DETAILED PROJECT REPORT

FOR

EXTENSION OF GBPRL BEDI PORT TERMINAL NEAR WINDMILL STATION OF RAJKOT DIVISION OF WESTERN RAILWAY

VOLUME – I

APRIL 2022

(Ref: DPR for Rail Connectivity to Old Bedi Port from Windmill station In District Jamnagar, Gujarat)

G-RIDE

(A JV of Govt. of Gujarat & Ministry of Railways)

GUJARAT RAIL INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED

7th Floor, Block No 06, Udhyog Bhavan, Sector 11, Gandhinagar, Gujarat -382017

Tel 079-232-32728/29 Email: info@gride.org.in

Table of Contents

Chapter 0
Executive Summary

Chapter 0 - Executive Summary

0.1 Introduction

0.1.1 The project "Last Mile Rail Connectivity to Old Bedi Port, Rajkot Division of Western Railway had been sanctioned to GRIDE by the Railway Board vide letter No. 2020/JV Cell/ G-RIDE/Bedi Port dated 29.11.2021.

0.1.2 Bedi Port Rail Connectivity is developed from Windmill Station in Jamnagar District to Bedi Port Loading/Unloading Yard by GRIDE through Project SPV GRIDE Bedi Port Rail Limited (GBPRL) through EPC mode. The project has been completed on dated 30.05.2022 and the operation at Old Bedi Port has been started.

0.1.3 Now, as per discussion with the Stakeholder, to augment the capacity of the Old Bedi Port and to tap containerized market within hinterland, Further Extension at Bedi Port Terminal (called as "**Phase II**") has been planned in this Detailed Project Report.

0.1.4 G-RIDE to execute the Phase II work at Bedi Port Terminal through project SPV-GBPRL, including preparation of work of Detailed Project Report (DPR) and Detailed Engineering Drawings.

0.1.5 The scope of work is as follows:

i. Detail Survey of the project area and land plans
ii. Preparation of Detailed Project Report
iii. Final Location Survey.
iv. Preparation of Engineering Scale Plan (ESP) and other Drawings.
v. Preparation of GAD's of Bridges and other structures.
vi. Cost Estimates.
vii. Financial analysis.

0.2 Traffic Projections

Jamnagar District is located in the North-West of Gujarat State. It is bounded partly by Gulf and partly by the desert of Kutch in the North, Junagadh District in the South, Rajkot District in the East and Arabian Sea in the West. The district is famous for its petrochemicals, brass products, tie dyed fabric and port related business. Large scale industries in Jamnagar involved in production of solvents, edible oils, cement, yarn, agricultural equipment's, soda ash, salt and fertilizers.

Logistics Cost Comparison – Road Vs Rail:

To identify the suitability of rail logistics and container freight terminals for extension of Bedi Port Terminal, a comparison of current road transport costs and potential transport costs via ICD on the rail was compared. This analysis, elaborated in the respectively chapter, confirms that the proposed rail terminal can generate transport cost savings of at least INR 4000 per

TEU for the hinterland industries in Jamnagar. Apart from savings in logistics cost, industries in the hinterland can explore options for domestic carbon trade as per Energy Conservation (Amendment) Bill 2022 due to lesser carbon emission via rail in comparison to road.

Based on the analysis, the potential traffic for the proposed terminal is derived as follows:

Year	2024-25	2029-30	2034-35	2039-40	2044-45	2049-50	2054-55
Total Container movement (TEU)	53,317	62,992	64,160	65,195	65,516	65,516	65,516
Container (Tonnes- 15 tonnes/ TEU)	6,55,975	9,38,986	9,54,876	9,72,987	9,82,740	9,82,740	9,82,740
Break Bulk Traffic (tonnes)	30,000	33,122	36,570	40,376	44,578	49,218	54,341
Bulk Traffic (tonnes)	71,800	5,15,942	10,22,500	11,36,212	12,56,317	13,83,175	15,17,165
Total Traffic (Tonnes)	7,57,000	14,88,050	20,13,946	21,49,575	22,83,683	24,15,133	25,54,246

Traffic Estimation for Rakes for Phase-II

Year	2024-25	2029-30	2034-35	2039-40	2044-45	2049-50	2054-55
Container rake per annum	592	700	713	724	728	728	728
Break Bulk and Bulk Cargo Rakes per annum	25	137	271	294	325	358	393
Total Rakes per annum	617	837	984	1,018	1,053	1,086	1,121
Total Rakes	**1.7**	**2.3**	**2.7**	**2.8**	**2.9**	**3.0**	**3.1**

Year	2024-25	2029-30	2034-35	2039-40	2044-45	2049-50	2054-55
per day							

On a conservation approach, it is expected that Extension of Old Bedi shall cater around 2.5 million tonnes of traffic by FY 2054-55. Traffic flow will enhance with the tie ups with large and medium scale industries within the hinterland. Old Bedi can be explored as hub and spoke model with the possibility of having connectivity of Old Bedi -Malia- Mundra and Old Bedi – GCT Rafaleshwar- Mundra.

0.3 Train Operation Plan

0.3.1 Bedi Port terminal is newly constructed terminal connected with Windmill Station near Jamnagar Station on BG Line of Rajkot (RJT) Division on Viramgam – Rajkot – Jamnagar - Okha single line section. Electrification and Doubling work are in progress.

0.3.2 A separate connectivity for Bedi Port Terminal by providing loop line number 5 at Windmill Station, will take off from line number 4 of Windmill Station from Jamnagar end.

0.3.3 Remodeling of Windmill yard towards Bedi Port end for proposed Container and White Goods siding, parallel to existing holding yard of Bedi Port Terminal.

0.3.4 Provision of two full length Rake at a time in Bedi Port Terminal for loading/Unloading by extending existing spur.

0.3.5 Development of Stacking and loading/Unloading area to provide better Stacking facilities.

0.3.6 Proposed Container and White Goods siding for full length Rake with 30-meter broad Rail level platform.

0.4 Silent Feature and Proposed Layout

The following parameters for the design of Rail alignment and planning of other facilities have been adopted:

Feature	Description
Length of the prop. line	~1.89 Km. Track Km: 2.49 Km
Road Length	~1.00 Km
Standard of Construction	Broad Gauge (1676 mm)
Rail Bridges	2 Nos
Road Bridges	2 Nos

Feature	Description
Level Crossing Gates	1 Nos
Signaling & Telecommunication	Bedi port Non-Interlocked and Only Windmill Interlocked. Also Related Telecom work
Electrification	OHE electrification with 25 KV High rise OHE

The Proposed connectivity will improve the existing Bedi Port Terminal connectivity to Old Bedi Port. In addition to this, a new container and white good staking area is also developing with proposed loading/Unloading line for the same. The development of further Staking area at Bedi Port Terminal yard is also proposed in this report.

0.5 Engineering Parameters

0.5.1. Permanent Way

Following highlights in Phase II(a) are mentioned as under:

Sr. No.	Description	Details	Remarks
1.	Route KM	1.891 Km	From proposed take-off point to Dead End at Ch: 1612.50 m
2.	Track KM	2.498 Km	Track Km includes all points and crossings.

0.5.2. Track Structure

i. Rail - 60 kg rails
ii. Sleepers - PSC Monoblock sleepers with a sleeper density of 1660 nos. per km on main line and 1540 nos. per km on loop line.
iii. Turnouts – 60 Kg 1:12 curved switch on PSC sleeper with CMS crossing at Windmill takeoff point is proposed.
iv. 1 in 12 curved switches on PSC sleeper layout and 60 Kg rail section in proposed line.
v. Ballast – 350 on main line & 250-mm on loop lines cushion of hard stone ballast machine crushed ballast shall beused as per RDSO Specification and DFCC Standards
vi. Check Rail – at the location of level crossing and on curves sharper than 5º.

0.5.3. Formation:

Blanketing material of minimum 450 mm depth has been considered below 350 mm on main line & 250-mm on loop lines ballast cushion and embankments/subgrade are to be made of compacted earth filling with a side slope of 2:1. The side slope in cutting in ordinary/hard soil would generally be 1:1. Steeper slopes of 0.5:1 in rocks and a flatter slope of 1.5:1 in soft/loose soil may have to be adopted, depending upon the nature of the material to be excavated. Standard Railway/DFC formation profile has been adopted.

0.5.4. Bridges

i. All the minor bridges are to be designed corresponding to DFC loading standards of 32.5 t axle load.

ii. Minor Bridges:

Sr. No.	Bridge No.	Existing Span /Type	Proposed span	Proposed Type of Br	Prop. Chainage	Remarks
1	Br No 1	1 X 3X 2 M	1 X 3X 2 M	RCC Box	Ch: 1140.00	
2	Br No 2	2 X 3X 2 M	2 X 3X 2 M	RCC Box	Ch: 1487.12	

iii. LC's:

Sr. No.	Lc No.	Type of LC	Chainage	Remarks
1	LC No 1	Manned	715.800	Will be interlocked

0.5.5. Proposed Signaling and Telecommunication Arrangements

0.5.5.1. Existing Bedi port terminal is taking off from Windmill station which is non-interlocked station at present. The extension of Bedi Port Terminal will also be connected to Bedi port terminal and Windmill station, it is proposed to provide New Electronic interlocking at Windmill station along with Proposed connectivity of Bedi Port Terminal.

0.5.5.2. The Windmill station is Existing Non-interlocked station. New Electronic interlocking along with Dual VDU, Multi aspect signaling, Electrical point operation, Datalogger, Integrated power supply is proposed for the Windmill station along with connectivity to Bedi Port Terminal and in new station Building. The New station Building will also be provided with communication arrangement like control phone, magenta phone, railway phone and communication through OFC & Quad cable.

0.5.5.3. The Bedi Port Terminal will be provided with essential telecommunication gears is as under:

i. Auto-telephone, magneto phone
ii. Control Communication through OFC & quad cable
iii. FOIS network at weigh bridges.
iv. VHF sets (25watts) fixed at the station & 5-watt walkie-talkie for mobile communication.

0.5.6. General Electrification

1. The Bedi Port Terminal is developed by GBPRL with 25 KV electrification with high rise OHE. The electrification of the section is completed, whereas the Viramgam-Jamnagar-Kanalus section electrification is in progress with high rise OHE. Therefore, Jamnagar-Windmill-Bedi Port terminal shall be charge with 25KV electrification with

High-Rise OHE after completion of Viramgam-Jamnagar-Kanalus section.

2. The Extension work of Bedi Port Terminal will be carried out with 25KV electrification with High Rise OHE.

2.5.1. Other Major Works:

Sr. No.	Description	Details	Remarks
1.	Loading unloading area For Container and White Goods	750 X 30 = 22500 sqm	
2.	High Rise OHE	1x25 Kv AC	
3.	Signal & Telecom work	Interlocking of Windmill station with EI and Telecom work Cable from Windmill station to the Container Staking area.	
4.	Station Building and Toilet Block at Windmill Station.	Total 420 sqm (approx.)	
5	Gate Lodge at LC 1	Total 55 sqm (approx.)	
6	High Mast (30 m Height)	04 nos Electrical high masts at Stacking & loading/unloading area	
7	Boundary wall	Compound wall/ Pale fencing: ~884m	

2.6. Estimation of cost

The cost has been worked out based on RVNL SOR and Last Accepted Rates (LARs) of similar kinds of items. Estimation cost of Rail Facilities works out as under:

Detailed Project Cost (As per Latest RVNL SOR Dt. March/2021)			
Lumpsum Cost of Construction for Extension of Bedi Port Terminal at Old Bedi Port near Windmill, Jamnagar of Rajkot Division of Western Railway			
S.No.	**Description**	**Percentages**	**Cost (Rs) in Crores**
I	Land Acquisition including environmental charges		17.00
II	Civil Works		102.58
III	S&T		8.94
IV	Genl Electrification (Incl. Overhead Crossing)		0.99
V	TRD		1.74
VI	Mechanical Works		0.00
A	**Basic Cost:**		**131.24**
VII	Preliminary expenses **@ 0.5 % of Total Project Cost Including Land**	0.2%	0.66
VIII	Escalation during Construction @ **5%** over **70%** of Basic cost for 1 year (Excluding Land Acquisition)	5%	4.00
IX	PMC @ **10%** over Basic Cost (Excluding Land Acquisition)	10%	11.42
X	SPV registration/Administration Charges Lumpsum @**1%** (Excluding Land Acquisition)	1%	1.14
XI	Legal and Insurance Charges @ **0.5%** percentage on Basic Cost (Excluding Land Acquisition)	0.5%	0.57
XII	Contingency @ **1%**	1%	1.14
B	**Total Cost Rounded Off:**		**150.00**
TOTAL PROJECT COST			**150.00**

2.7. Financial Analysis

The summarized financial results are as below:

Financial Performance of the project (base case):	
Project IRR (Post Tax)	12.3 %

Chapter 1
Introduction

Chapter 1 - Introduction

1. Background

Gujarat state takes pride of being a versatile and dynamic state in India with stronger economic foundation. Over the last two decades, the name of "Gujarat" has emerged synonymous with progress and vibrancy. The Government of Gujarat (GoG) is striving to deliver better than the best rail infrastructure in the state.

With this backdrop, Government of Gujarat (GoG) and Ministry of Railway (MoR) have signed a joint venture agreement on 17th August 2016 to develop railway projects through a project specific SPV. Consequently, a JV company "Gujarat Rail Infrastructure Development Corporation Limited (G-RIDE)" has been incorporated under the provisions of the companies Act, 2013 on 6th January 2017 with equity contribution of 51% and 49% from Government of Gujarat (GOG) and Ministry of Railway (MOR) respectively.G-RIDE has been established with a mission to develop and augment critical Railway Infrastructure, to enhance capacity of High-Density Network and to provide last mile rail connectivity with the main railway line within the State, with high standards of safety and efficiency by adopting the best technological practices, sound financial strategy and optimum utilization of resources through implementing large capacity creation programs.

Gujarat Maritime Board (GMB), the state maritime board owns the Bedi Group of Ports and entrusted G-RIDE for Extension of Bedi Port Terminal.

Old Bedi Port is located in the district of Jamnagar, on the southern coast of the Gulf of Kutch It is an all-weather tidal lighterage facility, with a long wharf of length 2250m, presently having lighterage operation with cargo transportation via barges. The port has a high dependency on Coal and Petroleum Coke with road freight movement to its immediate hinterland.

Last Mile rail Connectivity to Old Bedi port from Windmill station, of Rajkot Division Western Railway, has been developed as Bedi Port Terminal by G-RIDE Bedi Port Rail Limited (GBPRL), the project SPV incorporated as a joint venture of GMB and G-RIDE to develop port facilities and for development and operations of the Bedi Port Terminal.

Further, to compensate the increase in traffic of coal, container and other white goods, the further extension Bedi Port Terminal by developing Loading/Unloading and staking area is proposed in this project.

1.1 The Scope of Work:

The scope of services for the project as per TOR is as follows:

1.1.1 Detailed Project Report

- Firm-up category-wise traffic volumes, terminal throughput, and generation of trains.
- Preparation of Train Operation Plan for seamless movement of train in the proposed Corridor and smooth interchange of trains between siding corridor and IR.
- Detail plan of takeoff arrangement.
- Design of terminal with a quick evacuation plan.
- Assessment of needed base manpower for train operation.
- Carry out a detailed survey of the approved rail layout(s) comprising station, railwaysidings, internal rail facilities, and connectivity.
- Based on loading/unloading arrangements and requirements prescribed bythe railways, develop train handing facilities/terminals and related infrastructure.
- Assess land area requirements for rail facilities.
- Prepare GAD for culverts/bridges and other civil structures.
- Propose suitable signal arrangements and draw signaling plans for the identified works.
- Preparation and submission of the technical specification of Civil work. G-RIDE will provide technical specifications for P-way material, earthwork in formation, bridgework, permanent way, laying of P-way.
- Prepare BOQ and cost estimate of all civil works (rail hardware, buildings, bridges, pavements, and other structures).

1.1.2 Final Location Survey

- Physical stacking of alignment through survey instruments and taking levels along the line and finalization of ESP for gradient and curves and earthwork calculations.
- Fixing of centerline pillars as per Railway Engineering Code.
- Fixing of leveling pillars and benchmarks at suitable places concerning theGTS benchmark fixed by the survey of India.
- To carry out preliminary field investigation to broadly assess the bearing capacity of the soil required for GAD of control building viz. staff quarters, station building,cabin & restroom, etc. rail track formation and culverts/bridges.
- Calculation of land required for laying the proposed lines indicating railway and private land.
- Preparation of plans for diversion of roads etc. if any, falling on the alignment.

1.1.3 Engineering Scale Plan (Approved ESP)

- Design and prepare detailed engineering scale plan (ESP) for the proposed rail

facility.

- Preparation of Civil Engineering Plans for the alignment, junction arrangement with the new and existing railway system, unloading/loading terminal facilities, etc. on the scale 1:2500 horizontal and 1:500 vertical or any suitable scale applicable for the preparation of the layout plans.
- To assist the Client in obtaining approval of the engineering plan from the concerned Railway office.

1.1.4 GADs of Bridges and Other Structures

- To prepare GAD for control buildings viz. staff quarters, station building, restroom cabin, etc. & culvert/bridges.

1.1.5 Cost Estimates

- To prepare cost estimates for civil, S&T, and Electrical

Chapter 2
Traffic Projections

Chapter 2 - Traffic Projections

2.0. Industry Profile

Jamnagar District is located in the North West of Gujarat State. It is bounded partly by Gulf and partly by the desert of Kutch in the North, Junagadh District in the South, Rajkot District in the East and Arabian Sea in the West. The district is famous for its petrochemicals, brass products, tie dyed fabric and port related business. Large scale industries in Jamnagar involved in production of solvents, edible oils, cement, yarn, agricultural equipment's, soda ash, salt and

fertilizers. Some of the major medium and large-scale players in Jamnagar and Devbhumi Dwarka district is shown below figure and table:

Source: Indextb

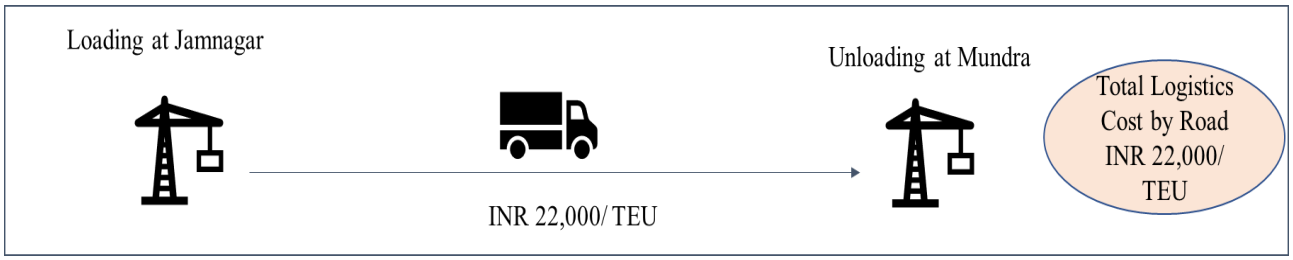
Name of Company	Taluka	Production
Tata Chemicals Limited	Mithapur	Soda Ash, Caustic Soda & other chemicals
Essar Oil Limited	Jam Khambhaliya	Petrochemicals
Reliance Industries Limited	Jamnagar	Petrochemicals
Gujarat State Fertilizer Co. Ltd.	Sikka	Fertilizers
New Bharat Engineering Works	Jamnagar	Machine Tools
Bellarpur Industries Limited	Jam Khambhaliya	Salt and other chemicals
Ashapura Minechem Limited	Jamnagar	Bauxite
Digvijay Cement Limited	Sikka	Cement
Nova International	Jamnagar	Brass Parts
Natraj Ceramics & Chemical Industries Pvt. Ltd	Jam Khambhaliya	Refractory, Calcite. Bauxite

Source: Indextb

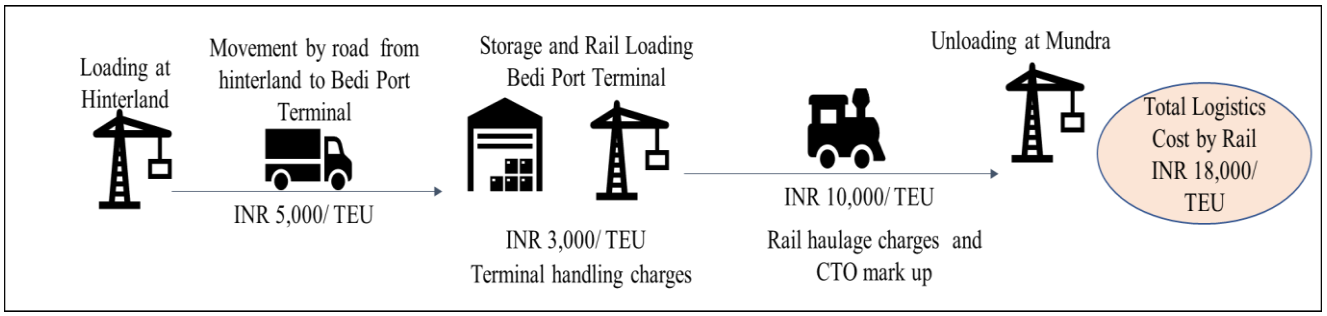
2.1. Logistics Cost Comparison – Road Vs Rail:

To identify the suitability of rail logistics and container freight terminals in Bedi Port Terminal, a comparison of current road transport costs and potential transport costs via ICD on the rail was compared. The analysis is summarized below.

1. Road



2. Rail



The above analysis confirms that the proposed rail terminal can generate transport cost savings of at least INR 4000 per TEU for the hinterland industries in Jamnagar. Apart from savings in logistics cost, industries in the hinterland can explore options for domestic carbon trade as per Energy Conservation (Amendment) Bill 2022 due to lesser carbon emission via rail in comparison to road.

2.2 Potential Traffic

District caters to 80% of the country's requirement for brass parts supply. There are over 5,000 units involved in production of brass parts which are mainly produced from brass scrap. Imports of brass scrap are majorly carried out from Mundra Port. Of the total produced brass parts, 90% is supplied within country while rest 10% are exported mainly via Mundra Port. There is potential market for Bedi Port Terminal to divert traffic of brass scrap and brass finished product by having ties up with Jamnagar Factory Owner's Association.

Jamnagar, Dev Bhoomi Dwarka and Kutch districts are the largest producer of bauxite in the State. As per IBM data, in FY 2018-19, around 50% of bauxite were produced from Dev Bhoomi Dwarka district. Majority of the Bauxite rare found in Mevasa region of Dev Bhoomi Dwarka district which is around 162 km far away from Old Bedi Port. 72% of Bauxite produced in the hinterland are used for cement industry followed by 14% for refractory purposes and 13% for alumina production. [1]Bauxite produced in the hinterland are supplied across the nation. There is

[1] Indian Burau of Mines Yearbook

potential market for Bedi Port Terminal to capture bauxite traffic heading towards other long-distance states by having ties up with players like Gujarat Mineral Development Corporation Limited and Ashapura Minechem Limited.

In the hinterland, industries like Tata Chemicals and RSPL are one of the largest producers of Soda Ash. Tata Chemicals currently soda ash facility in Mithapur, Devbhumi Dwarka District which is around 150 km from Old Bedi Port. Currently cargo for Tata Chemicals is being handled from Bhimrana rail siding in Devbhumi Dwarka. As per Annual reports of Tata Chemicals, capacity expansion of the plant at Mithapur is already under progress. With the expansion, annual soda ash capacity shall increase from 1.09 million tonnes per annum to 1.31 million tonnes per annum. RSPL group have formed soda ash plant in Gujarat near Kuranga village which is around 130 Km from Bedi Port Terminal. It is assumed that both these plants can cater some traffic due to limited capacity availability in the nearby sidings and future expansion of soda ash plant

Apart from container, Bedi Port Terminal shall cater to the storage and stacking of coal imported via Old Bedi Port. Stacking facility at Bedi Port Terminal shall augment capacity of Old Bedi Port. It is presumed that due to Bedi Port Terminal shall increase the coal traffic from current 1 million tonnes per annum to around 2-3 million tonnes per annum which shall cater to the thermal power in the hinterland as well as for the land lock states like Rajasthan and Madhya Pradesh.

Rozi Port in the vicinity of old Bedi handles imported fertilizer and currently is being loaded from Windmill Station. Such imported fertilizer is destined for Ludhiana, Amritsar, Karnal, Hirasar, Sonipat, Jallandhar, Bharatpur, Kota, Kanakpura, Jalgaon, Akola, Laxmibainagar, Moradabad, Aligarh and other locations in Punjab, UP, Haryana and Rajasthan.

Based on the above analysis, the potential traffic for the proposed terminal is derived considering conservative approach as follows:

Year	**2024-25**	**2029-30**	**2034-35**	**2039-40**	**2044-45**	**2049-50**	**2054-55**
Total Container movement (TEU)	53,317	62,992	64,160	65,195	65,516	65,516	65,516
Container (Tonnes- 15 tonnes/ TEU)	6,55,975	9,38,986	9,54,876	9,72,987	9,82,740	9,82,740	9,82,740
Break Bulk Traffic (tonnes)	30,000	33,122	36,570	40,376	44,578	49,218	54,341
Bulk Traffic (tonnes)	71,800	5,15,942	10,22,500	11,36,212	12,56,317	13,83,175	15,17,165

Year	2024-25	2029-30	2034-35	2039-40	2044-45	2049-50	2054-55
Total Traffic (Tonnes)	7,57,000	14,88,050	20,13,946	21,49,575	22,83,683	24,15,133	25,54,246

Traffic Estimation for Rakes for Phase-II:

Year	2024-25	2029-30	2034-35	2039-40	2044-45	2049-50	2054-55
Container rake per annum	592	700	713	724	728	728	728
Break Bulk and Bulk Cargo Rakes per annum	25	137	271	294	325	358	393
Total Rakes per annum	617	837	984	1,018	1,053	1,086	1,121
Total Rakes per day	**1.7**	**2.3**	**2.7**	**2.8**	**2.9**	**3.0**	**3.1**

On a conservation approach, it is expected that Bedi Port Terminal shall cater around 2.5 million tonnes of traffic by FY 2054-55. Traffic flow will enhance with the tie ups with large and medium scale industries within the hinterland. Bedi Port Terminal can be explored as hub and spoke model with the possibility of having connectivity of Bedi Port Terminal -Malia- Mundra and Bedi Port Terminal – GCT Rafaleshwar- Mundra.

Chapter 3
Train Operation Plan

Chapter 3 - Train Operation Plan

3.0 Introduction

Bedi Port terminal is newly constructed terminal connected with Windmill Station near Jamnagar Station on BG Line of Rajkot (RJT) Division on Viramgam-Rajkot-Jamnagar-Okha single line section. Electrification and Doubling work are in progress.

3.1 Descriptions of Bedi Port Terminal:

- Bedi Port Terminal is a rail linked port terminal, having a length of 3.024 Kms. From Windmill Station near Jamnagar of Rajkot Division Western Railway.
- At the terminal end two spur of CSR 375 meters for loading/unloading purpose.
- There is a holding yard of two lines having CSR of 750 meters each before Port Terminal yard.
- One BVG and Sick line siding having CSR of 120 meters before loading/unloading area.
- Electronic In Motion Weigh Bridge (EIMWB) is provided just before Loading/Unloading area

The clear holding capacity of the lines in meters is tabulated as under vide table no.3.1.

Table No.3.1: Holding Capacity in CSR

Line No.	Nomenclature	CSR in Meters
1	Holding yard Line One	750.00
2	Holding yard Line Two	750.00
3	Spur Line One	375.00
4	Spur Line Two	375.00
5	BVG & Sick wagon Siding	120.00

3.1.1 The working of the Bedi Port Terminal is in Shunting Mode from Windmill Station.

3.2 Descriptions of Windmill Station Yard:

Windmill is a four-line non-interlocked special class station situated at Km 828.78 from Church gate. Yard has hand lever operated pad lock points in operation, the keys remain in the custody of on duty SM. The line level, badges and hand signals are used for shunting movement within Station yard. The station limit is from outermost facing point number 101 to the Dead-end towards port side. The clear holding capacity of the lines in meters is tabulated as under vide table no.3.2

Table 3.2: Holding Capacity in CSR of Windmill Station Yard

Line No.	Nomenclature	CSR in Meters
Line No. 1	Running Line Number One (Loop)	670.50
Line No. 2	Running Line Number Two (Main)	670.50
Line No. 3	Running Line Number Three (Loop)	729.258
Line No. 4	Non-Running Line Number On (Loop)	729.258

3.2.1 The working of Windmill Station.

The working of Windmill Station is tabulated vide table no. 3.3 herewith to understand the system of train working between Jamnagar- 'A' Cabin to Windmill Station.

Table 3.3: Working on the Section

Section	Distance	Maximum Permissible Speed on the section (Km/h)	System of working
Jamnagar A Cabin - Windmill	3.08 Km	15 KMPH	Absolute Block System
Windmill – Bedi Port	3.024 Km	15 KMPH	Shunting Mode

The current Station Working Rules (SWR) defines the Block Section between Jamnagar – 'A' Cabin and Wind Mill outermost facing point number 101.

The Windmill Station Yard limit is start from Stop Board towards Jamnagar and will end by Trap Point number 110 towards Bedi Port side, from where the take-off is connecting Bedi Port.

3.3 Rail Hardware Planned.

3.3.1 Extension of Bedi Port Terminal is proposed as follows:

(i) A separate connectivity for Bedi Port Terminal, by providing loop line number 5 at Windmill Station, will take off from line number 4 of Windmill Station from Jamnagar end.

(ii) Remodeling of Windmill yard towards Bedi Port end for proposed Container and White Goods siding, parallel to existing holding yard of Bedi Port Termional.

(iii) Provision of two full length Rake at a time in Bedi Port Terminal for loading/Unloading by extending existing spur.

(iv) Development of Stacking and loading/Unloading area to provide better Stacking facilities.

(v) Proposed Container and White Goods siding for full length Rake with 30-meter broad Rail level platform.

3.4 Train Operations

3.4.1 Placement and Removal of Rakes at Bedi Port Terminal.

(i) Placement of Rakes

For placement of a Rake to Bedi port Terminal, existing procedure for movement of train up to holding yard will remain as usual.

After reversal of Loco, if load has to place in Port area, load will be pushed back in either of loading/unloading line number 1 or 2 as loading/unloading area being top wired.

After reversal of Loco, if load has to place to Container siding, load will be pulled ahead with permission of SM Windmill, towards Windmill Station in line number 5 and after clearing facing point 108 of Container siding loading/unloading line number 3, load will be pushed back in loading/unloading line number 3, as Container siding being top wired.

During whole movement, Guard of the train will supervise the operations. The speed of the train during shunting shall not exceed 15 Kmph. The Loco Pilot of the train will frequently whistle while moving the load towards loading/unloading area.

After placement of load, BVG will be detached from the load and placed in the siding exclusive for the BVG parking. After placement of the rake in the siding, if there is not any outward load inside port siding or Container siding, Guard and shunting staff will return by light engine or follow the instruction of SM Windmill.

Second and subsequent rake will be placed after completion of first move.

(ii) Removal of Rakes

After consultation with the port Transport Manager. SM Windmill station will advise Guard and instruct shunting staff accompanying light engine regarding the intended move. The engine will pull the load from loading/unloading line number 1 or 2, and simultaneously weighment will be done, after weighment load will push back in BVG siding to attach BVG, after that train will be moved towards holding yard for GDR process. Once after completion of GDR, Guard will satisfy himself that, load is intact and ready to depart he will inform to SM Windmill for further movement of the train.

For removal of rake from Container siding, loco will attach directly to load and after completion of GDR and with permission of SM Windmill further movement will be done.

3.4.2 System Provisions for Loading/Unloading of Wagons.

There is no provision made by client for fully mechanized loading/unloading system like silo, loading conveyor belt etc. However, arrangements have to made for loading/unloading with the help of Proclaim/ JCB/Hydra loader as presently used for loading the Trucks/Lorries.

Prior stacking is required saving the time before placement of trains. Also, the rail level Platform is proposed for smooth movement of loading/unloading machineries.

In case of bagged consignment, presently only one option of manual loading/unloading are available by using the laborers.

Chapter 4
Proposed Layout Design & Engineering Parameters

Chapter 4 - Proposed Layout Design & Engineering Parameters

General

G-RIDE has carried out a study of Bedi Port Terminal connected from Windmill station at Jamnagar District proposed Loading/Unloading Line and Sperate Connectivity to Bedi Port with construction of Proposed Line No. 5 from existing line No 4 at Windmill at Jamnagar end.

4.1 Engineering Parameters as adopted

- **Gauge:** The broad gauge adopted for the proposed rail infrastructure will be 1676 mm to be in conformity with the existing gauge of the Indian Railway track, in the vicinity of the project area.
- **Curves:** Proposed alignment of the siding has been planned with curves of 4º.
- **Gradients:** Steepest Gradient in the proposed siding is 1 in 200.
- **Formation:** Blanketing material of minimum 450 mm depth has been considered below 350 mm on main line & 250-mm on loop lines ballast cushion and embankments/subgrade are to bemade of compacted earth filling with a side slope of 2:1. The side slope in cutting in ordinary/hard soil would generally be 1:1. Steeper slopes of 0.5:1 in rocks and a flatter slope of 1.5:1 in soft/loose soil may have to be adopted, depending upon the nature of the material to be excavated. Standard Railway/DFC formation profile has been adopted.
- CSR of ~884.5 m for 1 loading/unloading lines for Container and White goods. Rail level Platform of 750 * 30 m for loading/unloading and staking area proposed in Bedi Port Yard will be provided: VDC of 100mm, DLC (Dry Lean Concrete) of 150mm, WMM (Wet Mix Macadam) of 200mm and GSB (250mm avg. approx.), and rest will be Good Earth of ~ 500mm.
- **Bridges:** All the minor and major bridges are to be designed corresponding to DFC loading standards of 32.5 t axle load.
- **Moving Dimensions:** Fixed structures are to be designed to suit the Recommended Dimensions indicated in the B.G. Schedule of Dimensions of Indian Railways.
- **Standard of Track:** The track structure is proposed to be made up of 60 kg R-260 rails laid on PSC monoblock sleepers with sleeper density of 1660 Nos. for main line and 1540 Nos. for loop lines, siding. per km on a 250-mm cushion of hard stone ballast in conformity with the existing track structure. Points and crossings within the yard will be 1 in 12 with curved switches on the PSC sleeper layout and 60 Kg rail section.
- **Turfing:** Turfing is generally envisaged for the side slopes of all embankments. Present alignment is in filling mostly, turfing if required will be provided basedon the nature of soil strata.
- **Protection Works:** Hill slopes, as well as approaches of nalas/creek and high bank, will be protected by pitching as well as sodding in general. Stone pitchingwith boulders grouted in (1:6) cement sand mortar has been recommended in the high bank portion. Also, Retaining Wall/Toe Wall/Stone pitching has been considered along the track running parallel to the existing track connecting to retaining wall on one side of formation has also been considered along the track due to land constraint

- **HT/LT Crossings:** Provision of minimum vertical & lateral clearances may require shifting/raising/lowering of HT/ LT and telephone lines as per site requirement.
- **Structural Clearance:** All overhead structures will have clearance to cater for High Rise electric traction (OHE).

4.1.1 In addition to the above, the following parameters for the design of Rail alignment and planning of other facilities have been adopted:

- Platform on Container and White Goods stacking area are Rail level platform of 750x30 m
- Road crossing to be provided at the suitable places (wherever feasible) for the crossing of road vehicle for the purpose of staking.

4.2 General Topography

The general nature of the terrain in this area is undulation. Proposed railway track is in filling for almost the entire length of the siding. Existing ground levels vary from 3 m to 6 m. The Rail top level of Main Line at proposed Ch: -280.00 at is 6.13 and at Ch: 1600 it is 5.81. Formation levels of the proposed siding have been decided based on Rail levels of existing railway track with a difference from formation level as 0.767m.

4.3 Take-off details & Route Description

- For the Separate connectivity to Newly constructed Bedi Port Terminal at Old Bedi Port, a line No. 5 is proposed at Windmill station. The proposed Line No.5 will take off from Ch: 278.550 from existing line No.4 in Windmill yard at Jamnagar end, taking zero chainage at C/L of Windmill station.
- To improve the connectivity the modification of windmill yard is also proposed by slewing the existing line no. 3 and 4 at Old Bedi Port end.
- A new line of CSR 884.50, from proposed Ch: 610.548 is proposed for loading/ Unloading and staking of container and white goods in Container yard with rail level platform (i.e of area 22,500 sqm).
- The existing connectivity to Bedi port terminal from Line No. 3 will modified to smooth the connectivity to Bedi Port Terminal and to Connect newly proposed loading/unloading line at Container yard.
- Provision of two full length Rake for loading/unloading purpose is proposed at Bedi Port Terminal by extension the Spur 1 and 2.
- Development of staking and loading/unloading area for full length rake at Bedi Port Terminal.

Costing of the dismantling of road, Gate Lodge etc. coming in rail alignment and related facilities have been considered in the estimates.

4.3.1. Windmill Yard layout

Train for Bedi Port terminal will be received in proposed Line Lime 5 directly.

Chapter 5
Proposed Signaling & Telecommunication Arrangements

Chapter 5 - Proposed Signalling & Telecommunication Arrangements

5.1 Existing Bediport Terminal takes off from windmill station which is a non-interlocked station. Along with Bedi Port Terminal yard remodeling and additional lines will be provided in Windmill station. Now it is proposed to be Provide New Electronic interlocking at Windmill station along with connectivity of Bedi port terminal. The station have one main line with 3 loop lines at present & proposed to provide one more loop line no.5 along with modification in yard on Bediport side for connectivity for Bedi Port Terminal. Trains movements is on an Absolute block system using token less Block Instrument (UFSBI) will be provided in the SM's office between Jamanagar & Windmill stations.

5.2 **SIGNALLING**: - The station will be-interlocked with STD-II R with the latest signaling arrangement. Following Signaling provisions are proposed for the Windmill station: -

- Electronic Interlocking with Dual VDU & MT terminal
- MACLS signaling with LED units
- Track circuiting by DC track circuits
- Electrical operation & detection of Points
- Absolute Block working with UFSBI & BPAC (HASSDAC)
- Provision of Datalogger for monitoring and fault diagnostic work.
- Provision for Track charger monitoring, Fuse Alarm, Fire Alarm, ELD etc
- Interlocking of LC gates with Electrical lifting barrier & Slide booms.
- Fire alarm system & Fuse Alarm system
- 3 Nos of Electrical supply is proposed at all Station (i) 25kvA single phase AC. (ii) Local supply of station (iii) D.G. Set supply. Provision of Auto changeover.
- I.P.S is proposed for different supply which is required for signaling system.
- Relay room closing/Opening monitoring

5.3 The Bedi Port Terminal will be non-interlocked terminal. Entry into Windmill yard from Bedi Port Terminal and Entry Into the proposed siding to Windmill station will be shunting movement.

- **TELECOMMUNICATION:** - 6 Quad Cable with Optical Fibre cable (OFC) are already available at Windmill station. Following Telecom provisions are proposed for the windmill station: -
  - Control communications with Optical fibre cable in HDPE duct
  - Block Phone, Auto Phone, and P&T phones
  - Six Quad cable at station for LC gate communication
  - Provision of Emergency communications
  - Provision of VHF set

5.4 The Telecommunication arrangement at Bedi Port Terminal siding will be provided with as per standard practice. Both OFC and Quad cable connectivity are already available for control

communication & FOIS connectivity for Weigh bridge. VHF set will used for shunting works.

5.5 ENGINEERNG REQUIREMENT FOR S&T: -STRUCTURES

a. At Windmill station

Following new structures are Required at proposed Windmill station.

- Relay Room size 9m x 6m
- Power Room size 4m x 6m
- Battery Room size 3m x 6m
- DG set Room size 3m x 6m
- ESM Duty Room size 3m x 6m
- Cable huts on both side of yard 3m x 6m
- LC Gate equipment room size 4m x 6m
- OFC Equipment room size 3m x6m
- OFC power equipment room size 4m x 6m

b. At Siding- Existing structures are available

P-WAY requirement

- Approximately 150 Glued Joints are required for track circuits
- Provision of PFN Liners & Rubber pads in Stations area
- All New points to be on PRC sleepers

5.6 ELECTRICAL REQUIREMENT FOR S&T

1. 25 KVA single phase electric supply at Windmill station with Autochange over
2. Electronic Interlocking Relay room to be provided with Air conditioning.
3. Exhaust Fans to be provided in all Rooms.
4. All rooms may be provided with sufficient light & Fan arrangements.
5. Necessary Traction bonding in yards.

5.7 Abstract Estimated Cost = Latest available rates of RVNL SOR are considered for estimation

Abstract Estimate (Signalling)	=	8,46,49,319
Abstract Estimate (Telecom)	=	47,64,603
Total(S&T) Cost	=	**8,94,13,922**

Chapter 6

General Electrification

Chapter 6 - General electrification

The Bedi Port Terminal is developed by GBPRL with 25 KV electrification with high rise OHE. The electrification of the section is completed, whereas the Viramgam-Jamnagar-Kanalus section electrification is in progress with high rise OHE. Therefore, Jamnagar-Windmill-Bedi Port shall be charge with 25KV electrification with High-Rise OHE after completion of Viramgam-Jamnagar-Kanalus section.

The Extension work of Bedi Port Terminal will be carried out with 25KV electrification with High Rise OHE.

6.1 General Electrification

The work has been carried out in accordance with following governing specification and other statutory rules as per priority given below:

a. Indian Electricity Rules 1956, National building code 1994 and 1985 or latest issued by Central Electricity Authority with latest amendments. Indian Electricity Act-2003 with latest amendments.
b. Regulations laid down by Chief Electrical Inspector.
c. Rules and regulations prescribed by local authorities as applicable.
d. Relevant Indian Standard:
   (i) 1100 V. grade FRLS PVC insulated wires; IS 694:1990 – ISI Mark
   (ii) MS conduits for electrical wiring; IS 9537: 1980 – ISI Mark
   (iii) Switch socket outlets; IS 4615:1990 – ISI Mark
   (iv) pin plugs and socket outlets up to 250 V; IS 11293:1988 – ISI Mark
   (v) 1100 V XLPE insulated Armoured Cables; IS 7098: Part1 – ISI Mark
   (vi) Glossary of items for electrical cable; IS1885:1971 – ISI Mark
   (vii) Switches for domestic and similar purposes; IS 3854:1997
   (viii) Boxes for enclosure of electrical accessories; IS 5133:1969 – ISI Mark
   (ix) Code of practice for electrical wiring installations; IS 732:1089
   (x) Guide for safety procedure and practice in electrical works; IS 5216:1982

Windmill Railway station is a terminal station next to Jamnagar Jn. Windmill section is at a distance of 828.78 km. from Churchgate.

The Connectivity to Bedi Port Terminal is developed from Windmill station. to improve the connectivity Line No. 5 at Windmill station is proposed with full electrification. A New Loading/unloading line for container and white goods is also proposed in this phase. Container/White Goods Loading/unloading line will be illuminate with octagonal pole. Coal siding and entrance area is to be illuminated with high mast. Improvement in road

lighting system has been initiated by port authority.

6.2 TERMS OF REFERENCE (ELECTRICAL)

6.2.1 Platform lighting: There are 38(Thirty-Eight) nos of electrical octagonal poles with required (every 5th pole should be earthed) earthing as per IS-3043 will be installed at Container and whitegoods stacking area. Available average lux level is less than 20 lux. Average illumination level may be improved up to 40 lux, which is sufficient for safe working. Along with this 4 nos. of 30 m High Mast will be provided at Bedi Port Terminal to cover the increase stacking area.

6.2.2 Service Building – The proposed B- Class station building no-1 & S&T Hut building no- 02 is to be electrified in concealed type wiring with PVC pipes and FRLS PVC insulated copper wire. Provision for water supply & installed the single phase 5 HP submersible pump. Power supply for these proposed building shall be taken from state electricity board & AT supply.

6.2.3 Road lighting – Light fittings shall be done at an appropriate distance alongside road & 5 mtr octagonal pole with proper earthing shall be installed at LC gate area & 7.5 mtr wide road area.

6.2.4 Examination of power supply for Platform - Power supply shall be received from existing substation. Existing two no of 250 Amp MCCB as incomer that has been installed to feed required power supply from existing electrical sub –station to proposed electrical load.

6.2.5 Crossings of tracks & bridges are to be done with 160 mm HDPE pipes& thick ness 6.2 mm-7.1 mm only. NP-4 Pipes along with provision of RCC chambers at suitable distances will be used for cable laying works. Cables laid easily in these suitable dia pipes and can be repaired/ replaced in case of failure.

Chapter 6A

Over Head Electrification (OHE)

Chapter 6A - Overhead Electrification

6A.0 Introduction

Bedi Port Terminal area is on an electrified broad-gauge section at 828.78Km. from Church gate. It is a special class station on a single line. However, the same may be electrified as ad when Windmill station is electrified by Railway for which cost has been considered in the estimate to be incurred in future and the same shall be borne by the siding owner i.e. Gujarat Maritime Board (GMB).

6A.1 Electrification of Bedi Port Terminal is proposed 25KV AC single phase 50 Hz high rise OHE, the work is to be carried out in accordance with following governing specification and other statutory rules as per the priority given below:

(i) Safety regulation – 2010 issued by Central Electricity Authority with latest amendments.
(ii) Indian Electricity Act-2003 with latest amendments.
(iii) Regulations laid down by Chief Electrical Inspector.
(iv) Rules and regulations prescribed by local authorities as applicable.
(v) Relevant Indian Standard.
(vi) Indian Railways Schedule of Dimensions (2004) – with Latest ACs for theworks concerning Indian Railways and connecting tracks.
(vii) Design manual for Electric Traction (Indian Railways)
(viii) Indian Railways AC Traction Manual.
(ix) Electrical safety code and National Building Code.
(x) IEC Standard, British standards, and other national/international standards carried out by following governing specifications and other statutory rules.

6A.2 Power Supply for Bedi PortTerminal:

Power supply shall be received from line no-04 at WIND -MILL connecting to proposed OHE line no-05.

6A.3 Modification of High Rise OHE:

Towards Jamnagar -Line No-04 (Length-50 Mtr) & Line no-04, 03main line (500 Mtr) at WINDMILL (towards BEDI-PORT) shall be modified. Thus, total length of modification shall be 550 Mtr.

6A.4 Design Criteria

The design is complying with AC traction manual (ACTM) and RDSO Specification

6A.4.1 25 KV High Rise OHE Design Principles

Design principles adopted for OHE designs and drawings are based on Design Handout for High rise OHE AC Traction Manual of Indian Railway and RDSO drawings.

Overhead Electrification consists of conductors supported by cantilevers and associated fittings from steel structures located at a setting distance from the track. The main drawings and principles adopted in each are detailed below.

6.A.4.2 Sectioning Diagram

The overhead equipment is divided electrically into sections insulated overlaps and section insulators at turnouts under normal working conditions, electrical continuity is maintained by bridging the insulated overlaps using interrupters or isolators, and isolation of small sections of OHE for the maintenance and repairs is possible.

6.A.4.3. Layout Plan/Pegging plan/Power supply diagram

All OHE principles laid down by RDSO and stated in ACTM will be followed for OHE erection, installation, testing, and commissioning.

6.A.4.4. Cross-sectional diagrams

(a) CSDs provide the details such as type and dimensions of foundation (which is selectedusing the approved volume chart), soil profile, mast type, mast embedded length, superblock, anchor type if any, and reverse deflection provided at the location
(b) Type and dimensions of the foundation are chosen from volume charts foundation bending movement code (FBM), soil type, and bearing capacity

6.A.4.5 Structural Erection Diagrams

SEDs provide the details like dimensions of the mast, details about bracket assembly, guy rod, termination style, etc.

6A.5 Overhead Structure/Mast:

Rolled fabricated hot-dipped galvanized OHE structure will be used. The zinc coating for steel structure and part shall be as per RDSO-specification no. ETI/OHE/13 i.e., minimum coating of zinc shall be 610 gm/sqm length of the OHE mast should be 11.40 meters and the Maximum span should be 54 meters.

6A.6 Foundation

Foundation design has been considered as per the Indian Railways Design Manual for Electric Traction Mixture M-10 & M-15 with the proportion as per IS: 456-1978. A nut bolt system for fixing mast on bridges etc. has also been considered. Foundation should be selected by SPT report.

6A.7 Overhead equipment conductors

6A.7.1 For yard lines for each track

The size of the contact and catenaries wire in the yards will be a minimum of sizes 107 sq. mm. HDGC copper and 65 sq. mm. catenary respectively to RDSO specification of copper contact and catenaries wires withstanding minimum 800 C Temperature will be provided.

6A.7.2 25 KV High-rise OHE configuration

The configuration of high-rise OHE for the double-stack container is given in below table. RDSO has issued Design Handout for Overhead equipment for running Double stack container & Three Tier Car under electrified route (High Rise OHE) with speed potential 140 KMPH. Some important parameters of High Rise OHE are as given below-

OHE Parameter

1	Height of Double Stack Container	7100 mm
2	Height of Contact Wire at support from Rail Level	7570 mm
3	Height of Contact Wire at mid span from Rail Level	7520 mm
4	Height of Catenary Wire at support from Rail Level	8970 mm
5	Pre sag at mid span	50 mm
6	Max stagger at Tangent Track	+ or – 150 mm
7	Max stagger at Curves	+ or – 250 mm
8	Standard Encumbrance	1.40 mtr
9	Speed	140 KMPH
10	Type of Mast	B-150/B-175/B-200/B-225/B-250
11	Mast Length	11.4 Mtr
12	Min Implantation	2.8 Mtr
13	Max Tension Length	1.5 KM
14	Catenary Wire	65 Sq mm
15	Contact Wire	107 Sq mm

The High Rise OHE shall be merged with conventional OHE with the contact wire

gradient @ 10mm/metre.

HIGH RISE OHE FOR RUNNING DOUBLE STACK CONTAINERS UNDER ELECTRIFIED ROUTE (WITH SPEED POTENTIAL OF 140 KMPH)

Design, installation and erection of High Rise OHE shall conform as per RDSO's Design Document No-TI/DESIGNS/OHE/2014/00001(Rev 1), Dec 2014. Further RDSO has issued drawings for 11.4-meter masts, Portals, TTC, Employment Schedule, Foundations & Anchor Arrangement etc which shall be followed while executing the work.

1. The type of foundations shall remain same. However, the work to be done as per the relevant drawings issued by RDSO.
2. Structures: RDSO has issued the drawings of 11.4m high masts
3. Track Earthing and bonding system as per the Railway ACTM.

6A.8 Cantilever Assembly for the yard

Cantilever assemblies, ATD, droppers, and other fittings in the yard will be as per Indian Railway design and RDSO specification.

6A.9 Encumbrance:

The proposed OHE encumbrance is 1.4 m while retaining an encumbrance value of 0.9 m for the out-of-turn (OR) OHE. Accordingly, the Bottom fittings will be provided at 7.27 m and the Top fitting at 9.27 m height from Rail level

6A.10 Auxiliary Transformer:

One no of proposed 25 KVA AT & CLS panel with cable shall be provided at the proposed Station Building No-01

6A.11 Integration

OHE to be integrated by overlapping system to windmill station yard.

6A.12 SPT required as per RDSO

6A.13 Employment schedule shall be as per wind pressure of the relevant zone.

Chapter 7

Project Engineering & Estimation of Cost

Chapter 7 - Project Engineering & Estimation of Cost

7.1 Project Engineering

This chapter covers details of works to be carried out by GRIDE for Extension of Bedi Port Terminal near Windmill station.

7.2 Preliminary works

Preliminary works include Feasibility Study, Field survey, Geo-Technical Investigation, DPR, and Engineering Scale Plan, GAD's, Cost Estimate.

The feasibility study has been completed and the connectivity at Bedi Port Terminal is completed and operation is started. Further development at Bedi Port Terminal is proposed in this report.

Field Survey of the proposal have also been completed. Based on Field Survey, a detailed design of alignment has been carried out. Approved ESP and Plan with L- section of the proposed extension of Bedi Port Terminal is enclosed in Annexures as **Annexure-II**.

Major components of the project constituting the major cost of the project are briefly described in this chapter.

7.3 Curve details of the Railway connectivity

Sr. No.	Curve No.	Deflection Angle			Degree of Curve	Radius (m)	(TL) Tangent Length	Circular Arc Length
		Deg.	Min.	Sec.				
1.	4A	56	22	5	6.783	258.00	138.246	253.82
2.	4B	16	55	29	7.533	232.32	34.564	68.63
3	4C	17	26	41	7.533	232.32	35.643	70.73
4	4D	12	11	33	7.533	232.32	24.812	49.44
5	4E	23	53	56	7.533	232.32	49.167	96.9

7.4 Land

Land for rail connectivity along the Railway line and for Staking area from Windmill station is to be acquired by the Project SPV. Accordingly, the cost for the same has been included in the estimate.

7.5 Formation

Almost the entire length of the siding is in cutting. Blanketing material of minimum 450 mm depth has been considered below 350 mm on main line & 250-mm on loop lines ballast cushion and embankments/subgrade are to be made of compacted earth cutting/filling. The side slope in cutting in ordinary/hard soil would generally be 1:1. Steeper slopes of 0.5:1 in rocks and a flatter slope of 1.5:1 in soft/loose soil may have to be adopted, depending upon

the nature of the material to be excavated. Standard Railway/DFC formation profile has been adopted.

CSR of ~884.50 m for 1 loading/unloading lines for Container and White goods. Rail level Platform of 750 * 30 m for loading/unloading and staking area proposed in Bedi Port Terminal Yard will be provided: VDC of 100mm, DLC (Dry Lean Concrete) of 150mm, WMM (Wet Mix Macadam) of 200mm and GSB (250mm avg. approx.), and rest will be Good Earth of ~ 500mm.

7.6 Permanent Way

Following track structure has been proposed for Bedi Port Terminal and other tracks inside the Terminal:

Sl. No.	Brief Description ofItem	Specification	Remarks
1	Rails – 60 Kg, 90 UTS(IU)	T-12/90 UTS, IRS.T- 43-1992/1996	These Rails and Sleepers shall be used in siding track
2	Sleepers – 60 Kg PSCSleeper %-2496	T-39/1993	
3	Sleeper Density	1660 nos. per km on main line and 1540 nos. per km on loop line	
4	Points & crossing on PSC Sleeper	Drawing no. of layout and sleeper are as under:	
	a) 1 in 8.5 fan shaped Layout	RT-4865, RT-4793 to 4844 & RT-4512	To be provided in connection with loop lines and BVG siding
5	Curved Sleeper		
	With Check Rail	RDSO drawing no. T-4183, 84, 85 & 86	On Curve Sharper than 5o
	Without Check Rail	RDSO drawing no. T-4170, 71, 72 & 73	On Curve Sharper than 5o
6	Level crossing sleeper with the provision of checkrail	RDSO Drawing no. T-4148	To be provided at level crossings
7	Ballast	65mm and downsize track ballast as per RDSO specification	The hard stone (dolomite/granite) machine crushed ballast shall be used

7.7 Bridges and Level Crossing

Following bridges/Culverts/ LC has been proposed in the Rail Alignment:

i. Minor Bridges:

Sr. No.	Bridge No.	Existing Span /Type	Proposed span	Proposed Type of Br	Prop. Chainage	Remarks
1	Br No 1	1 X 3X 2 M	1 X 3X 2 M	RCC Box	Ch: 1140.00	
2	Br No 2	2 X 3X 2 M	2 X 3X 2 M	RCC Box	Ch: 1487.12.00	

ii. LC's:

Sr. No.	Lc No.	Type of LC	Chainage	Remarks
1	LC No 1	Manned	715.800	Will be interlocked

7.8 Other Structures

(a) Station Building: A new B-Class Station Building is proposed at the Windmill.

(b) Service Buildings: Gate Lodge is proposed at LC No.1.

(c) Three Nos. **Pathway** has been proposed in the Handling Yard between the existing tracks.

(d) Retaining Wall of length 1200 m is proposed in the Container and White good Platform.

7.9 Estimation of Cost: The cost of railway facilities has been worked out based on DSR/Railway SOR and Last Accepted Rates (LARs) of similar items.

Detailed Project Cost (As per Latest RVNL SOR Dt. March/2021)			
Lumpsum Cost of Construction for Extension at Bedi Port Terminal near Windmill, Jamnagar of Rajkot Division of Western Railway			
S.No.	**Description**	**Percentages**	**Cost (Rs) in Crores**
I	Land Acquisition including environmental charges		17.00
II	Civil Works		102.58
III	S&T		8.94
IV	Genl Electrification (Incl. Overhead Crossing)		0.99
V	TRD		1.74
VI	Mechanical Works		0.00
A	**Basic Cost:**		**131.24**
VII	Preliminary expenses **@ 0.5 % of Total Project Cost Including Land**	0.2%	0.66
VIII	Escalation during Construction @ **5%** over **70%** of Basic cost for 1 year (Excluding Land Acquisition)	5%	4.00
IX	PMC @ **10%** over Basic Cost (Excluding Land Acquisition)	10%	11.42
X	SPV registration/Administration Charges Lumpsum @**1%** (Excluding Land Acquisition)	1%	1.14
XI	Legal and Insurance Charges @ **0.5%** percentage on Basic Cost (Excluding Land Acquisition)	0.5%	0.57
XII	Contingency @ **1%**	1%	1.14
B	**Total Cost Rounded Off:**		**150.00**
TOTAL PROJECT COST			**150.00**

Chapter 8

Engineering Survey & Geo-Technical Investigation

Chapter 8 - Engineering Survey & Geo-Technical Investigation

1.0 Introduction

Field Survey has been carried out by establishing control points by the DGPS system. Geo-Technical Investigation has been carried out by GRIDE. Based on Field Survey and Geo-Technical Investigation, a detailed design of alignment has been carried out.

1.1. Methodology Adopted for Topographical Survey using DRONE (UAV):

1.1.1. Preparation:

This step includes site survey along with all the structure to be measured in the Topographic survey and Digital Surface model.

1.1.2. Survey:

This step includes two different survey

- GCP Survey
- Aerial Photogrammetric Survey: To be done with prescribed technology

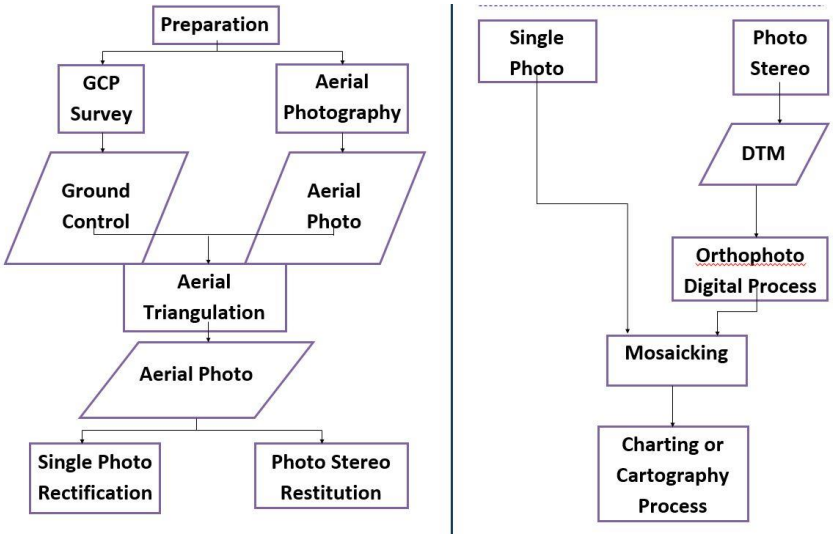
1.1.3. Post Survey Data Generation & Processing:

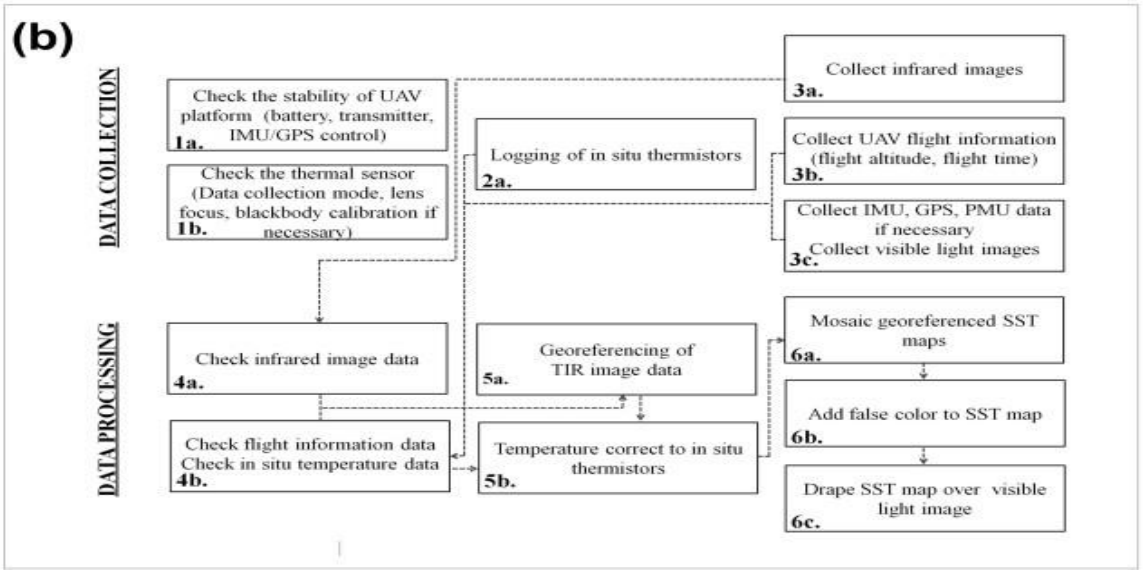
This step includes following results

- Ortho-mosaic models
- DEM model
- Digital Point Cloud Generations

1.1.4. Charting/ Cartography:

This step includes demanded dataset on paper or on soft copy module which is as per the described manner.





1.2. R8-RTK DGPS (GNSS) System:

DGPS (Differential GPS) is essentially a system to provide positional corrections to GPS signals. DGPS uses a fixed, known position to adjust real time GPS signals to eliminate pseudo range errors. First Base is fixed at Known level location and reading is taken after 3 to 4 hours to finalize the base point level. A Rower is then moved along the alignment coordinates as a receiver and levels are saved in it. Basically, this instrument is used to fix the control points which are then closed by triangulation method.

1.3. The Total Station:

The South is a user-friendly data collection and calculation program for the Series Total Stations with the accuracy of 1 second. It will be used for the traversing and the detailed topography survey. The Total Station incorporates not only the Power surveying programs as the Special Function but also File Manager and Data Transfer Programs. The internal memory of the instrument can store a maximum of 60,000 points of data.

The Total Station vary with the selections of the "Preference". The factory default settings of the Preference are shown there. It is also possible to select "Process type" that takes over the functionality.

1.4. South Auto Level:

The B series South Auto level will be used for the detailed levelling work. It incorporates the most precise and reliable compensator available in the market today. The optimally designed telescope provides exceptionally bright and sharp view that reduces operator's eye strain. Quick collimation and horizontal angle measurement combine for fast and easy aiming of layout and alignment tasks. The basic features are as under.

Levelling Accuracy: B30 ±1.5mm
Telescope Magnification: B30 – 28x
Minimum focus distance: 0.2m from end of telescope,
0.3m from instrument centre

Features:

1) IPX6 (IEC 60529:2001) dust tight and watertight protection
2) Precise, Reliable Automatic Compensator
3) Horizontal Angle Measurement
4) Quick collimation with two horizontal motion knobs
5) Superior telescope with two-speed focus knob

Result of the Topographical Survey Work

TBM List

Point No.	Easting	Northing	R.L.	Description
1	606491.76	2489064.001	6.09	TBM
2	605823.475	2489881.956	5.732	T-1

Ground Control Points

Point	Easting	Northing	Elevation	Description
1	607549.944	2489066.59	5.662	gcp1
2	607549.854	2489062.514	5.884	gcp2
3	607351.645	2489061.663	5.529	gcp3
4	607346.537	2489036.159	6.423	gcp4
5	607372.368	2489020.94	5.932	gcp5
6	607157.024	2489010.342	6.6	gcp6
7	607156.348	2489030.486	6.241	gcp7
8	607161.813	2488978.461	6.024	gcp8
9	606954.583	2488959.462	6.02	gcp9
10	606987.321	2488990.996	6.394	gcp10
11	606977.126	2489016.393	5.85	gcp11
12	606753.332	2488952.043	5.985	gcp12
13	606746.499	2488994.922	5.597	gcp14
14	606751.419	2488974.042	5.633	gcp13
15	606540.803	2489013.913	5.274	gcp15
16	606559.631	2489049.745	5.407	gcp16
17	606384.361	2489166.787	5.221	gcp17
18	606397.207	2489173.323	4.474	gcp18
19	606276.49	2489303.415	5.447	gcp19
20	606286.531	2489309.672	3.754	gcp20
21	606152.155	2489465.732	5.112	gcp21
22	606149.973	2489482.605	3.641	gcp22
23	606006.705	2489650.018	5.068	gcp23
24	606012.292	2489659.222	4.938	gcp24
25	605846.952	2489816.105	5.358	gcp25
26	605874.042	2489812.685	5.615	gcp26
27	605755.609	2489972.275	4.951	gcp27
28	605738.477	2489967.704	5.058	gcp28
29	605595.92	2490149.258	5.047	gcp29
30	605622.745	2490160.588	5.057	gcp30
31	605642.55	2490174.834	5.151	gcp31
32	605617.754	2490285.09	5.213	gcp32
33	605636.892	2490320.604	5.677	gcp33
34	605651.274	2490326.823	5.334	gcp34
35	605628.332	2490552.214	5.789	gcp35
36	605613.996	2490548.779	5.744	gcp36
37	605596.717	2490730.071	5.746	gcp37
38	605589.731	2490956.421	5.73	gcp39
39	605569.449	2490949.226	5.758	gcp40
40	605580.904	2491050.393	5.721	gcp41
41	605561.801	2491056.949	5.678	gcp42
42	605608.849	2490739.323	5.747	gcp38

Chapter 9
Financial Analysis

Chapter 9 – Financial Analysis

Summary of Capital Cost Estimate

The Cost Estimate of all components of works envisaged to be taken up for implementation has been prepared. The overall capital cost for Bedi Port Terminal including land cost is as follows:

Detailed Project Cost (As per Latest RVNL SOR Dt. March/2021)			
Lumpsum Cost of Construction for Extension at Bedi Port Terminal near Windmill, Jamnagar of Rajkot Division of Western Railway			
S.No.	**Description**	**Percentages**	**Cost (Rs) in Crores**
I	Land Acquisition including environmental charges		17.00
II	Civil Works		102.58
III	S&T		8.94
IV	Genl Electrification (Incl. Overhead Crossing)		0.99
V	TRD		1.74
VI	Mechanical Works		0.00
A	**Basic Cost:**		**131.24**
VII	Preliminary expenses **@ 0.5 % of Total Project Cost Including Land**	0.2%	0.66
VIII	Escalation during Construction @ **5%** over **70%** of Basic cost for 1 year (Excluding Land Acquisition)	5%	4.00
IX	PMC @ **10%** over Basic Cost (Excluding Land Acquisition)	10%	11.42
X	SPV registration/Administration Charges Lumpsum @**1%** (Excluding Land Acquisition)	1%	1.14
XI	Legal and Insurance Charges @ **0.5%** percentage on Basic Cost (Excluding Land Acquisition)	0.5%	0.57
XII	Contingency @ **1%**	1%	1.14
B	**Total Cost Rounded Off:**		**150.00**
TOTAL PROJECT COST			**150.00**

Revenue and Opex Estimates

Basis the traffic analysis assessed in the traffic chapter, the potential traffic for the proposed Bedi Port Terminal is as follows:

Year	**2024-25**	**2029-30**	**2034-35**	**2039-40**	**2044-45**	**2049-50**	**2054-55**
Traffic (million tonnes)	0.76	1.49	2.01	2.15	2.28	2.42	2.55
Traffic (Rakes/Day)	1.7	2.3	2.7	2.8	2.9	3.0	3.1

Estimation of Revenue profile for the Terminal (considering a base tariff as 200/- Rs per Tonnes as per prevailing market rate was carried out. A nominal 4% escalation in base tariff of terminals per annum to comprehend the financial performance of project from a conservative view-point.

The summary of the revenue profile for proposed terminal and Railways is as below:

Year	**2024-25**	**2029-30**	**2034-35**	**2039-40**	**2044-45**	**2049-50**	**2054-55**
Revenue (in Cr)	16	39	64	84	108	139	162

PROJECT STRUCTURE AND FINANCIAL RESULTS

- G-RIDE and GMB shall implement project through Project SPV GRIDE Bedi Port Rail Limited (GBPRL)
- Project SPV shall develop Bedi Port Terminal under full equity model
- O&M shall be contracted to the private operator on PPP basis

The summarized financial results are as below:

Financial Performance of the project (base case):	
Project IRR (Post Tax)	12.3 %

Annexures

ANNEXURE I

PROJECT FINANCIALS

CASHFLOW STATEMENT

GCT Old edi														
Year Start		01-Apr-22	01-Apr-23	01-Apr-24	01-Apr-25	01-Apr-26	01-Apr-27	01-Apr-28	01-Apr-29	01-Apr-30	01-Apr-31	01-Apr-32	01-Apr-33	01-Apr-34
Year End		31-Mar-23	31-Mar-24	31-Mar-25	31-Mar-26	31-Mar-27	31-Mar-28	31-Mar-29	31-Mar-30	31-Mar-31	31-Mar-32	31-Mar-33	31-Mar-34	31-Mar-35
Financial Year		FY-2023	FY-2024	FY-2025	FY-2026	FY-2027	FY-2028	FY-2029	FY-2030	FY-2031	FY-2032	FY-2033	FY-2034	FY-2035
Cash Flow Statement														
Cash Generated from Operations	INR Crores													
Revenue Generated for Project SPV	INR Crores	-	-	16.39	20.31	24.85	29.67	35.00	39.16	43.81	48.98	54.76	61.20	64.49
Net Revenue of SPV	INR Crores	-	-	16.39	20.31	24.85	29.67	35.00	39.16	43.81	48.98	54.76	61.20	64.49
Operating Expenses	INR Crores	-	-	(8.51)	(10.75)	(13.41)	(16.32)	(19.62)	(22.37)	(25.51)	(29.07)	(33.13)	(37.73)	(40.52)
Interest on term loans	INR Crores	-	-	-	-	-	-	-	-	-	-	-	-	-
Interest income	INR Crores	-	-	-	0.29	0.65	1.08	1.59	2.18	2.84	3.56	4.36	5.25	6.22
Tax	INR Crores	-	-	(0.54)	(0.90)	(1.32)	(1.75)	(2.22)	(2.59)	(2.99)	(3.42)	(3.89)	(4.39)	(4.75)
Net Cash Generated from Operations	820.8 INR Cr	-	-	7.34	8.95	10.78	12.69	14.75	16.38	18.14	20.05	22.11	24.32	25.43
(NPV of Operating Cash flows @ 12%)	122.7 INR Cr													
Cash flow from Investment Activities														
Capex	INR Crores	-	(149.42)	-	-	-	-	-	-	-	-	-	-	-
Net Cash Flow from Investment Activities		-	(149.42)	-	-	-	-	-	-	-	-	-	-	-
Cash flow from financing Activities														
Equity Drawdown	INR Crores	-	149.42	-	-	-	-	-	-	-	-	-	-	-
Debt Drawdown	INR Crores	-	-	-	-	-	-	-	-	-	-	-	-	-
Debt Repayment	INR Crores	-	-	-	-	-	-	-	-	-	-	-	-	-
VGF Drawdown	INR Crores	-	-	-	-	-	-	-	-	-	-	-	-	-
Net Cash From Financing Activities		-	149.42	-	-	-	-	-	-	-	-	-	-	-
Net Cash balance														
Cash brought forward	INR Crores		-	-	7.34	16.29	27.07	39.76	54.51	70.89	89.04	109.09	131.20	155.52
Addition	INR Crores	-	-	7.34	8.95	10.78	12.69	14.75	16.38	18.14	20.05	22.11	24.32	25.43
Cash Carried forward		-	-	7.34	16.29	27.07	39.76	54.51	70.89	89.04	109.09	131.20	155.52	180.96

GCT Old edi																			
Year Start		01-Apr-35	01-Apr-36	01-Apr-37	01-Apr-38	01-Apr-39	01-Apr-40	01-Apr-41	01-Apr-42	01-Apr-43	01-Apr-44	01-Apr-45	01-Apr-46	01-Apr-47	01-Apr-48	01-Apr-49	01-Apr-50	01-Apr-51	01-Apr-52
Year End		31-Mar-36	31-Mar-37	31-Mar-38	31-Mar-39	31-Mar-40	31-Mar-41	31-Mar-42	31-Mar-43	31-Mar-44	31-Mar-45	31-Mar-46	31-Mar-47	31-Mar-48	31-Mar-49	31-Mar-50	31-Mar-51	31-Mar-52	31-Mar-53
Financial Year		FY-2036	FY-2037	FY-2038	FY-2039	FY-2040	FY-2041	FY-2042	FY-2043	FY-2044	FY-2045	FY-2046	FY-2047	FY-2048	FY-2049	FY-2050	FY-2051	FY-2052	FY-2053
Cash Flow Statement																			
Cash Generated from Operations	INR Crores																		
Revenue Generated for Project SPV	INR Crores	67.95	71.61	75.47	79.54	83.74	88.18	92.84	97.76	102.92	108.24	113.84	119.72	125.92	132.43	139.27	146.48	154.05	162.02
Net Revenue of SPV	INR Crores	67.95	71.61	75.47	79.54	83.74	88.18	92.84	97.76	102.92	108.24	113.84	119.72	125.92	132.43	139.27	146.48	154.05	162.02
Operating Expenses	INR Crores	(43.52)	(46.75)	(50.21)	(53.94)	(57.88)	(62.12)	(66.67)	(71.55)	(76.77)	(82.29)	(88.21)	(94.56)	(101.36)	(108.65)	(116.47)	(124.84)	(133.83)	(143.45)
Interest on term loans	INR Crores	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Interest income	INR Crores	7.24	8.30	9.41	10.57	11.78	13.04	14.34	15.69	17.09	18.52	20.00	21.52	23.07	24.65	26.26	27.89	29.53	31.18
Tax	INR Crores	(5.12)	(5.40)	(5.68)	(5.95)	(6.23)	(6.50)	(6.76)	(7.02)	(7.27)	(7.50)	(7.72)	(7.91)	(8.09)	(8.23)	(8.35)	(8.44)	(8.48)	(8.48)
Net Cash Generated from Operations		26.55	27.76	29.0	30.21	31.41	32.60	33.76	34.9	35.96	36.97	37.91	38.77	39.54	40.19	40.72	41.08	41.28	41.27
(NPV of Operating Cash flows @ 12%)																			
Cash flow from Investment Activities																			
Capex	INR Crores	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Net Cash Flow from Investment Activities		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cash flow from financing Activities																			
Equity Drawdown	INR Crores	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Debt Drawdown	INR Crores	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Debt Repayment	INR Crores	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VGF Drawdown	INR Crores	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Net Cash From Financing Activities		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Net Cash balance																			
Cash brought forward	INR Crores	180.96	207.50	235.27	264.26	294.47	325.88	358.48	392.24	427.13	463.09	500.06	537.97	576.75	616.29	656.48	697.20	738.28	779.56
Addition	INR Crores	26.55	27.76	28.99	30.21	31.41	32.60	33.76	34.89	35.96	36.97	37.91	38.77	39.54	40.19	40.72	41.08	41.28	41.27
Cash Carried forward		207.50	235.27	264.26	294.47	325.88	358.48	392.24	427.13	463.09	500.06	537.97	576.75	616.29	656.48	697.20	738.28	779.56	820.83

PROFIT & LOSS STATEMENT

GCT Old edi															
Year Start		01-Apr-22	01-Apr-23	01-Apr-24	01-Apr-25	01-Apr-26	01-Apr-27	01-Apr-28	01-Apr-29	01-Apr-30	01-Apr-31	01-Apr-32	01-Apr-33	01-Apr-34	01-Apr-35
Year End		31-Mar-23	31-Mar-24	31-Mar-25	31-Mar-26	31-Mar-27	31-Mar-28	31-Mar-29	31-Mar-30	31-Mar-31	31-Mar-32	31-Mar-33	31-Mar-34	31-Mar-35	31-Mar-36
Financial Year		FY-2023	FY-2024	FY-2025	FY-2026	FY-2027	FY-2028	FY-2029	FY-2030	FY-2031	FY-2032	FY-2033	FY-2034	FY-2035	FY-2036
Profit and Loss															
Revenue by Project for SPV	INR Crores	-	-	16.39	20.31	24.85	29.67	35.00	39.16	43.81	48.98	54.76	61.20	64.49	67.95
Interest Income	INR Crores	-	-	-	0.29	0.65	1.08	1.59	2.18	2.84	3.56	4.36	5.25	6.22	7.24
Opex	INR Crores	-	-	(8.51)	(10.75)	(13.41)	(16.32)	(19.62)	(22.37)	(25.51)	(29.07)	(33.13)	(37.73)	(40.52)	(43.52)
PBDIT	INR Crores	-	-	7.88	9.85	12.09	14.44	16.97	18.97	21.13	23.47	26.00	28.72	30.18	31.67
Depreciation	INR Crores	-	-	(4.98)	(4.98)	(4.98)	(4.98)	(4.98)	(4.98)	(4.98)	(4.98)	(4.98)	(4.98)	(4.51)	(3.98)
PBIT	INR Crores	-	-	2.90	4.87	7.11	9.46	11.99	13.99	16.15	18.49	21.02	23.74	25.68	27.69
Interest (Expense)	INR Crores	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PBT	INR Crores	-	-	2.90	4.87	7.11	9.46	11.99	13.99	16.15	18.49	21.02	23.74	25.68	27.69
Tax	INR Crores	-	-	(0.54)	(0.90)	(1.32)	(1.75)	(2.22)	(2.59)	(2.99)	(3.42)	(3.89)	(4.39)	(4.75)	(5.12)
PAT	INR Crores	-	-	2.36	3.97	5.80	7.71	9.77	11.40	13.17	15.07	17.13	19.34	20.93	22.56

GCT Old edi																		
Year Start		01-Apr-36	01-Apr-37	01-Apr-38	01-Apr-39	01-Apr-40	01-Apr-41	01-Apr-42	01-Apr-43	01-Apr-44	01-Apr-45	01-Apr-46	01-Apr-47	01-Apr-48	01-Apr-49	01-Apr-50	01-Apr-51	01-Apr-52
Year End		31-Mar-37	31-Mar-38	31-Mar-39	31-Mar-40	31-Mar-41	31-Mar-42	31-Mar-43	31-Mar-44	31-Mar-45	31-Mar-46	31-Mar-47	31-Mar-48	31-Mar-49	31-Mar-50	31-Mar-51	31-Mar-52	31-Mar-53
Financial Year		FY-2037	FY-2038	FY-2039	FY-2040	FY-2041	FY-2042	FY-2043	FY-2044	FY-2045	FY-2046	FY-2047	FY-2048	FY-2049	FY-2050	FY-2051	FY-2052	FY-2053
Profit and Loss																		
Revenue by Project for SPV	INR Crores	71.61	75.47	79.54	83.74	88.18	92.84	97.76	102.92	108.24	113.84	119.72	125.92	132.43	139.27	146.48	154.05	162.02
Interest Income	INR Crores	8.30	9.41	10.57	11.78	13.04	14.34	15.69	17.09	18.52	20.00	21.52	23.07	24.65	26.26	27.89	29.53	31.18
Opex	INR Crores	(46.75)	(50.21)	(53.94)	(57.88)	(62.12)	(66.67)	(71.55)	(76.77)	(82.29)	(88.21)	(94.56)	(101.36)	(108.65)	(116.47)	(124.84)	(133.83)	(143.45)
PBDIT	INR Crores	33.16	34.67	36.17	37.64	39.09	40.52	41.91	43.23	44.47	45.63	46.69	47.63	48.43	49.07	49.52	49.76	49.75
Depreciation	INR Crores	(3.98)	(3.98)	(3.98)	(3.98)	(3.98)	(3.98)	(3.98)	(3.92)	(3.92)	(3.92)	(3.92)	(3.92)	(3.92)	(3.92)	(3.92)	(3.92)	(3.92)
PBIT	INR Crores	29.18	30.68	32.19	33.66	35.11	36.53	37.93	39.31	40.55	41.71	42.77	43.71	44.51	45.15	45.60	45.84	45.83
Interest (Expense)	INR Crores	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PBT	INR Crores	29.18	30.68	32.19	33.66	35.11	36.53	37.93	39.31	40.55	41.71	42.77	43.71	44.51	45.15	45.60	45.84	45.83
Tax	INR Crores	(5.40)	(5.68)	(5.95)	(6.23)	(6.50)	(6.76)	(7.02)	(7.27)	(7.50)	(7.72)	(7.91)	(8.09)	(8.23)	(8.35)	(8.44)	(8.48)	(8.48)
PAT	INR Crores	23.78	25.01	26.23	27.43	28.61	29.78	30.91	32.04	33.05	33.99	34.85	35.62	36.27	36.79	37.16	37.36	37.35

PROJECTED BALANCE SHEET

GCT Old edi														
Year Start	01-Apr-22	01-Apr-23	01-Apr-24	01-Apr-25	01-Apr-26	01-Apr-27	01-Apr-28	01-Apr-29	01-Apr-30	01-Apr-31	01-Apr-32	01-Apr-33	01-Apr-34	01-Apr-35
Year End	31-Mar-23	31-Mar-24	31-Mar-25	31-Mar-26	31-Mar-27	31-Mar-28	31-Mar-29	31-Mar-30	31-Mar-31	31-Mar-32	31-Mar-33	31-Mar-34	31-Mar-35	31-Mar-36
Financial Year	FY-2023	FY-2024	FY-2025	FY-2026	FY-2027	FY-2028	FY-2029	FY-2030	FY-2031	FY-2032	FY-2033	FY-2034	FY-2035	FY-2036
Balance Sheet														
Fixed Assets														
Gross Fixed Assets	-	149.42	149.42	149.42	149.42	149.42	149.42	149.42	149.42	149.42	149.42	149.42	149.42	149.42
Less: Accumulated Depreciation	-	-	4.98	9.96	14.94	19.92	24.90	29.88	34.86	39.84	44.82	49.80	54.30	58.29
Net Fixed Assets	-	149.42	144.44	139.46	134.48	129.50	124.52	119.54	114.56	109.58	104.60	99.62	95.11	91.13
Current Assets														
Cash & Bank Balance	-	-	7.34	16.29	27.07	39.76	54.51	70.89	89.04	109.09	131.20	155.52	180.96	207.50
Total Assets	-	149.42	151.78	155.75	161.55	169.25	179.03	190.43	203.59	218.67	235.80	255.14	276.07	298.63
Shareholder's Equity														
Equity	-	149.42	149.42	149.42	149.42	149.42	149.42	149.42	149.42	149.42	149.42	149.42	149.42	149.42
Retained Earnings	-	-	2.36	6.33	12.13	19.84	29.61	41.01	54.18	69.25	86.38	105.73	126.65	149.22
Total Equity	-	149.42	151.78	155.75	161.55	169.25	179.03	190.43	203.59	218.67	235.80	255.14	276.07	298.63
Term Loan	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Debt	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grant	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Liability	-	149.42	151.78	155.75	161.55	169.25	179.03	190.43	203.59	218.67	235.80	255.14	276.07	298.63
Ok	-	-	-	-	-	-	-	-	-	-	-	-	-	-

GCT Old edi																	
Year Start	01-Apr-36	01-Apr-37	01-Apr-38	01-Apr-39	01-Apr-40	01-Apr-41	01-Apr-42	01-Apr-43	01-Apr-44	01-Apr-45	01-Apr-46	01-Apr-47	01-Apr-48	01-Apr-49	01-Apr-50	01-Apr-51	01-Apr-52
Year End	31-Mar-37	31-Mar-38	31-Mar-39	31-Mar-40	31-Mar-41	31-Mar-42	31-Mar-43	31-Mar-44	31-Mar-45	31-Mar-46	31-Mar-47	31-Mar-48	31-Mar-49	31-Mar-50	31-Mar-51	31-Mar-52	31-Mar-53
Financial Year	FY-2037	FY-2038	FY-2039	FY-2040	FY-2041	FY-2042	FY-2043	FY-2044	FY-2045	FY-2046	FY-2047	FY-2048	FY-2049	FY-2050	FY-2051	FY-2052	FY-2053
Balance Sheet																	
Fixed Assets																	
Gross Fixed Assets	149.42	149.42	149.42	149.42	149.42	149.42	149.42	149.42	149.42	149.42	149.42	149.42	149.42	149.42	149.42	149.42	149.42
Less: Accumulated Depreciation	62.27	66.25	70.24	74.22	78.20	82.18	86.16	90.08	94.01	97.93	101.85	105.77	109.69	113.61	117.53	121.45	125.38
Net Fixed Assets	87.15	83.16	79.18	75.20	71.21	67.23	63.25	59.33	55.41	51.49	47.57	43.65	39.72	35.80	31.88	27.96	24.04
Current Assets																	
Cash & Bank Balance	235.27	264.26	294.47	325.88	358.48	392.24	427.13	463.09	500.06	537.97	576.75	616.29	656.48	697.20	738.28	779.56	820.83
Total Assets	322.41	347.42	373.65	401.08	429.70	459.47	490.38	522.42	555.47	589.46	624.32	659.94	696.21	733.00	770.17	807.52	844.87
Shareholder's Equity																	
Equity	149.42	149.42	149.42	149.42	149.42	149.42	149.42	149.42	149.42	149.42	149.42	149.42	149.42	149.42	149.42	149.42	149.42
Retained Earnings	173.00	198.01	224.24	251.67	280.28	310.06	340.97	373.01	406.06	440.05	474.90	510.52	546.79	583.59	620.75	658.11	695.46
Total Equity	322.41	347.42	373.65	401.08	429.70	459.47	490.38	522.42	555.47	589.46	624.32	659.94	696.21	733.00	770.17	807.52	844.87
Term Loan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Debt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grant	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Liability	322.41	347.42	373.65	401.08	429.70	459.47	490.38	522.42	555.47	589.46	624.32	659.94	696.21	733.00	770.17	807.52	844.87
Ok	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

PROJECTRETURNS

GCT Old edi																
Year Start		01-Apr-22	01-Apr-23	01-Apr-24	01-Apr-25	01-Apr-26	01-Apr-27	01-Apr-28	01-Apr-29	01-Apr-30	01-Apr-31	01-Apr-32	01-Apr-33	01-Apr-34	01-Apr-35
Year End		31-Mar-23	31-Mar-24	31-Mar-25	31-Mar-26	31-Mar-27	31-Mar-28	31-Mar-29	31-Mar-30	31-Mar-31	31-Mar-32	31-Mar-33	31-Mar-34	31-Mar-35	31-Mar-36
Financial Year		FY-2023	FY-2024	FY-2025	FY-2026	FY-2027	FY-2028	FY-2029	FY-2030	FY-2031	FY-2032	FY-2033	FY-2034	FY-2035	FY-2036
Returns															
PROJECT IRR															
EBITDA	INR Crores	-	-	7.88	9.85	12.09	14.44	16.97	18.97	21.13	23.47	26.00	28.72	30.18	31.67
Capital Expenditure (Equity and Debt)	INR Crores	-	(149.42)	-	-	-	-	-	-	-	-	-	-	-	-
Less: IDC	INR Crores	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pre-Tax Free Cash Flow to Firm	INR Crores	-	(149.42)	7.88	9.85	12.09	14.44	16.97	18.97	21.13	23.47	26.00	28.72	30.18	31.67
Tax	INR Crores	-	-	0.54	0.90	1.32	1.75	2.22	2.59	2.99	3.42	3.89	4.39	4.75	5.12
Post-Tax Free Cash Flow to firm	INR Crores	-	(149.42)	7.34	8.95	10.78	12.69	14.75	16.38	18.14	20.05	22.11	24.32	25.43	26.55
Pre-Tax Project IRR		13.9%													
Post-Tax Project IRR		12.3%													

GCT Old edi																		
Year Start		01-Apr-22	01-Apr-36	01-Apr-37	01-Apr-38	01-Apr-39	01-Apr-40	01-Apr-41	01-Apr-42	01-Apr-43	01-Apr-44	01-Apr-45	01-Apr-46	01-Apr-47	01-Apr-48	01-Apr-49	01-Apr-50	01-Apr-51	01-Apr-52
Year End		31-Mar-23	31-Mar-37	31-Mar-38	31-Mar-39	31-Mar-40	31-Mar-41	31-Mar-42	31-Mar-43	31-Mar-44	31-Mar-45	31-Mar-46	31-Mar-47	31-Mar-48	31-Mar-49	31-Mar-50	31-Mar-51	31-Mar-52	31-Mar-53
Financial Year		FY-2023	FY-2037	FY-2038	FY-2039	FY-2040	FY-2041	FY-2042	FY-2043	FY-2044	FY-2045	FY-2046	FY-2047	FY-2048	FY-2049	FY-2050	FY-2051	FY-2052	FY-2053
Returns																			
PROJECT IRR																			
EBITDA	INR Crores	-	33.16	34.67	36.17	37.64	39.09	40.52	41.91	43.23	44.47	45.63	46.69	47.63	48.43	49.07	49.52	49.76	49.75
Capital Expenditure (Equity and Debt)	INR Crores	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Less: IDC	INR Crores	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pre-Tax Free Cash Flow to Firm	INR Crores	-	33.16	34.67	36.17	37.64	39.09	40.52	41.91	43.23	44.47	45.63	46.69	47.63	48.43	49.07	49.52	49.76	49.75
Tax	INR Crores	-	5.40	5.68	5.95	6.23	6.50	6.76	7.02	7.27	7.50	7.72	7.91	8.09	8.23	8.35	8.44	8.48	8.48
Post-Tax Free Cash Flow to firm	INR Crores	-	27.76	28.99	30.21	31.41	32.60	33.76	34.89	35.96	36.97	37.91	38.77	39.54	40.19	40.72	41.08	41.28	41.27
Pre-Tax Project IRR		13.9%																	
Post-Tax Project IRR		12.3%																	

ANNEXURE II

TYPICAL PLAN AND DRAWINGS

List of Drawings	
Sr. No	**Description**
1	Engineering Scale Plan