 2018 | 2019 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2049 |
| Project Cost | | | | | | | | | |
| Cargo in Million Tonnes | | | 2.48 | 3.03 | 3.03 | 3.03 | 3.03 | 3.03 | 3.03 |
| | | | | | | | | | |
| Revenues | | | | | | | | | |
| Cargo Handling Revenue | | | 422.96 | 599.61 | 695.11 | 805.82 | 934.17 | 1082.96 | 1218.88 |
| Storage Revenue | | | 93.51 | 132.61 | 153.73 | 178.21 | 206.60 | 239.50 | 269.56 |
| Vessel Related Revenue | | | 0.26 | 0.50 | 0.58 | 0.67 | 0.78 | 0.90 | 1.02 |
| Total Income | | | 516.72 | 732.71 | 849.42 | 984.71 | 1141.55 | 1323.36 | 1489.46 |
| Fynansas | | | | | | | | | |
| Operating Expense | | | | | | | | | |
| Electricity Cost | | | 26.84 | 36.94 | 42.83 | 49.65 | 57.56 | 66.72 | 75.10 |
| Fuel Cost | | | 24.68 | 35.44 | 41.09 | 47.63 | 55.22 | 64.01 | 72.05 |
| Other Labour Cost | | | 12.38 | 19.32 | 24.66 | 31.47 | 40.16 | 51.26 | 62.30 |
| Manpower Cost | | | 35.00 | 44.67 | 57.01 | 72.76 | 92.87 | 118.52 | 144.06 |
| Insurance @ 0.75% of Project cost | | | 2.51 | 2.91 | 3.37 | 3.90 | 4.53 | 5.25 | 5.91 |
| Maintenance Cost | | | 48.74 | 56.51 | 65.51 | 75.94 | 88.04 | 102.06 | 114.87 |
| Total Expense | | | 150.16 | 195.79 | 234.46 | 281.36 | 338.37 | 407.83 | 474.29 |
| EBITDA | | | 366.56 | 536.93 | 614.96 | 703.35 | 803.18 | 915.54 | 1015.17 |
| Depreciation | | | 243.72 | 149.53 | 98.37 | 68.42 | 49.53 | 36.81 | 29.39 |
| EBIT | | | 122.84 | 387.40 | 516.59 | 634.93 | 753.65 | 878.73 | 985.78 |
| Interest | 257.30 | 257.30 | 257.30 | 158.34 | 59.38 | 0.00 | 0.00 | 0.00 | 0.00 |
| РВТ | (257.30) | (257.30) | (134.46) | 229.07 | 457.22 | 634.93 | 753.65 | 878.73 | 985.78 |
| CAPEX | (1675.00) | (1675.00) | | | | | | | |
| Salvage Value | | | | | | | | | 544.23 |
| Cash Flow before Tax | (1675.00) | (1675.00) | 366.56 | 536.93 | 614.96 | 703.35 | 803.18 | 915.54 | 1559.39 |
| IRR | 14.77% | | | | | | | | |
| NPV | 775.54 | | | | | | | | |





20.3 Economic Analysis

In this section, economic analysis has been carried out for Phase 1 of Sahibganj terminal based on various socio-economic factors as mentioned below.

20.3.1 Economic Factors considered

Following are the factors that are considered to carry out the economic analysis for Sahibganj project:

- Energy Consumption
- Air Pollution
- Noise Pollution
- Soil and Water Pollution
- Accidents

20.3.2 Key Assumptions

In addition to the key assumptions that has been considered for the financial analysis, the following are the specific assumptions considered for carrying out economic analysis.

- a) Based on the traffic study, the average distance considered between Sahibganj terminal and the origin/destination terminals is about 300 km.
- b) It is assumed that in the present scenario, 70% of the cargo is transported through roadways and 30% of the cargo is transported through railways.

20.3.3 Approach and Methodology

The economic analysis of the project has been evaluated based on the following scenarios.

- 'With Project' Scenario and
- 'Without Project' Scenario

Both 'with project' and 'without project' scenarios have been quantified over the full life of the project. Also the 'incremental situation' or 'Benefit from the project' have been arrived by comparing the 'with project' scenario and 'without project' scenario wherein in the former case, the cargoes will be transported through barges and in later case, cargoes will be transported through barges and in later case, cargoes will be transported through barges and in later case, cargoes will be transported through barges and in later case, cargoes will be transported through barges and in later case, cargoes will be transported through barges and in later case, cargoes will be transported through road & rail.

20.3.4 Energy Consumption

Transport infrastructure plays a key role in the economic development of a country and an efficient transport sector, particularly for transportation of bulk goods is vital for development of any country. As per the World Bank study, Indian logistics cost is one of the highest in the world. As per this study, the logistics cost is 6% to 8% of the total value of goods in developing countries, 10% of the total values of goods in China whereas the cost of logistics in India is 14% of the total value of goods. By using the energy efficient mode of transportation, the logistics cost can be drastically reduced which in turn will boost the economy of the country.





In this section, a comparative study on the energy performance of inland shipping versus that of other land transportation modes has been carried out.

The energy consumption pattern of waterways, roadways and railways is illustrated in the below table, which is based on the 'Eleventh Working Group Report on Shipping and IWT' and 'Working Group Report on Railways'.

| | Waterways | | Road | | Rail | |
|--|-----------|-----------|---------|-----------|---------|-----------|
| Energy Consumption | Mj/t km | litre/Tkm | Mj/t km | litre/Tkm | Mj/t km | litre/Tkm |
| 11 th Working Group Report on shipping and IWT (Based on EU: Progress Report on short sea shipping 1999) | | 0.0048 | | 0.0313 | | 0.0089 |
| Report of Working Group on Railways-2012 | | | 1.3550 | 0.0350 | 0.2550 | 0.0066 |
| 'Energy Consumption' considered for the Study | | 0.0048 | | 0.0313 | | 0.0089 |

Table 20.7: Energy Consumption - Waterways, Road and Rail

For the present study, the energy consumption pattern published by `11th Working Group Report on shipping and IWT' has been considered for further analysis.

The benefit from the project pertaining to the energy consumption of all the three modes of transportation viz. waterways, roadways and railways has been forecasted and presented in below table.

| Energy Consumption - Phase 1 | FY | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2049 |
|--|-----------|----------|----------|----------|----------|----------|----------|----------|
| Without Project Scenario | | | | | | | | |
| Road Transportation | 0.70 | | | | | | | |
| Road - Energy Consumption | Rs/ Tkm | 2.19 | 2.54 | 2.94 | 3.41 | 3.96 | 4.59 | 5.16 |
| Road- Total Energy Consumption | in Rs. Mn | 1,138.89 | 1,614.71 | 1,871.89 | 2,170.03 | 2,515.66 | 2,916.34 | 3,282.37 |
| Rail Transportation | | | | | | | | |
| Rail Transportation | 0.30 | | | | | | | |
| Rail - Energy Consumption | Rs/ Tkm | 0.62 | 0.72 | 0.84 | 0.97 | 1.13 | 1.30 | 1.47 |
| Rail- Total Energy Consumption | in Rs. | 138.79 | 196.77 | 228.11 | 264.44 | 306.56 | 355.39 | 400.00 |
| Total | in Rs. Mn | 1,277.67 | 1,811.48 | 2,100.00 | 2,434.48 | 2,822.23 | 3,271.73 | 3,682.36 |
| With Project Scenario | | | | | | | | |
| Waterways Transportation | | | | | | | | |
| Waterways - Energy Consumption Cost | Rs/ Tkm | 0.34 | 0.39 | 0.45 | 0.52 | 0.61 | 0.70 | 0.79 |
| Waterways- Total Energy Consumption Cost | in Rs. Mn | 737.60 | 1,045.76 | 1,212.33 | 1,405.42 | 1,629.27 | 1,888.77 | 2,125.82 |
| Incremental Benefit from the project | in Rs. Mn | 540.07 | 765.71 | 887.67 | 1,029.06 | 1,192.96 | 1,382.97 | 1,556.54 |

Table 20.8 Energy Consumption – Economical Benefit





20.3.5 External Costs

Transport contributes significantly to economic growth. Unfortunately, most forms of transport do not only affect society in a positive way but also give rise to side effects. In contrast to the benefits, the cost of these effects of transport are generally not borne by the transport users and hence not taken into account when they make a transport decision. Therefore these effects are generally labelled as external effects. The various cost associated with the external effects are described below.

20.3.5.1 Air Pollution

Transport related air pollution causes damages to humans, biosphere, soil, water, buildings and materials. The most important pollutants are the following:

- Particulate matters
- Nitrogen oxides
- Sulphur oxide
- Ozone
- Volatile organic compounds

Several studies have been carried out to estimate the level of impact caused due to the air pollution triggered by road, rail and inland shipping. Subsequently, the cost factor was arrived for the air pollution by critically valuating various cost elements like valuation of human life, market prices for crops, valuation of building damages, and valuation of long term risks in biosphere. The external cost of air pollution arrived by various studies are listed below:

| Table 20.9: External Costs of Air Pollution | - Waterways, | , Roadways and | Railways |
|---|--------------|----------------|----------|
|---|--------------|----------------|----------|

| Inland Water Transportation | Unit | Cost | Cost (in Rs/tkm) |
|---|-----------|--------|---------------------|
| Total Transportation System Study - Planning Commission Report | Rs / t km | 0.0300 | 0.0300 |
| Union Internationale des Chemins de fer (PIANC) | €/Tkm | 0.0040 | 0.0011 |
| le Groupe d'Economie des Transports de l'ULB (PIANC) | €/ Tkm | | |
| Bundesamt fur Umweltschutz (PIANC) | €/Tkm | 0.0014 | 0.0004 |
| Cost considered for the study | | | 0.0300 |





| Roadway | Unit | Cost | Cost (in Rs/tkm) |
|---|-----------|--------|---------------------|
| Total Transportation System Study - Planning Commission Report | Rs / t km | 0.2020 | 0.2020 |
| Union Internationale des Chemins de fer (PIANC) | €/Tkm | 0.0122 | 0.0033 |
| le Groupe d'Economie des Transports de l'ULB (PIANC) | €/ Tkm | 0.0329 | 0.0090 |
| Bundesamt fur Umweltschutz (PIANC) | €/Tkm | 0.0096 | 0.0026 |
| Cost considered for the study | | | 0.2020 |

| Railway | Unit | Cost | Cost (in Rs/tkm) |
|---|-----------|--------|---------------------|
| Total Transportation System Study - Planning Commission Report | Rs / t km | 0.0366 | 0.0366 |
| Union Internationale des Chemins de fer (PIANC) | €/Tkm | 0.0122 | 0.0033 |
| le Groupe d'Economie des Transports de l'ULB (PIANC) | €/ Tkm | 0.0329 | 0.0090 |
| Bundesamt fur Umweltschutz (PIANC) | €/Tkm | 0.0096 | 0.0026 |
| Cost considered for the Study | | | 0.0366 |

Based on the traffic projection, the external cost of air pollution is estimated for the both the scenarios 'With Project' and 'Without project' which are captured below:

| Air Pollution - Phase 1 | FY | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2049 |
|--|-----------|--------|--------|--------|--------|--------|--------|--------|
| Without Project' Scenario | | | | | | | | |
| Road Transportation | 0.70 | | | | | | | |
| Unit Cost | Rs/Tkm | 0.20 | 0.23 | 0.27 | 0.31 | 0.36 | 0.42 | 0.48 |
| Total cost | in Rs. Mn | 105.00 | 148.87 | 172.58 | 200.07 | 231.93 | 268.87 | 302.62 |
| Rail Transportation | 0.30 | | | | | | | |
| Unit Cost | Rs/Tkm | 0.04 | 0.04 | 0.05 | 0.06 | 0.07 | 0.08 | 0.09 |
| Total cost | in Rs. Mn | 8.15 | 11.56 | 13.40 | 15.54 | 18.01 | 20.88 | 23.50 |
| Without Project' Scenario - Total cost | in Rs. Mn | 113.15 | 160.43 | 185.98 | 215.60 | 249.94 | 289.75 | 326.12 |
| With' Project Scenario | | | | | | | | |
| Waterways Transportation | | | | | | | | |
| Unit Cost | Rs/Tkm | 0.03 | 0.03 | 0.04 | 0.05 | 0.05 | 0.06 | 0.07 |
| Total cost | in Rs. Mn | 67.28 | 95.39 | 110.58 | 128.19 | 148.61 | 172.28 | 193.90 |
| Increamental Benefit from the project | in Rs. Mn | 45.88 | 65.04 | 75.40 | 87.41 | 101.34 | 117.48 | 132.22 |





20.3.5.2 Noise Pollution

Noise costs consist of costs for annoyance and health. The external cost of noise pollution arrived by various studies are listed in the below table. The cost factors for noise pollution are available only based on European conditions and are mentioned in Euros. Same has been converted to Rupees based on the purchasing power parity as mentioned in the Key Assumptions.

| Inland Water | Unit | Cost | Cost (in Rs/tkm) |
|--|--------|--------|------------------|
| Union Internationale des Chemins de fer (PIANC) | €/Tkm | - | - |
| le Groupe d'Economie des Transports de l'ULB (PIANC) | €/ Tkm | - | - |
| Bundesamt fur Umweltschutz (PIANC) | €/Tkm | - | - |
| Cost considered for the study | | | |
| Roadways | Unit | Cost | Cost (in Rs/tkm) |
| Union Internationale des Chemins de fer (PIANC) | €/Tkm | 0.0119 | 0.0032 |
| le Groupe d'Economie des Transports de l'ULB (PIANC) | €/ Tkm | - | - |
| Bundesamt fur Umweltschutz (PIANC) | €/Tkm | 0.0018 | 0.0005 |
| Cost considered for the Study | | | 0.0012 |
| Railways | | | |
| | Unit | Cost | Cost (in Rs/tkm) |
| Union Internationale des Chemins de fer (PIANC) | €/Tkm | 0.0044 | 0.0012 |
| le Groupe d'Economie des Transports de l'ULB (PIANC) | €/ Tkm | 0.0010 | 0.0003 |
| Bundesamt fur Umweltschutz (PIANC) | €/Tkm | 0.0035 | 0.0009 |
| Cost considered for the study | | | 0.0008 |

Table 20.11: External Cost of Noise Pollution

The incremental cost benefit for the project due to the external cost of noise pollution is estimated as given below.





| Noise Pollution-Phase 1 | FY | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2049 |
|--|-----------|----------|----------|----------|----------|----------|----------|----------|
| Without Project' Scenario | | | | | | | | |
| Road Transportation | 0.70 | | | | | | | |
| Unit Cost | Rs/ Tkm | 0.001200 | 0.001391 | 0.001613 | 0.001870 | 0.002167 | 0.002513 | 0.002828 |
| Total cost | in Rs. Mn | 0.62 | 0.88 | 1.03 | 1.19 | 1.38 | 1.60 | 1.80 |
| Rail Transportation | 0.30 | | | | | | | |
| Unit Cost | Rs/ Tkm | 0.00080 | 0.00093 | 0.00108 | 0.00125 | 0.00144 | 0.00168 | 0.00189 |
| Total cost | in Rs. Mn | 0.18 | 0.25 | 0.29 | 0.34 | 0.39 | 0.46 | 0.51 |
| Without Project' Scenario - Total cost | in Rs. Mn | 0.80 | 1.14 | 1.32 | 1.53 | 1.77 | 2.05 | 2.31 |
| With' Project Scenario | | | | | | | | |
| Waterways Transportation | | | | | | | | |
| Unit Cost | Rs/ Tkm | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total cost | in Rs. Mn | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Increamental Benefit from the project | in Rs. Mn | 0.80 | 1.14 | 1.32 | 1.53 | 1.77 | 2.05 | 2.31 |

Table 20.12 Noise Pollution - Economical Benefit

20.3.5.3 Soil and Water Pollution

The external cost of soil & water pollution arrived by various studies and it is observed that only roadways tends to produce soil & water pollution as mentioned.

| Table 20.13 External Cost of Soil and Wa | ater Pollution |
|--|----------------|
|--|----------------|

| Roadways | Unit Rs / t km | Cost | Cost in Rs. |
|--|-------------------|--------|-------------|
| Union Internationale des Chemins de fer (PIANC) | €/Tkm | - | - |
| le Groupe d'Economie des Transports de l'ULB (PIANC) | €/ Tkm | - | - |
| Bundesamt fur Umweltschutz (PIANC) | €/Tkm | 0.0020 | 0.0005 |
| Cost considered for the Study | | | 0.0005 |

The incremental cost benefit for the project due to the external cost of noise pollution is estimated as given below.





| Soil and Water Pollution - Phase 1 | FY | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2049 |
|--|-----------|--------|--------|--------|--------|--------|--------|--------|
| Without Project' Scenario | | | | | | | | |
| Road Transportation | 0.70 | | | | | | | |
| Unit Cost | Rs/ Tkm | 0.0005 | 0.0006 | 0.0007 | 0.0008 | 0.0009 | 0.0010 | 0.0012 |
| Total cost | in Rs. Mn | 0.26 | 0.37 | 0.43 | 0.50 | 0.57 | 0.67 | 0.75 |
| Rail Transportation | 0.30 | | | | | | | |
| Unit Cost | Rs/ Tkm | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total cost | in Rs. Mn | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Without Project' Scenario - Total cost | in Rs. Mn | 0.26 | 0.37 | 0.43 | 0.50 | 0.57 | 0.67 | 0.75 |
| With' Project Scenario | | | | | | | | |
| Waterways Transportation | | | | | | | | |
| Unit Cost | Rs/ Tkm | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total cost | in Rs. Mn | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Increamental Benefit from the project | in Rs. Mn | 0.26 | 0.37 | 0.43 | 0.50 | 0.57 | 0.67 | 0.75 |

Table 20.14: Soil and Water Pollution - Economical Benefit

20.3.5.4 Reduction in Accidents

The external cost for accident considered for three modes of transportation is mentioned below.

| Accidents | | Unit | Cost | Cost (in Rs/tkm) |
|-----------|---|---------|--------|---------------------|
| Waterways | Total Transportation System - Planning commission | Rs./Tkm | - | - |
| | Union Internationale des Chemins de fer (PIANC) | €/Tkm | - | - |
| | le Groupe d'Economie des Transports de l'ULB (PIANC) | €/Tkm | - | - |
| | Bundesamt fur Umweltschutz (PIANC) | €/Tkm | - | - |
| | Cost considered for the Study | | - | - |
| Roadways | Total Transportation System - Planning commission | Rs./Tkm | 0.0620 | 0.0620 |
| | Union Internationale des Chemins de fer (PIANC) | €/Tkm | 0.0208 | 0.0057 |
| | le Groupe d'Economie des Transports de l'ULB (PIANC) | €/Tkm | 0.0353 | 0.0096 |
| | Bundesamt fur Umweltschutz (PIANC) | €/Tkm | 0.0091 | 0.0025 |
| | Cost considered for the Study | | | 0.0620 |
| Railways | Total Transportation System - Planning commission | Rs./Tkm | 0.0010 | 0.0010 |
| | Union Internationale des Chemins de fer (PIANC) | €/Tkm | 0.0008 | 0.0002 |
| | le Groupe d'Economie des Transports de l'ULB (PIANC) | €/Tkm | 0.0005 | 0.0001 |

Table 20.15: Accident Cost - Waterways, Roadways and Railways





| Accidents | | Unit | Cost | Cost (in Rs/tkm) |
|-----------|------------------------------------|-------|--------|---------------------|
| | Bundesamt fur Umweltschutz (PIANC) | €/Tkm | 0.0006 | 0.0002 |
| | Cost considered for the study | | | 0.0010 |

The incremental cost benefit for the project due to the external cost of reduction in accidents is estimated as given below.

| Table 20.16: Reduction in Accident Cost - Economical Benefit |
|--|
|--|

| Accidents - Phase 1 | FY | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2049 |
|--|-----------|-------|-------|-------|-------|-------|-------|-------|
| Without Project' Scenario | | | | | | | | |
| Road Transportation | 0.70 | | | | | | | |
| Unit Cost | Rs/ Tkm | 0.06 | 0.07 | 0.08 | 0.10 | 0.11 | 0.13 | 0.15 |
| Total cost | in Rs. Mn | 32.23 | 45.69 | 52.97 | 61.41 | 71.19 | 82.53 | 92.88 |
| Rail Transportation | 0.30 | | | | | | | |
| Unit Cost | Rs/ Tkm | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total cost | in Rs. Mn | 0.22 | 0.32 | 0.37 | 0.42 | 0.49 | 0.57 | 0.64 |
| Without Project' Scenario - Total cost | in Rs. Mn | 32.45 | 46.01 | 53.34 | 61.83 | 71.68 | 83.10 | 93.53 |
| With' Project Scenario | | | | | | | | |
| Waterways Transportation | | | | | | | | |
| Unit Cost | Rs/ Tkm | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total cost | in Rs. Mn | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Increamental Benefit from the project | in Rs. Mn | 32.45 | 46.01 | 53.34 | 61.83 | 71.68 | 83.10 | 93.53 |





20.3.6 Economic IRR

Taking in the consideration of the economic benefits from the projects as worked out above, the economic IRR has been worked out to be **32.05% for Phase-1 development** which indicates that the project is economically viable.

| S No. | Description | FY | 2018 | 2019 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2049 |
|--------|-----------------------------------|----------------|--------|--------|-------|-------|-------|-------|--------|--------|--------|
| 5.110. | Description | Unit | | | 1 | 6 | 11 | 16 | 21 | 26 | 30 |
| Α | Cargo in Million Tonnes | Million Tonnes | | | 2.48 | 3.03 | 3.03 | 3.03 | 3.03 | 3.03 | 3.03 |
| В | Benefit from the project | Rs Million | | | | | | | | | |
| 1 | Revenue | Rs Million | | | 516.7 | 732.7 | 849.4 | 984.7 | 1141.5 | 1323.4 | 1489.5 |
| 2 | Salvage Value | Rs Million | | | | | | | | | 544.2 |
| 3 | Economic Benefit from the project | Rs Million | | | 619 | 878 | 1018 | 1180 | 1368 | 1586 | 1785 |
| 4 | Total Benefit from the project | Rs Million | | | 1136 | 1611 | 1868 | 2165 | 2510 | 2910 | 3819 |
| | | | | | | | | | | | |
| С | Operation Expenses | | | | 150.2 | 195.8 | 234.5 | 281.4 | 338.4 | 407.8 | 474.3 |
| | | | | | | | | | | | |
| D | EBIDTA | | | | 986 | 1415 | 1633 | 1884 | 2171 | 2502 | 3345 |
| | | | | | | | | | | | |
| E | CAPEX | Rs Million | -1,675 | -1,675 | | | | | | | |
| | | | | | | | | | | | |
| F | Cash Flow (Before Tax) | Rs Million | -1,675 | -1,675 | 986 | 1,415 | 1,633 | 1,884 | 2,171 | 2,502 | 3,345 |
| | | | | | | | | | | | |
| G | Economic IRR | | 32.05% | | | | | | | | |

 Table 20.17: Economic IRR for Phase 1 of Terminal

20.3.7 Financial & economic IRR for all Phases

Following the same methodolgy for arrving at financial & economic IRR for Phase 1 of Sahibganj Terminal, the financial & economic IRR for different phases are worked out as given in Table 20.18.

| S.No. | Phase Description | Financial IRR | Economic IRR |
|-------|-----------------------------|---------------|--------------|
| 1 | Phase 2 | | |
| а | Without Railway | 12.60% | 21.34% |
| b | With Railway | 15.35% | 20.65% |
| 2 | Phase 3 | 16.52% | 28.70% |
| 3 | Phase 2 + Phase 3 | 13.78% | 22.66% |
| 4 | Phase 1 + Phase 2 + Phase 3 | 12.23% | 29.08% |

Table 20.18: Financial & Economic IRR for different phases of Sahibganj Terminal

39. ANNEXURE XVII: Base Case Financial Model

[Note: The model BCFM would be developed with the appropriate inputs from the financial and technical consultants. However such Financing Plan would need to be customized based on each project and its requirements. Such model Financing Plan would essentially include;

- (i) Estimated Project Cost,
- (ii) License Fee and Royalty payable to the Concessioning Authority,
- (iii) Annual estimated Project revenue,
- (iv) Equity contribution,
- (v) Cargo handling projections estimated by Concessionaire,
- (vi) Discounted net present value of the cash flows,
- (vii) Equity IRR,
- (viii) Debt equity ratio, and
- (ix) Debt service ratio.

Such Financing Plan would be submitted by the concessionaire and got approved by the Concessioning Authority at the time of Financial Close.]

Note: Such format of the Financing Plan shall also identify the respective threshold limit of the above parameters and the basis of further projections and the detailed requirements that would need to be stratified with respect to each line item.

40. ANNEXURE XVIII: Draft Tripartite Agreement

MODEL TRIPARTITE AGREEMENT

BETWEEN INLAND WATERWAYS AUTHORITY OF INDIA, CONCESSIONAIRE AND INFRASTRUCTURE DEBT FUND

This Tripartite Agreement is made at ***** on the ***** day of *****, 20** by

and between

(i) **MEMBERS OF INLAND WATERWAYS AUTHORITY OF INDIA**, a body corporate constituted under the provisions of the Inland Waterways Authority of India Act 1985, and having its principal administrative office at A-13, Sector-1, Noida – 201301, Uttar Pradesh,

hereinafter referred to as the "**Concessioning Authority**" which expression shall, unless repugnant to the context or meaning thereof, include its administrators, successors and assigns;

(ii) The [***** Infrastructure Debt Fund], a company registered under the Companies Act, 1956, acting through *****, and having its registered office at ***** (hereinafter referred to as the "**Debt Fund**" which expression shall, unless repugnant to the context or meaning thereof, include its administrators, successors and assigns);

And

[***** Limited], a company registered under the Companies Act, 2013, acting through *****, duly authorised by the resolution passed at the meeting of its Board of Directors held on *****,

and having its registered office at ***** (hereinafter referred to as the "**Concessionaire**" which expression shall, unless repugnant to the context or meaning thereof, include its administrators, successors and assigns)

40.1.1. WHEREAS:

(A) The Concessioning Authority and the Concessionaire had entered into a Concession Agreement (as defined hereinafter), a true copy of which is annexed hereto and marked as Annex-I, for development of ***** (the "**Project**");

(B) The Project entered into commercial operation or any substitute thereof on ***** (the "Date of Commercial Operation") in accordance with the provisions of the Concession Agreement;

(C) Following the occurrence of the Date of Commercial Operation, the Concessionaire has been operating the Project in accordance with the terms and conditions of the Concession Agreement;

(D) The Concessionaire had raised debt from the Senior Lenders for financing the Project and had utilised the same for the purposes of the Project under the Concession Agreement;

(E) The Concessionaire has been discharging its debt service obligations, including the repayment of principal and interest, in accordance with the provisions of the Financing Documents;

(F) The debt service obligations have not been rescheduled, waived or postponed in any manner during the past one year from the date hereof, and the Concessionaire is not in default of its debt service obligations under the Financing Documents; and

(G) The Concessionaire has decided to refinance all or part of its outstanding debt and has requested the Debt Fund to invest in its bonds, the proceeds of which shall be paid to the Senior Lenders as specified in Schedule-I.

Now, therefore, the Parties hereby agree and this agreement witnessed - as follows:

1. DEFINITIONS AND INTERPRETATIONS

1.1 For the purposes of this Agreement, the following terms shall have the meaning hereinafter respectively assigned to them:

"Agreement" means this Tripartite Agreement, and amendments if any thereto;

"**Bonds**" means the securities issued by the Concessionaire in consideration of the amounts paid for the investment thereof;

"**Concession Agreement**" means the executed Concession Agreement dated [date on which the Concession Agreement has been signed] for the Project, entered into between the Concessioning Authority and the Concessionaire,

and shall include all Schedules thereof and any amendments thereto made in accordance with the provisions contained in this behalf therein;

"Financing Documents" means financing documents under the Concession Agreement and documents executed on the date [...date of signing of the financing documents] for the Project and shall include all Schedules thereof and any amendments thereto made in accordance with the provisions contained in this behalf therein.

"Senior Lenders" means any Persons based in India or abroad providing Financial Assistance under the Financing Documents and includes a trustee for the holders of debentures/ or other debt instruments issued by the Concessionaire to finance the Project.

"Senior Lenders' Representative" shall have the same meaning as ascribed to it in the Financing Document, provided that, this would include the Trustees for any bonds issued by the Concessionaire. In absence of one such person/ entity having the authority to sign, Senior Lenders Representative shall mean all the Senior Lenders, and/or the Trustees for any bonds issued by the Concessionaire.

"**Parties**" means the parties to this Agreement collectively and "Party" shall mean any of the parties to this Agreement individually;

1.2 The words and expressions beginning with or in capital letters used in this Agreement and not defined herein but defined in the Concession Agreement shall have, unless repugnant to the context, the meaning respectively assigned to them in the Concession Agreement.

1.3 Interpretation

- 1.3.1 In this Agreement, unless the context otherwise requires,
- (a) references to any legislation or any provision thereof, or any rules, regulations, bylaws or notifications thereunder, shall include amendment or re-enactment or consolidation of such legislation or any provision thereof so far as such amendment or re-enactment or consolidation applies or is capable of applying to any transaction entered into hereunder;
- (b) references to "**development**" include, unless the context otherwise requires, construction, renovation, refurbishing, augmentation, upgradation and other activities incidental thereto, and "**develop**" shall be construed accordingly;
- (c) "**lakh**" means a hundred thousand (100,000) and "**crore**" means ten million (10,000,000);
- (d) save and except as otherwise provided in this Agreement, any reference, at any time, to any agreement, deed, instrument, licence or document of any description shall be construed as reference to that agreement, deed, instrument, licence or other document as amended, varied, supplemented, modified or suspended at the time of such reference; provided that this Sub-clause shall not operate so as to increase liabilities or obligations of the Debt Fund hereunder or pursuant hereto in any manner whatsoever;
- (e) any agreement, consent, approval, authorisation, notice, communication, information or report required under or pursuant to this Agreement from or by any Party shall be valid and effective only if it is in writing under the hand of a duly authorised representative of such Party in this behalf and not otherwise;
- (f) the Recitals and Annexes to this Agreement form an integral part of this Agreement and will be in full force and effect as though they were expressly set out in the body of this Agreement; and
- (g) time shall be of the essence in the performance of the Parties' respective obligations. If any time period specified herein is extended, such extended time shall also be of the essence.

1.3.2 Any word or expression used in this Agreement shall, be construed as per the definition given in the General Clauses Act, 1897 failing which it shall bear the ordinary English meaning.

2. ISSUE OF BONDS

2.1 The Parties agree that the Concessionaire may, in accordance with the provisions of this Agreement, issue Bonds for the amounts subscribed by the Debt Fund; provided that the total value of such Bonds shall not exceed 94% (ninety four percent) of compensation payment from the Concessioning Authority on day of signing this Tripartite Agreement(**as specified in Schedule II**); [provided further that the Concessionaire may, with prior written approval of the Concessioning Authority, which approval the Concessioning Authority may in its sole discretion deny, issue additional Bonds for a total value not exceeding the balance of the said compensation payable]⁵.

2.2 Upon investment in Bonds pursuant to Paragraph 2.1, the Debt Fund shall be deemed to be a Senior Lender and shall thereupon be entitled to all the rights and privileges of a Senior Lender under the Concession Agreement.

2.3 The tenor of the Bonds, in accordance with the provisions of this Agreement shall be such that at least 50% (fifty per cent) and 75% (seventy five per cent) of the total nominal value thereof shall be fully redeemed by the Concessionaire no later than the expiry of 75% (seventy five per cent) and 85% (eighty five per cent) of the Concession Period respectively and the balance, if any, shall be redeemed no later than 2 (two) years prior to the expiry of the Concession Period.

2.4 Subject to the clause 2.3 of this Agreement, the tenure, rate of interest and other commercial terms of the Bonds shall be determined by mutual agreement between the Debt Fund and the Concessionaire.

2.5 The Bonds shall be in such denomination as the Debt Fund and the Concessionaire may determine, but not less than Rs [10,000 (Rupees ten thousand)] in any case.

2.6 Subject to the provisions of Paragraph 4.1, the Debt Fund and the Concessionaire may, with prior written approval of the Concessioning Authority, which approval the Concessioning Authority may in its sole discretion deny, allocate and bear the foreign exchange risks for and in respect of any foreign-exchange denominated Bonds, in such manner as they may mutually agree. For the avoidance of doubt, the Parties expressly agree that if the foreign exchange risk for any or all Bonds is borne by the Concessionaire. The compensation to be made by the Concessioning Authority for and in respect of such Bonds shall be adjusted to cover the variation between the nominal value of Bonds and the actual amount payable to the Debt Fund, such that the liability of the Concessionaire for redemption of the Bonds hereunder is fully discharged by the Concessioning Authority.

2.7 The Parties expressly agree and confirm that repayment of the principal and interest in respect of the Bonds shall have a prior charge over the Senior Lenders on appropriation of compensation under Articles 9, 16 and 17 of the Concession Agreement, and only the balance remaining shall be paid to the other Senior Lenders.

2.8 Any delay in the repayment of the principal or interest for and in respect of the Bonds shall attract interest at a rate of 3% (three per cent) above the rate of interest applicable for the Bonds.

2.9 The Parties agree and confirm that upon execution of this Agreement, the Debt Fund shall, acting through the Senior Lenders' Representatives, be deemed to be a party to the Escrow Agreement and the Substitution Agreement for the Project, and all rights, privileges and obligations of the Senior Lenders shall also vest in the Debt Fund. The Parties further agree and confirm that the provisions of the Concession Agreement and all other agreements, including the Escrow Agreement, Substitution Agreement and Financing Documents, shall be read and construed so as to give effect to the provisions of this Agreement, but without increasing any financial obligations and/ or liabilities of the Concessioning Authority under the Concession Agreement.

2.10 By counter-signing the Tripartite Agreement, the Senior Lenders' Representative, acting on behalf of the Senior Lenders agrees, confirms and undertakes that the *paripassu* rights, title or interest of the Lenders in compensation, to the extent such rights, title or interest are provided in the Concession Agreement, Substitution Agreement, Escrow Agreement, Financing Documents or any other agreement, shall be subordinate to the rights, title or interest created by the Bonds in favour of the Debt Fund, and accordingly, the compensation shall be applied first for the redemption of Bonds and only the balance remaining, if any, shall be paid into the Escrow Account for meeting other obligations including the balance Debt Due. For the avoidance of doubt, the Parties expressly agree that the Debt Fund may, in its discretion, exercise all the rights and privileges of the Senior Lenders' Representative under the Concession Agreement, Substitution Agreement, Escrow Agreement and this Agreement. The Parties further agree that save and except the application of compensation for redemption of Bonds in pursuance of this Agreement and subject to the provisions of Paragraph 2.7, the Senior Lenders shall have *paripassu* charge on the revenues of the Concessionaire in accordance with the provisions of the Concession Agreement.

2.11 The Debt Fund may, by notice to the Parties, transfer all or any Bonds to any other person, and upon such transfer, the rights and obligations of the Debt Fund shall vest in such person. Provided that no such notice shall be required for transfer of Bonds if they have been listed in any recognized Stock Exchange and such transfer is in accordance with the regulations of the Stock Exchange.

2.12 Notwithstanding anything to the contrary contained in this Agreement, the Debt Fund may have the option to extend a term loan to the Concessionaire for an amount not exceeding 50% (fifty per cent) of its total exposure to the Concessionaire and the provisions of this Agreement shall apply *mutatis mutandis* to such term loan as if it were a Bond.

3. REDEMPTION OF BONDS

3.1 The Concessionaire agrees and undertakes that upon completion of the tenor of the Bonds, it shall redeem the same by making full and complete payment of the outstanding principle and the interest thereon.

3.2 Notwithstanding anything to the contrary in this Agreement, the Debt Fund may by notice require the Concessionaire to redeem upto 10% (ten per cent) of the value of the Bonds in any financial year and upon notice in this behalf, the Concessionaire shall redeem such Bonds no later than 120 (one hundred and twenty) days from the date of receipt of such notice.

3.3 The Parties expressly agree that the Debt Fund and the Concessionaire may at any time by mutual agreement undertake early redemption of the Bonds and upon full redemption thereof, this Agreement shall cease to be in force.

3.4 The Parties expressly agree and confirm that in terms of Article [15, 16 and 17] of the Concession Agreement, the Concessioning Authority has covenanted that in the event of termination of the Concession Agreement, the Concessioning Authority shall pay compensation in accordance with the provisions of the Concession Agreement, which shall be applied for redemption of the Bonds in accordance with the provisions of this Agreement. The Parties further agree and confirm that upon termination on account of a Concessionaire Event of Default or Concessioning Authority Event of Default, the Concessioning Authority shall pay compensation in accordance with the provisions of the Concession Agreement.

3.5 The Parties agree and confirm that in the event of default in Debt Service by the Concessionaire, the Senior Lenders shall have the right to enforce termination of the Concession Agreement in terms of Article 15.1.1 and 17.1.2 of the Concession Agreement, which *inter alia* requires the Concessioning Authority to pay compensation in accordance with the provisions of the Concession Agreement. The Parties further agree that in the event the Concessioning Authority approves the issuance of additional Bonds under the provisions of Paragraph 2.1 of this Agreement, the liability of the Concessioning Authority shall, notwithstanding the provisions of the Concessionaire Event of Default.

3.6 The Concessioning Authority agrees and undertakes that upon receipt of a notice under and in accordance with the provisions of Article 3.2 of the Substitution Agreement, it shall, no later than 15 (fifteen) days from the date of receipt of such notice, issue a notice to the Concessionaire requiring it to cure the Financial Default and in the event the default is not cured before the expiry of the Remedial Period specified in Article 15.4 of the Concession Agreement, a Concessionaire Default shall have occurred and the Concessioning Authority shall issue the Termination Notice forthwith, but no later than 15 (fifteen) days from the date of occurrence of Concessionaire Default, and shall make compensation no later than 15(fifteen) days from the date of Termination Notice. The Parties expressly agree that the timelines specified in the Paragraph 3.6 of this Agreement are not in modification of the Concession Agreement but only in elaboration thereof.

3.7 The Parties expressly agree and confirm that the rights of the Debt Fund and the Senior Lenders' Representative to enforce termination of the Concession Agreement in accordance with Paragraph 3.6 may be exercised individually or jointly, as the case may be, by the Debt Fund and/or the Senior Lenders' Representative.

3.8 The Parties expressly agree that the Concessioning Authority shall, instead of depositing the compensation in the Escrow Account of the Project, redeem the Bonds by making payments due and payable to the Debt Fund, and the balance, if any, shall be paid into the Escrow Account. The Parties further agree that the provisions hereof shall in no way be construed to increase the financial liability of the Concessioning Authority for and in respect of the compensation [save and except as provided in Paragraph 3.5 for and in respect of the additional bonds specified therein].

3.9 The Parties agree and confirm that the amounts, if any, paid by the Concessioning Authority for redemption of Bonds and the balance compensation, if any, paid as per the Concession Agreement into the Escrow Account shall be deemed to be a valid discharge of its obligations to make compensation under and in accordance with the Concession Agreement.

4. FEES

4.1 The Debt Fund shall pay to the Concessioning Authority, 0.05% (zero point zero five per cent) per annum of the outstanding debt financed by the IDF, by way of a guarantee fee in consideration of the obligations of the Concessioning Authority hereunder; [provided that the guarantee fee shall be 1% (one per cent) in respect of Bonds for which the foreign exchange risk is to be borne by the Concessionaire] [provided further that the guarantee fee for and in respect of the additional Bonds specified in Paragraph 2.1 shall be 3% (three per cent) per annum of the nominal value thereof].

4.2 The guarantee fee specified in Paragraph 4.1 shall be due and payable annually before commencement of the financial year to which it relates. In the event of delay in payment of the guarantee fee, the Debt Fund shall pay interest at the rate of 14% (fourteen per cent) per annum, to be computed on a daily basis and compounded every month for the period of delay; provided, however, that if such delay exceeds the period of 180 (one hundred and eighty) days this Agreement shall cease to be in force, and upon termination of the Concession Agreement at any time thereafter, the Concessioning Authority's obligation to pay the compensation to the Debt Fund shall be deemed to be reduced by 20% (twenty per cent) thereof.

5. REPRESENTATIONS AND WARRANTIES

- 5.1 Each of the Parties represent, warrant and confirm the following:
- (a) This Agreement constitutes its legal, valid and binding obligation, enforceable against it in accordance with the terms hereof, and its obligations under this Agreement will be legally valid, binding and obligations enforceable against it in accordance with its terms;
- (b) the execution, delivery and performance of this Agreement will not conflict with or result in a breach or constitute default under or accelerate performance required by any of the terms of Memorandum and Articles of Association of any Party or any applicable law or any covenant, contract, arrangement or understanding, or any decree or order of any court to which it is a party or by which it or any of its properties or assets is bound or affected;
- (c) all information provided by the Party is true and accurate in all material respect;
- (d) there are no actions, suits, proceedings or investigations pending or to its knowledge threatened against it at law or in equity before any court or any other judicial, quasi judicial or other authority or body, the outcome of which may result in a material breach of this Agreement;
- (e) the Party has complied with all Applicable Laws and Applicable Permits in all material respects;
- (f) the Concessionaire is not in a material breach of the Concession Agreement or of any ProjectContracts or Financing Documents; and
- (g) no representation or warranty contained herein or in the Concession Agreement or any other document furnished by the Party contains or will contain any untrue or misleading statement of material facts or omits or will omit to state a material fact necessary to make such representation or warranty not misleading.

5.2 In the event of any occurrence or circumstance coming to the knowledge of the Party making any representation hereunder which renders any of its aforesaid representations or warranties untrue or incorrect at any time during the subsistence of this Agreement, such Party shall immediately notify the other Parties hereto about the same. Such notification shall not have the effect of remedying any such representation or warranty that has been found to be incorrect or untrue.

6. **ARBITRATION**

- 6.1 Any Dispute which is not resolved amicably by conciliation shall be finally decided by reference to arbitration by a Board of Arbitrators appointed in accordance with Paragraph 6.2 of this Agreement. Such arbitration shall be held in accordance with the Rules of Arbitration of the International Centre for Alternative Dispute Resolution, New Delhi (the "**Rules**"), or such other rules as may be mutually agreed by the Parties, and shall be subject to the provisions of the Arbitration Act. The venue of such arbitration shall be Delhi, and the language of arbitration proceedings shall be English.
- 6.2 In the event of a dispute between two Parties, there shall be a Board of three arbitrators, of whom each Party shall select one, and the third arbitrator shall be appointed by the two arbitrators so selected, and in the event of disagreement between the two arbitrators, the appointment shall be made in accordance with the Rules. In the event of a dispute involving all the Parties, a single arbitrator shall be appointed in accordance with the Rules.
- 6.3 The arbitrators shall make a reasoned award (the "Award"). Any Award made in any arbitration held pursuant to this Paragraph 6 shall be final and binding on the Parties as from the date it is made, and the Parties agree and undertake to carry out such Award without delay.

- 6.4 The Parties agree that an Award may be enforced against the Concessionaire, the Concessioning Authority and/or the Debt Fund, as the case may be, and their respective assets wherever situated.
- 6.5 This Agreement and the rights and obligations of the Parties shall remain in full force and effect, pending the Award in any arbitration proceedings hereunder.

7. COMING INTO FORCE AND DURATION OF THE AGREEMENT

This Agreement shall come into force and effect on the date hereof and shall remain in force until the redemption of all Bonds.

IN WITNESS WHEREOF, this Agreement has been executed on the day and year first above written.

For and on behalf of the Concessioning Authority

Signature :

Name :

Designation :

For and on behalf of the **Debt Fund**

Signature :

Name :

Designation :

For and on behalf of the Concessionaire

Signature :

Name :

Designation :

Agreed, Accepted, Countersigned and Witnessed by the Senior Lenders' Representatives for and on behalf of **Senior Lenders** by

Signature :

Name :

Designation :

SCHEDULE-I

(Refer Recital G)

| No. | Name of Senior Lenders/Bond holders' Trustee with Address | Amount to be refinanced IDF by way of Bonds/Loan (Rs. in crore) | Remarks, if any |
|-----|---|---|-----------------|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |

| 5. | | |
|-----|--|--|
| 6. | | |
| 7. | | |
| 8. | | |
| 9. | | |
| 10. | | |

SCHEDULE-II

(Quantum of compensation)

As per the definition in the Concession Agreement, the quantum of (i) Book Value, (ii) 90% of Debt Due and (iii) –Total Project Cost as on the date of execution of this Agreement, and at the end of each financial year until the end of the concession period is mentioned in the table below:

(Rs. In Crores)

| Date | Book Value | % of Debt Due | -Total Project Cost | Amount of Compensation |
|------|------------|------------------|---------------------|---------------------------|
| | | | | |
| | | | | |

41. ANNEXURE XIX: Negative list for non-operational activities

This annexure presents only an indicative and not exhaustive list of activities that shall be prohibited within the Terminal. For any construction at the Terminal however, a final approval of Concessioning Authority shall be sought by Concessionaire.

- manufacture or handling or storage or disposal of hazardous substances as specified in Notifications of the Government of India in the Ministry of Environment and Forests
- setting up and expansion of units/mechanism for disposal of waste and effluents, except facilities required for discharging treated effluents into the water course with approval under the Water (Prevention and Control of Pollution) Act, 1974; and except for storm water drains
- (iii) dumping of city or town waste for the purposes of landfilling or otherwise
- (iv) night clubs
- (v) casinos
- (vi) bars
- (vii) any commercial activity interrupting any existing social and cultural practice prevalent locally; this shall exclude any activity related to infrastructure to be developed mandatorily as per scope of work mentioned in Annexure III of this agreement
- (viii) organizations facilitating gambling and similar recreational activities such as nightclubs and casinos
- (ix) arranging for musical or any other concerts
- (x) setting up of any educational institution or university
- (xi) setting up of healthcare facilities for commercial purpose
- (xii) setting up of any religious structure/ monument, neither permanent construction nor temporary constructions
- (xiii) allocating the land for purpose of rehabilitation
- (xiv) allocating the land for any residential construction

42. Annexure XX: Auditors

42.1. Appointment of Auditors

- 42.1.1. The Concessionaire shall appoint, and have during the subsistence of this Agreement as its Statutory Auditors, a firm chosen by it from the mutually agreed list of 5 (five) reputable firms of chartered accountants ("Panel of Chartered Accountants"), such list to be prepared substantially in accordance with the criteria set forth in Schedule P. All fees and expenses of the Statutory Auditors shall be borne by the Concessionaire.
- 42.1.2. The Concessionaire may terminate the appointment of its Statutory Auditors in accordance with the provisions of the Companies Act, 2013, subject to the replacement Statutory Auditors being appointed from the Panel of Chartered Accountants.
- 42.1.3. Notwithstanding anything to the contrary contained in this Agreement, the Authority has the right, but not the obligation, to appoint at its cost from time to time and at any time, another firm ("Additional Auditors") from the Panel of Chartered Accountants to audit and verify all those matters, expenses, costs, realisations and things which the Statutory Auditors are required to do, undertake or certify pursuant to this Agreement.
- 42.1.4. Further, the Concessionaire shall change the Statutory Auditor from time to time to comply with the provisions of the Companies Act, 2013 and any rules and regulations framed thereunder.

42.2. Panel of Chartered Accountants

Pursuant to the provisions of the Agreement, the Authority and the Concessionaire shall prepare a mutually agreed panel of 5 (five) reputable firms of Chartered Accountants having their registered offices in India ("**Panel of Chartered Accountants**"). The criteria for preparing such Panel and the procedure to be adopted in this behalf shall be as set forth in this Annexure XX.

42.2.1. Invitation for Empanelment

The Authority shall invite offers from all reputed firms of Chartered Accountants who fulfil the following eligibility criteria, namely:

- (a) the firm should have conducted statutory audit of the annual accounts of at least one hundred companies registered under the Companies Act, 2013, including any reenactment or amendment thereof, of which at least ten should have been public sector undertakings;
- (b) the firm should have at least 5 (five) practising Chartered Accountants on its rolls, each with a minimum experience of 10 (ten) years in the profession;
- (c) the firm or any of its partners should not have been disqualified or black-listed by the Comptroller and Auditor General of India or the Authority; and
- (d) the firm should have an office in the State or in an adjacent State with at least 2 (two) practising Chartered Accountants on its rolls in such State.

Interested firms meeting the eligibility criteria shall be required to submit a statement of their

capability, including the bio-data of all the practising Chartered Accountants, on its rolls. In particular, each firm shall be required to furnish year-wise information relating to the names of all the companies with an annual turnover exceeding Rs. 25,00,00,000 (Rupees Twenty Five Crore) whose annual accounts were audited by such firm in any of the preceding 5 (five) Accounting Years.

42.2.2. Evaluation and Selection

The information furnished by each firm shall be scrutinised and evaluated by the Authority and 1 (one) point shall be awarded for each annual audit of the companies specified in Paragraph 0 above. (By way of illustration, a firm which has conducted audit of the annual accounts of any such company for 5 (five) years shall be awarded 5 (five) points).

The Authority shall prepare a list of all the eligible firms along with the points scored by each such firm and 5 (five) firms scoring the highest points shall be identified and included in the draft Panel of Chartered Accountants.

42.2.3. Consultation with the Concessionaire

The Authority shall convey the aforesaid panel of firms to the Concessionaire for scrutiny and comments, if any. The Concessionaire shall be entitled to scrutinise the relevant records of the Authority to ascertain whether the selection of firms has been undertaken in accordance with the prescribed procedure and it shall send its comments, if any, to the Authority within 15 (fifteen) days of receiving the aforesaid panel.

42.2.4. Mutually Agreed Panel

The Authority shall, after considering all relevant factors including the comments, if any, of the Concessionaire, finalise and constitute a panel of 5 (five) firms which shall be deemed to be the mutually agreed Panel of Chartered Accountants.

After completion of every 5 (five) years from the date of preparing the mutually agreed Panel of Chartered Accountants, or such earlier period as may be agreed between the Authority and the Concessionaire, a new panel shall be prepared in accordance with the provisions of this Annexure XX.