

The Feasibility Study on the Development of Dedicated Freight Corridor for Delhi-Mumbai and Ludhiana-Sonnagar

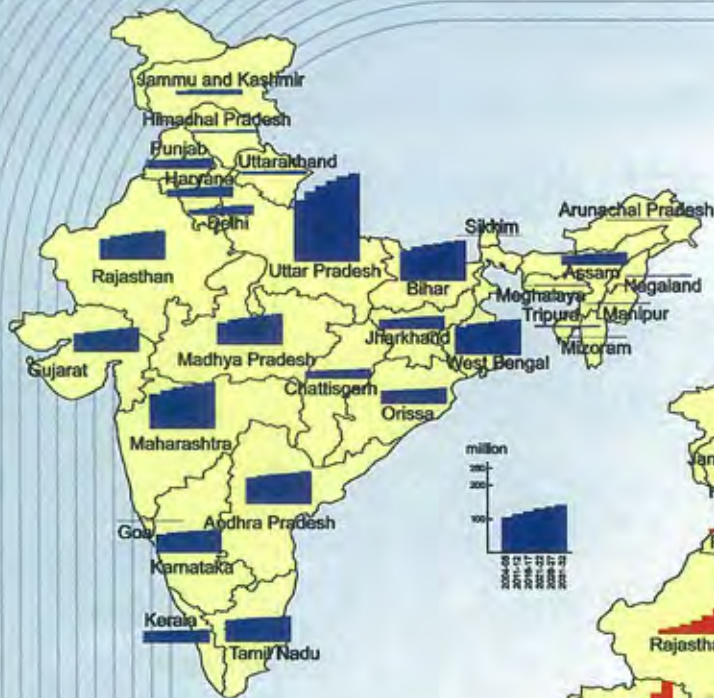


JAPAN INTERNATIONAL COOPERATION AGENCY

- NIPPON KOEI CO., LTD.
- JAPAN RAILWAY TECHNICAL SERVICE
- PACIFIC CONSULTANTS INTERNATIONAL

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ECONOMIC GROWTH OF INDIA



Population Growth by State



Net State Domestic Product (NSDP) Growth by State

Economic growth of India has been impressive and the country has become one of the most important areas for Foreign Direct Investment (FDI) in the world of today. Since the nineties, the Indian economy has demonstrated a constant average growth of 6% per annum between year 1990 and 2000, and of 6.2% per year from the year 2000 till the year 2004. The real annual Gross Domestic Product (GDP) growth accelerated to 8.6% in the period 2003-06 and peaked to 9.4% in the year 2006-07.

The growth prospects of Indian economy have strengthened and appear well entrenched to build on the current momentum. Conservative estimates of growth are at least 8.5% for the current financial year, among the world's largest economies, second only to China.

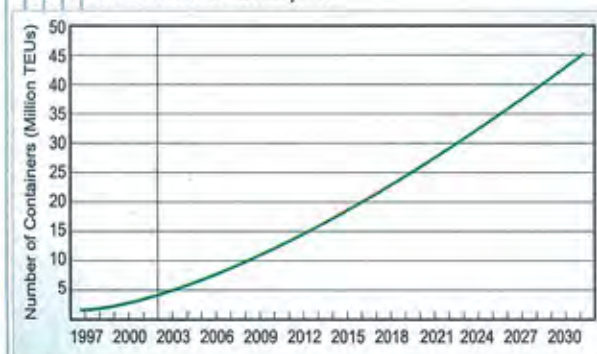
DEMAND FORECAST

Marine Containers

Demand estimate for next 25 years

- A projected throughput of 43 million TEUs in 25 years which is eight times the present throughput
- Traffic volume would be as large as that of USA and about half to that of China
- Container traffic by rail (Western DFC) would be around 14 times the present volume
- Container throughput at ICDs in and around Delhi will rise to 6 million TEUs (in 2033-34)

Growth of Container Transport

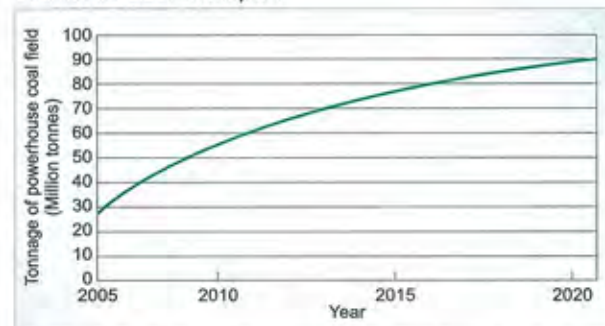


Coal

Projected demand after the completion of thermal power houses listed in the 11th Five Year Plan

- Coal traffic to reach 6.5 million tonnes which is around 2.4 times the present traffic at 2.71 million tonnes (2004-05)
- The coal traffic to increase to become 8.9 million tonnes finally (according to PETS-II estimation)

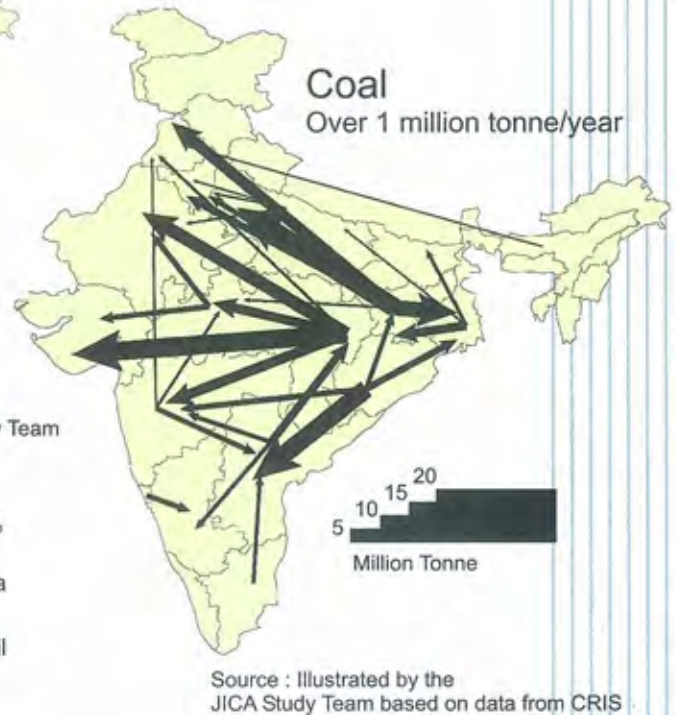
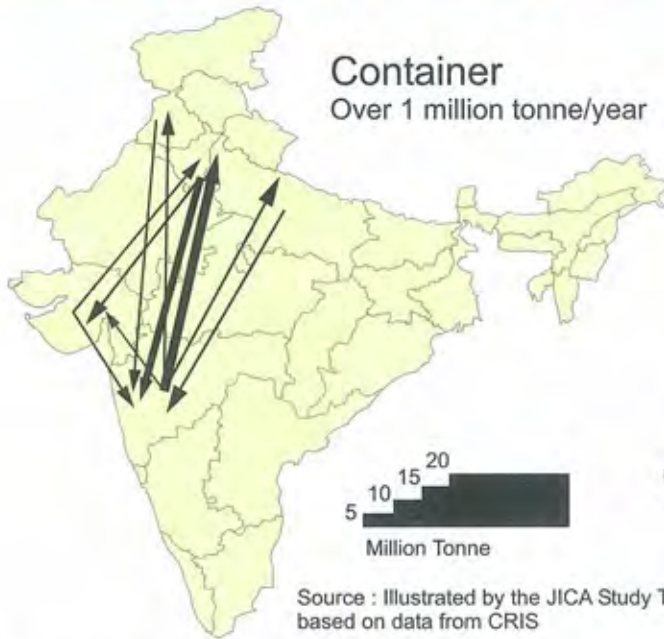
Growth of Coal Transport



Total Freight

- Eastern DFC would carry a total freight of 68.7 million tonnes in 2013-14, which would increase to 140.8 million tonnes there after in 10 years
- Western DFC would carry a total freight of 37.7 million tonnes in 2013-14. After 10 years, this would increase to 140.4 million tonnes

COMMODITY MOVEMENT BY RAIL



- The modal share of container transport by rail is about 30% at present
- The modal share of Railways for Freight Transport in India today is 33%
- Coal transport from coal fields to thermal plants by rail accounts for 75% of the total coal transported by rail

EXISTING TRAFFIC CONDITIONS



Saturated Line Capacity...



Passengers in long queue to board the train...



Chocked Road Traffic...

DEDICATED FREIGHT CORRIDOR

The dedicated new line construction will realize the long-distance, environment friendly, fast and economical Trunk Freight Transportation.

Since function of the DFC is transport of long distance freight, DFC need not pass through built-up area and is able to detour city by setting bypass routes. With this, the DFC can minimize cost of land acquisition and scale of resettlement in built-up area. In addition, DFC has advantage in reducing such negative impacts such as traffic interference at level crossings, emission gas and noise that harms local people living in built-up area by shifting freight trains to out skirts of the cities.

Maximum Speed	100 km/hr
Transport Time (Rail)	
• Mumbai – Delhi	17 hours
• Sonnagar – Delhi	10 hours
Transport Volume (maximum)	
• Mumbai – Delhi	12,000 TEU/day
• Sonnagar – Delhi	800,000 tonnes/day
Reduction in CO₂	25 million tonnes in 2033
Operating System	Centralised Train Control and Traffic Management System
Line Capacity (per day per direction)	140
Train Length	686 m

PROPOSED TECHNICAL SPECIFICATION OF DFC

Common Specifications

Track Gauge	: 1,676 mm
Rails	: 60 Kg/m UIC/90 UTS rail, HH rail
Axle Load	: 25 tonnes
Formation Width	: 12.5 m
Track Centre	: 5.5 m
Maximum Degree of Curve	: 2.5 degree curve
Curve Compensation	: @ 0.04% per degree of curvature
Signalling System	: Automatic Signalling (AF track circuit with advanced TPWS)
Traction	: 2x25 kv OHE system

Western Corridor

Alignment	: JNPT – Vasai Road – Vadodara – Ahmedabad – Ajmer – Rewari – Dadri
Route Length	: 1468 km (Double line)
Detour Length	: 474 km
Main Item	: Containers
Junction Stations	: 9 nos.
Terminal Stations	: 3 nos.
Crossing Stations	: 32 nos.

*Junction Stations: DFC stations connected with existing major stations; Terminal Stations: Last/first station on DFC route; Crossing Stations: DFC station to make long distance between stations.



Eastern Corridor

Alignment : Sonnagar – Mughal Sarai – Kanpur
 – Khurja Dadri and Khurja –
 Kalanaur – Dhandarikalan

Route Length : 1,309 km

Double Line : 883 km

Single Line : 426 km

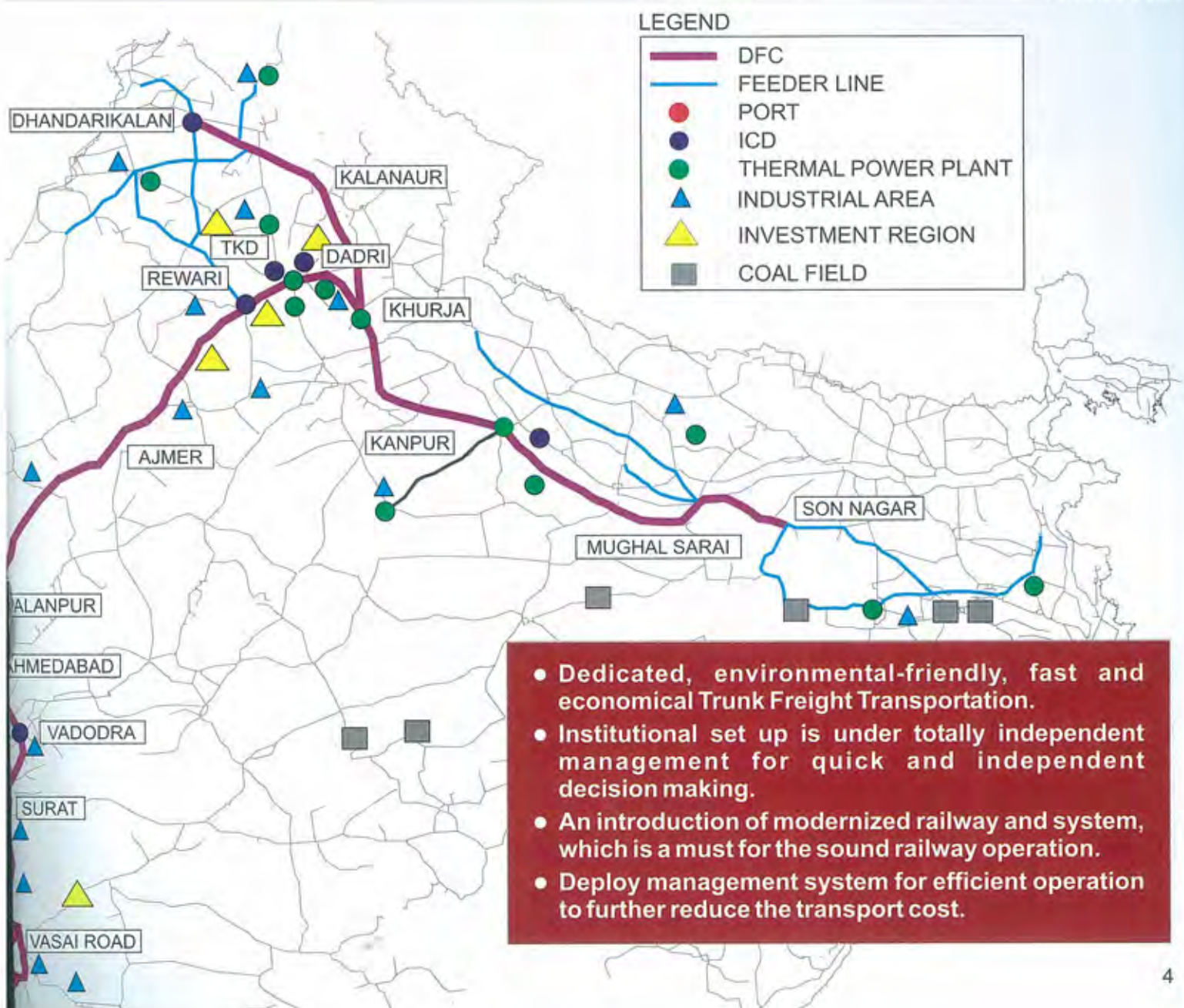
Detour Length : 275 km

Main Item : Bulk Commodity
 Coal, Minerals etc.

Junction Stations : 12 nos.

Terminal Stations : 2 nos.

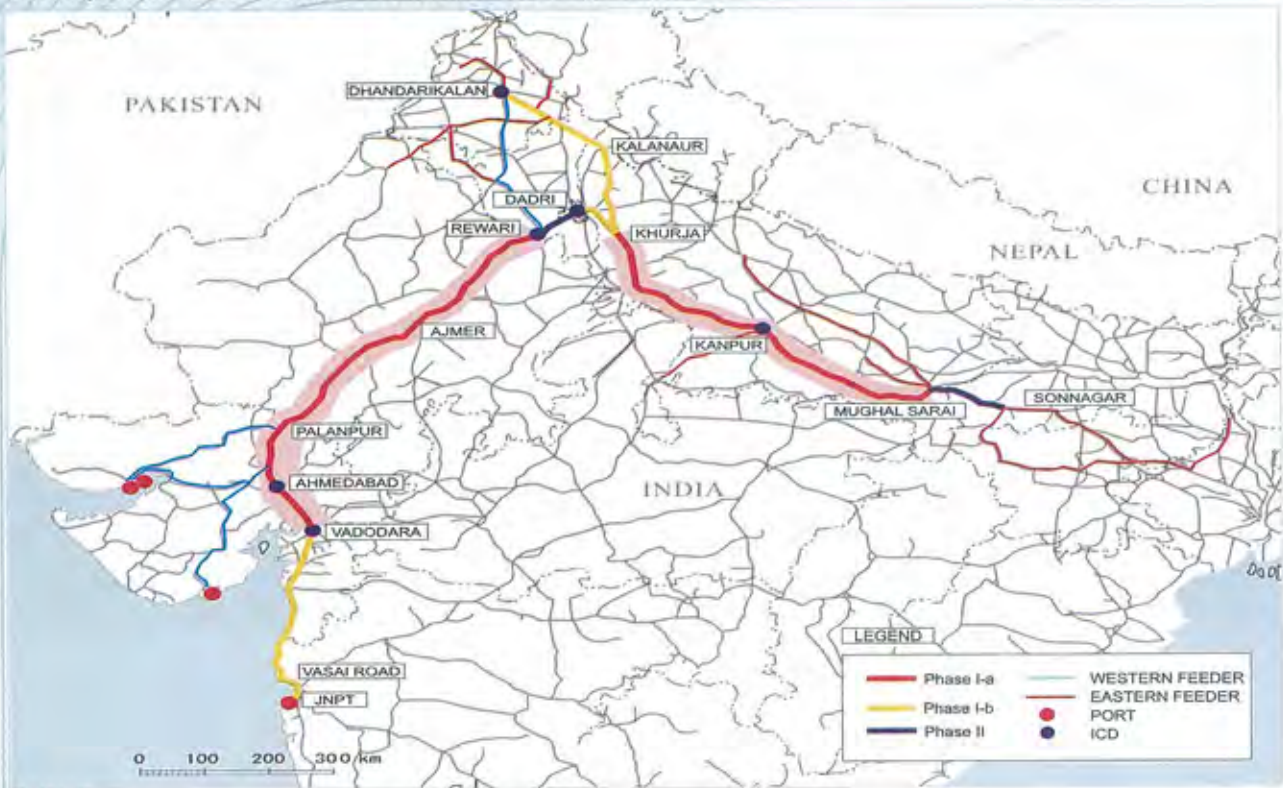
Crossing Stations : 16 (Double line)
 36 (Single line)



- Dedicated, environmental-friendly, fast and economical Trunk Freight Transportation.
- Institutional set up is under totally independent management for quick and independent decision making.
- An introduction of modernized railway and system, which is a must for the sound railway operation.
- Deploy management system for efficient operation to further reduce the transport cost.

PROPOSED PHASED DEVELOPMENT SCENARIO

The Project consists of three phases as shown in the figure below:



Phase I-a Development Project

The Phase I-a development sections as selected proposed are those which satisfy following conditions:

DFC	Section	Condition
Western	Rewari – Vadodara, 918km	<ul style="list-style-type: none"> ● Having stringent traffic situation in short to mid-term future ● Having no serious physical, engineering and social/environmental obstacles, such as reconstruction of existing Road over Bridges (ROBs) in built-up area, insufficiency of engineering study, big scale of land acquisition in urban area and big scale of resettlement.
Eastern	Mughal Sarai – Khurja, 710km	<ul style="list-style-type: none"> ● To satisfy requirements of national and regional development plans including Delhi-Mumbai Industrial Corridor Project ● To generate investment effect independently

Phase I-b and II Developments Projects

DFC	Section	Condition
Western	Dadri – Rewari (Phase II)	<ul style="list-style-type: none"> ● Insufficient engineering study and environmental consideration regarding proposed 4-5 km tunnel in National Capital Region (NCR)
built-	Vadodara – JNPT (Phase I-b)	<ul style="list-style-type: none"> ● Difficulty in reconstruction of 12 numbers of existing ROBs in highly up area, to accommodate DFC ● Large scale land acquisition and resettlement in urban area ● High number of squatters to be affected by the Project. ● Detailed route alternative study to be carried out to avoid above obstacles ● No need to construct the new track between Vasai Rd. – JNPT due to low traffic demand
Eastern	Sonnagar – Mughal Sarai (Phase II)	<ul style="list-style-type: none"> ● No need to construct the new track due to traffic demand on existing electrified triple track
	Khurja – Dhandarikalan (Phase I-b)	<ul style="list-style-type: none"> ● Difficulty in reconstruction of 5 numbers of existing ROBs in built-up area ● Large scale land acquisition and resettlement in the urban area is required. ● Detailed route alternative study to be carried out to avoid above obstacles
	Khurja – Dadri (Phase I-b)	<ul style="list-style-type: none"> ● Demand between Khurja and Dadri is projected to saturate by 2020, thus it's construction is considered along with Rewari – Dadri section

RECOMMENDED TECHNICAL OPTION

Electric Traction for Both DFC

- Electric traction system is economically most preferable to diesel traction when traffic demand is as high as DFC Project
- Electric traction system is environmentally most preferable to diesel traction
- Sufficient power supply infrastructure along Western DFC for electrification
- Electrified section can also accommodate Double Stack Container (DSC) system (Well type) from Chinese experience

Well Type Double Stack Container for Western Corridor

- Well type Double Stack Container (DSC) system is proven in the world
- Flat type DSC has to be examined in stability and safety before commercial operation.
- DSC is more applicable on existing feeder lines connecting to DFC
- No traffic demand that requires Flat type DSC in the impending future
- No significant difference in cost per TEU-km between two DSC system

Electric Traction System

**Well Type
Double Stack Container Wagon**



Single Stack Container for Eastern Corridor

- No big container transport demand in the impending future
- Reconstruction of existing Road Over Bridges (ROBs) can be minimized

Improvement of Level Crossing by Automatic Train Detection and Alarming System

- Construction of ROBs in urban area is too difficult to implement
- Grade separation of Level Crossing will force hardship to non-motorized traffic
- Construction of ROBs at low traffic Level Crossing site is not economically feasible
- Cost of ROBs should be shared by road administrator, IR and DFCCIL
- New ROBs construction recommended to be implemented separately from DFC

INTERMODAL TRANSPORT STRATEGY

In case of railway transport, the connections to other modes of transport are required to complete the entire transport process. To enhance the effectively of entire transportation, the following measures should be immediately taken.

Issues

Counter Measures



- Off-shore queue more than 10 days
- Redirect transfer to other ports

- Strengthening capacity of berths
- Expansion of container yard in ports



- Containers dwell for several days in container yard leading to its congestion.
- Long-haul handling of outside berth operator's container
- No first-in first-out handling of container at ports

- Improving container handling within port (direct transport to railway yard, etc.)
- Introducing commissioned business system for mutual operation
- Improving integration between train reservation information system & freight handling system



- Long-haul procedure and transmission of SMTP (Sub-Manifest Trans-shipment Permit)
- Operating container trains after collecting some containers
- No public announcement of freight train's time schedule
- The exact arrival time of containers is not known presently.

- Rationalising custom clearance – Integrating Import General Manifest and SMTP
- Improving track layout within port
- Operating container trains according to scheduled chart
- Introducing train reservation system
- Introducing container tracing systems
- Introducing information sharing system for customers



- Tedious procedure for application of delivered service on counter and deposit system
- Authorized freight charge, nonnegotiable system

- Introducing 'computerised administration of order' and 'payment after service'
- Introducing individual freight charge



- Inefficient handling in storage at ICD
- Insufficient storage space
- Limited delivery hours due to traffic control in urban area
- Few freight forwarder provide high-quality service

- Mechanising warehouse freight handling, expanding existing ICDs and constructing logistic parks
- Developing ICDs within the National Capital Region for Phase I-a
- Establishing Small packet distribution centre in traffic regulated urban area
- Developing access road to ICD. Introducing authorised freight forwarder and delivery service by railway freight forwarder

ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

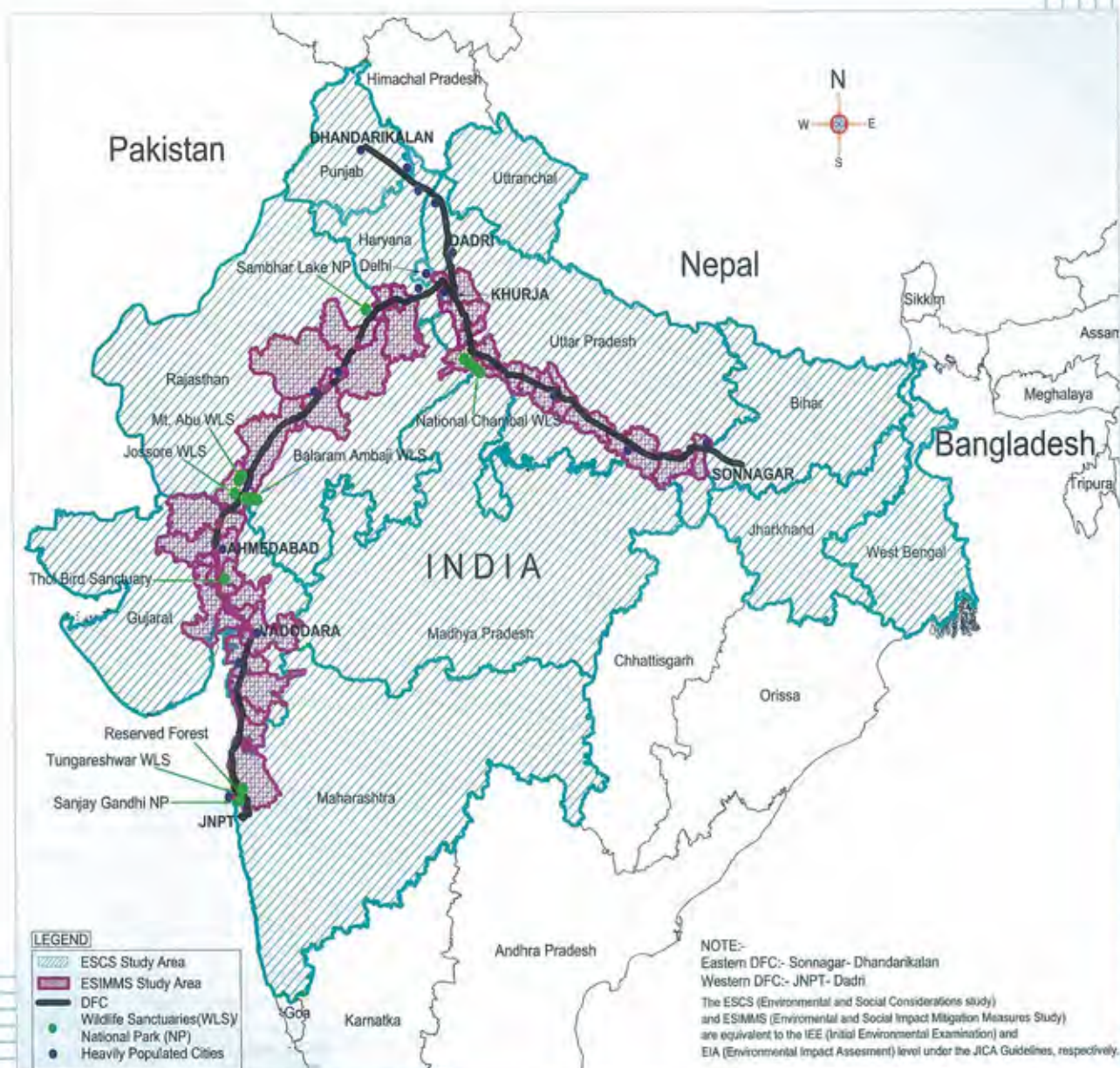
One of the major issues related to infrastructure projects is safeguarding the natural and social environment.

According to the Indian laws and regulations of environmental impact assessment, railway development projects are considered as "linear development" i.e. impact to the environment is negligible and the environmental impact assessment is exempted. However, as an internationally funded project all efforts need to be made in the DFC Project for minimizing environmental impacts caused.

JICA Guidelines for Environmental and Social Considerations were developed in 2004 so that the JICA funded feasibility study incorporates due considerations of the environmental protection and safeguards the sectors of society directly and indirectly affected by the Project. The feasibility study of DFC Project has also been carried out based on the JICA Guidelines.

Public Consultation Meetings/Stakeholders' Meetings (SHM) were held during the Study. These SHMs were conducted in three stages between January 2007 and September 2007, at 37 districts along the priority DFC project area. In addition, village-level meetings were held between the second and third stage SHMs.

- Railway route for the DFC project was designed with detouring urban area to avoid large-scale involuntary resettlement.
- Illegal occupants or squatters residing in and around the railway stations would also be subject to relocation due to improvement of the station under the DFC project, impacts of which are also assessed in the study.
- Concerns over railway noise and vibration are frequently expressed by the residents along the existing railway tracks as an environment issue caused by the railway development (according to a survey conducted under the study)
- The area of sensitive natural environment directly affected by the project is Barlam Ambaji Wildlife Sanctuary (Gujarat) on the Western Corridor. The existing railway line passes through the sanctuary over 2.4 km-long and the railway line for the DFC Project is carefully designed to be constructed on the eastern side of the existing railway.

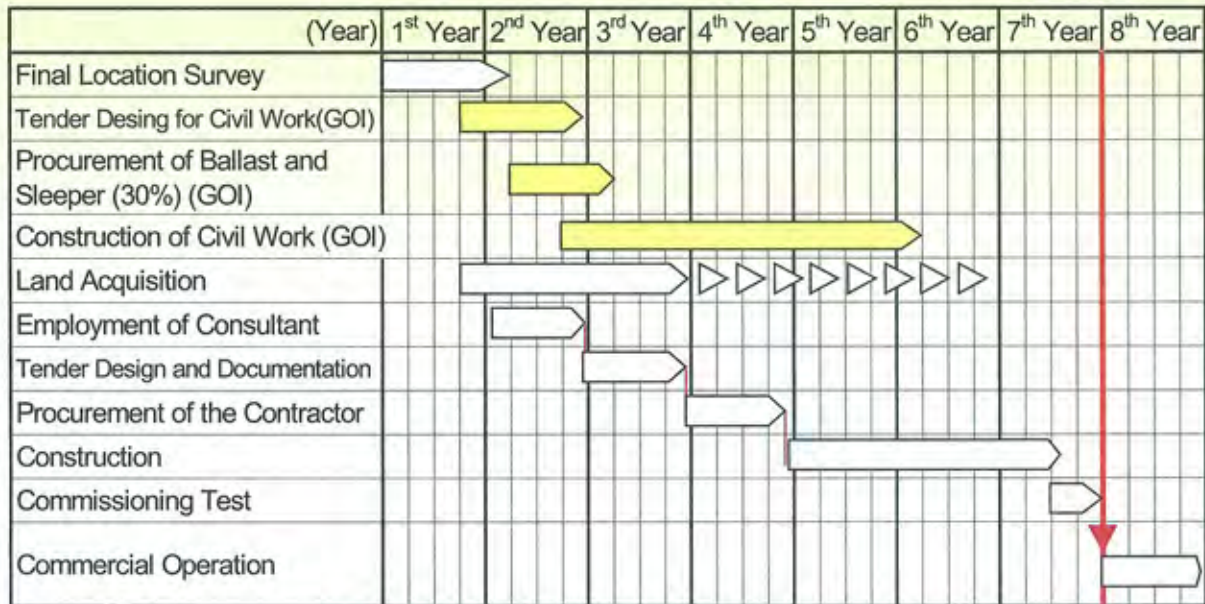


PROPOSED IMPLEMENTATION SCHEDULE

The duration of project implementation can be shortened by following measures.

- Early commencement of preparation of tender designs for civil works (Earth Work, Station, Bridge, Culvert, etc)
- Early commencement of critical works (civil work and procurement of track material) by Indian side with GOI budget in advance

The short cut implementation option applying the above measures are shown below :



Note: GOI > Government of India

PROJECT INDUCED IMPACT

Induced Impact on

Production

Gross value Added (GVA)

Tax Revenue

Operating Surplus

Household income and employment

Total Induced Impact*

Rs. 1,400 billion

Rs. 690 billion

Rs. 22 billion

Rs. 250 billion

Rs 360 billion,
1.1 million people

*During DFC construction time (8 years)

Regional Development Effects

- Acceleration of Nationwide Development
- Promotion of Industry
- Promotion of Agriculture, Forestry and Fisheries
- Improvement in Living Conditions

Abbreviations

DFC: Dedicated Freight Corridor; DFCCIL: Dedicated Freight Corridor Corporation of India Ltd.; DSC: Double Stack Container; ICD: Inland Container Depot; IR: Indian Railways; PETS-II: Preliminary Engineering cum Traffic Study

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For a better tomorrow for all.

Japan International Cooperation Agency

Headquarter : Shinjuku Maynds Tower Bldg., 7F, 2-1-1, Yoyogi, Shinjuku-ku, Tokyo 151-8558; Tel: +81-3-5352-5311-14; Fax : +81-3-5352-5079

India Office : 3A, 3rd Floor, Lotus Towers, Community Centre, New Friends Colony, New Delhi-110065, INDIA, Tel: +91-11-41672580-5; Fax : +91-11-41672586