

3.7.31 拡大環境ワーキング・グループ会議の開催（2007年9月26日）

これまで実施されてきた EWG 会議と異なり、拡大環境ワーキング・グループ会議を、2007年9月26日に通常の EWG メンバーに加えて農業省、都市開発省、および司法省を招待して開催した。会議の主要な討議内容は既存の法制度の枠組みで JICA 調査団の提言事項が実施可能かどうかに関心が当てられた。現行法に当てはまらない場合でも国際ドナーによる融資を受ける場合には検討すべき事項である。当日は残念ながら、MOR 以外の省庁の出席はなかった。以下に主要な討議内容を示す。

- 1) Gujarat 州の多くの District で事業に対する反対意見が出された。この背景には Final Location Survey の結果の公開と再取得価格に基づく市場価格での補償の表明の要求がある。MOR と DFCCIL は今後、事業の必要性和合意形成のためにさらに地元住民との協議を実施する立場にある。
- 2) JICA 調査での提言の内容。
- 3) 沿線住民に対する鉄道騒音・振動の対策。
- 4) JICA 調査の提言は NRP-2003 に基づくものではない。法的根拠なしに MOR は住民移転計画の実施はできない。
- 5) JICA や JBIC などの環境社会配慮ガイドラインは事業実施の基礎となるものである。MOR や DFCCIL は現行法にとらわれずに上記の提案された住民移転政策を検討すべきである。

3.7.32 Railway Board に対する DF/R の説明（2007年9月27日）

MOR Pillai 部長からの要請に基づき9月27日に Railway Board の幹部に調査団から DF/R の説明を行った。MOR からは Chairman of Railway Board(総裁)/Mr. Jena、Financial Commissioner/Ms. Sudha Choube, Member Traffic/Mr. Mathur が参席し、DFCCIL からは Kaol 社長も参加した。このほかに Executive Director 以上の MOR スタッフが参加した。日本側からは大使館/平石書記官、JBIC 斉藤/金駐在員、JICA 藤井所長/小島所員らが参加して説明会が開催された。

統合マネジメントから資料（次頁）を用いて説明を行った。特に問題となっている技術オプションについては、DFC 西回廊のダブルスタックコンテナシステム（調査団はフラットタイプを推奨）および機関車牽引方式（調査団は電気牽引を推奨）を含む6項目について PETS-II の提案内容と相違する理由を重点的に説明し、Railway Board の理解を求めた。

また MOR からの要請に基づき、調査団（統合マネジメント）から STEP 円借の融資条件およびコンサルタントとコントラクターの調達条件について説明を行った。

Presentation for Railway Board

September 27th, 2007



The Feasibility Study on the Development of Dedicated Multimodal High Axle Load Freight Corridor with Computerised Control for Delhi-Mumbai and Delhi-Howrah in India

Presentation for Railway Board on Draft Final Report

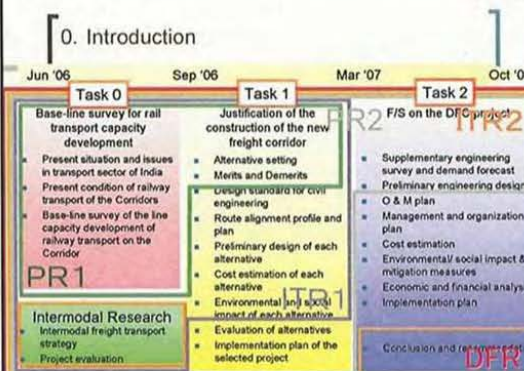
JICA Study Team
Nippon Koei Co., Ltd
Japan Railway Technical Service
Pacific Consultants International

0. Contents of the Presentation

Clarification of Draft Final Report

- 1) Phased Development Scenario
- 2) Comparative Analysis of Technical Options
- 3) Transport Planning
- 4) Guideline Design
- 5) Operation and Maintenance Plan
- 6) Environmental and Social Considerations
- 7) Project Cost
- 8) Economic and Financial Analysis
- 9) Evaluation of Induced Impact
- 10) Management Plan of DFC
- 11) Project Implementation Structure (Revised)
- 12) Comprehensive Evaluation
- 13) Recommendation and Conclusion

0. Introduction



Jun '06 Sep '06 Mar '07 Oct '07

Task 0 (PR1): Base-line survey for rail transport capacity development. Includes: Present situation and issues in transport sector of India, Present condition of railway transport of the Corridors, Base-line survey of the line capacity development of railway transport on the Corridor, Intermodal Research (Intermodal freight transport strategy, Project evaluation).

Task 1 (IR1): Justification of the construction of the new freight corridor. Includes: Alternative setting, Merits and Demerits, Design standards for civil engineering, Route alignment profile and plan, Preliminary design of each alternative, Cost estimation of each alternative, Environmental and social impact of each alternative, Evaluation of alternatives, Implementation plan of the selected project.

Task 2 (IR2): F/S on the DFC project. Includes: Supplementary engineering survey and demand forecast, Preliminary engineering design, O & M plan, Management and organization plan, Cost estimation, Environmental/ social impact & mitigation measures, Economic and financial analysis, Implementation plan, Conclusion and recommendation.

0. Contents of the Report

The Draft Final Report consists of the following document:

- Volume 1 Executive Summary (Task 0, Task 1, and Task 2)
- Volume 2 Task 0 and Task 1
- Volume 3 Task 2
- Volume 4 Annex 1 Technical Working Paper
- Volume 5 Annex 2 Preliminary Design Drawings

1. Phased Development Scenario
Categorization of Sections by Preconditions

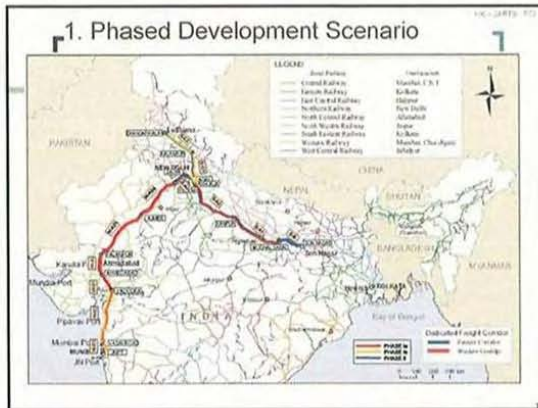
- Conditions required to meet for the justification for the implementation of the Project

1. Existence of saturated line capacity.
2. Basic plan based on thorough technical elaboration.
3. Elaboration of environmental and social consideration issues.
4. Independent viability of the project for the particular section.

1. Phased Development Scenario
Categorization of Sections by Preconditions

- Criteria for categorization of the sections

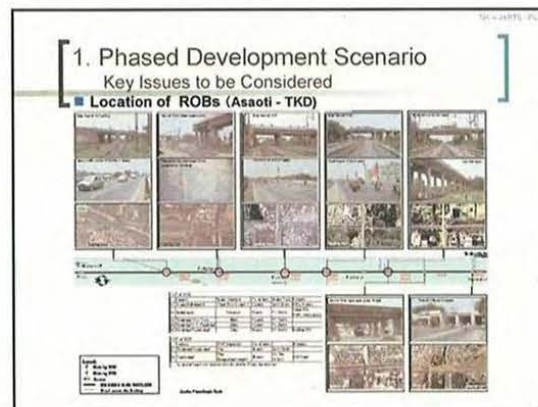
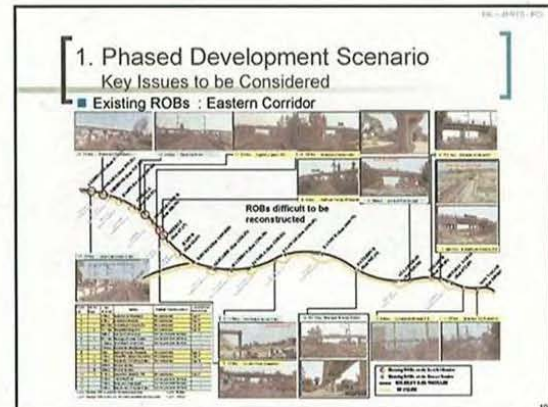
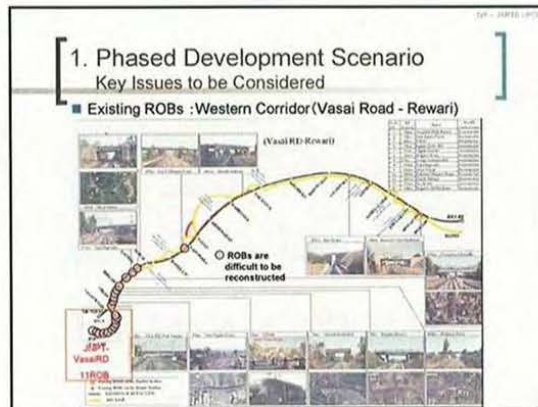
Category A:	Sections having commonality of stringent traffic situation in the short to mid-term future, and non existence of engineering and environmental issues in the near future that would undermine the implementation of the works
Category B:	Sections having commonality of stringent traffic situation in the short to mid-term future, however its implementation is judged to be impossible in the immediate future due to existence of serious negative impact from the engineering and environmental aspect.
Category C:	Sections having commonality of no serious traffic situation in the short to mid-term future..



1. Phased Development Scenario
Key Issues to be Considered

Line Capacity Applied to Calculate the Level of Seriousness of Traffic Situation

Type of Track	Line Capacity (Number of trains/day/direction)	
	IR	JST
Single track	20 (ABS)	25 (Automatic signalling)
Double track	55 (ABS)	110 (Automatic signalling)
	70 (Automatic signalling)	
Triple tracks (Double + Single)	75 (ABS)	135 (Automatic signalling)
	90 (Automatic signalling)	



1. Phased Development Scenario
Proposal on Phased Development Scenario

Definition of the Respective Phase


Phase I-a:	A Project which has urgency and which can be implemented possibly from year 2008-09 by using financial participation from the international lending agencies.
Phase I-b:	A Project which has urgency but need more lead-time for obtaining financial participation from the international lending agencies. The Project can be implemented partially by GO's own budget from year 2008-09.
Phase II:	A Project for which implementation can be deferred until the traffic situation becomes stringent, as well as a project with those sections that cannot immediately commence due to the necessity of review of its alignment in totality

Presentation for Railway Board

September 27th, 2007

1. Phased Development Scenario
Proposal on Phased Development Scenario


**Western Corridor
Phase I-a**



Section	Rewari – Vadodara
Main Reasons	No significant engineering and environmental constraint on alignment of parallel and detour sections. Basic plan is likely to be fixed this fiscal year.
Expected Effects	(1) Direct link of NCR and deep sea ports of Dujairat (2) Improvement of the freight train operation to/from JNP/Mumbai Port by detouring the bottlenecked Ahmedabad and Vadodara sections.
Duration	6 Years (2008-09 / 2013-14)
Necessary Conditions to be met for realization of Project	(1) Urgent allocation of Indian Government budget. (2) Completion of detailed design by December 2007. (3) Commencement of consultation with road authorities regarding the reconstruction of the ROB. (4) Approval of ESBMS of the subject section by MOR by November 2007. (5) Continuous effort for consensus building with residents. (6) Immediate action for construction of ICD.

1. Phased Development Scenario
Proposal on Phased Development Scenario


**Western Corridor
Phase I-b**



Section	Vadodara – Vasai Rd. & Vasai Rd. – JNPT
Main Reasons	Substantial numbers of ROB difficult to reconstruct. Requires reconsideration of alignment.
Expected Effects	(1) Improvement of transport capacity of section between Vadodara – Vasai Rd. where the traffic situation is most severely congested. Enhancement of freight transport capacity between JN Port, Mumbai and NCR. (2) Direct connection of Western DFC to JN Port.
Duration	8 Years (2008-09 / 2015-16)
Necessary Conditions to be met for realization of Project	(1) Urgent review of technical feasibility and reconstruction for existing ROB's including the study on detour route. (2) Prompt action for achieving consensus among residents and expedition of land acquisition process. (3) Urgent topographic survey extending across the Route W-BS and review of the alignment route is required. (4) Consideration on financial participation of the international lending agencies. (5) Timely execution and completion of an EIA level study of the section, in assumption of applying for external finance.

1. Phased Development Scenario
Proposal on Phased Development Scenario


**Western Corridor
Phase II**



Section	Dadri – Rewari
Main Reasons	Subject section has a tunnel section and requires further study.
Expected Effects	Improvement to the logistic transport in NCR by connection of the DFC to the existing ICD of TND and Dadri.
Duration	6 Years (2010-11 / 2015-16)
Necessary Conditions to be met for realization of Project	(1) Early commencement of engineering surveys - studies and EIA level study for tunnel section.

1. Phased Development Scenario
Proposal on Phased Development Scenario


**Eastern Corridor
Phase I-a**



Section	Mughal Sarai – Khurja
Main Reasons	There are no serious engineering and environmental issues that undermine the implementation of the works. Basic plan is likely to be fixed this fiscal year.
Expected Effects	To strengthen the transportation capacity for entire Eastern DFC by implementation of works of the most congested section of the corridor.
Duration	6 Years (2008-09 / 2013-14)
Necessary Conditions to be met for realization of Project	(1) Improvement of existing Mughal Sarai Station

1. Phased Development Scenario
Proposal on Phased Development Scenario


**Eastern Corridor
Phase I-b**



Section	Khurja – Dadri and Khurja – Dhondoi Kalan
Main Reasons	(1) Reconstruction of ROB's in built-up area Khurja – Dhondoi Kalan is judged to be extremely difficult, and reconsideration of DFC alignment on several sections is required.
Expected Effects	(1) Direct connection of both DFC corridors. (2) Alleviation of traffic situation in NCR by provision of bypass route linking Hurdham India and Western and Eastern DFC.
Duration	6 Years (2008-09 / 2015-16)
Necessary Conditions to be met for realization of Project	Urgent review of DFC alignment to avoid reconstruction of existing ROB's. Prompt action for land acquisition.

1. Phased Development Scenario
Proposal on Phased Development Scenario

**Eastern Corridor
Phase II**



Section	Son Nagar – Mughal Sarai
Main Reasons	Line capacity between Khurja and Dadri is projected to saturate in 2025, thus necessity of implementation of Project before then is not justified.
Expected Effects	To complete entire Western DFC
Duration	6 Years (2010-11 / 2015-16)
Necessary Conditions to be met for realization of Project	Finalization of planning of the track layout of new Mughal Sarai Junction station.

Presentation for Railway Board

September 27th, 2007

2. Technical Availability

Recommended Double Stack Container System (DSC) for Western DFC

PETS II Flat Type DSC → JICA Study Well Type DSC

- ✓ Well type DSC system is proven system in the world
- ✓ Flat type DSC is inferior to Well type (DSC) in Stability
- ✓ DSC is more applicable on existing feeder lines connecting to DFC (e.g. minimizing the reconstruction of ROB)
- ✓ No traffic demand that require Flat Type DSC in foreseeable future.
- ✓ No significant difference in cost per TEU-km between the two DSC system

2. Technical Availability

Recommended Traction System for DFC

PETS II Electric Traction for Eastern DFC Diesel Traction for Western DFC → JICA Study Electric Traction for Both DFC

- ✓ Electric traction system is more economical than diesel traction when traffic demand is as high as DFC Project
- ✓ Electric traction system is environmentally more preferable
- ✓ Sufficient power supply infrastructure along Western DFC for electrification
- ✓ Electrified section can also accommodate DSC system (Well Type) ← Chinese experience

2. Technical Availability

Recommended Container Transport System for Eastern DFC

PETS II Double Stack Container Well Type → JICA Study Single Stack Container (short-mid. Term)

- ✓ No big container transport demand in foreseeable future
- ✓ Reconstruction of existing ROBs can be minimized

2. Technical Availability

Recommended Loop Length for Station Facilities

PETS II 1,500 m Loop Length → JICA Study 750 m Loop Length (short-mid term basis)

- ✓ No necessity to operate double couple train in DFC from the view point of traffic demand in foreseeable future
- ✓ No difference in freight transportation cost (operation cost) between normal train and double couple train
- ✓ Adoption of longer loop length for station reduces line capacity of the main lines

2. Technical Availability

Recommended Improvement of Level Crossing (L/C) in DFC project

PETS II To replace all L/C with ROBs → JICA Study To Improve L/C by Automatic Train Detection and Alarming System

- ✓ Construction of ROBs in urban area is too difficult to implement
- ✓ Grade separation of L/C will force hardship to non-motorized traffic
- ✓ Construction of ROBs at low traffic L/C 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

2. Technical Availability

Recommended Measures for Connection to TKD ICD

PETS II By Construction of a new single track DFC → JICA Study By improvement of existing line

- ✓ TKD ICD has no such additional capacity to accommodate additional demand which needs DFC with double stack container transport system
- ✓ Existing 5 ROBs, three out of which are 4-lane ROB of trunk road, will be extremely difficult to be reconstructed to accommodate DFC

2. Comparative Analysis of Technical Options
Comparison on Container Transport System

■ Background

MOR considers that

- DSC operation under the OHC is UNPROVEN
- Unit operation cost of DSC is cheaper than SSC


JST conducted:

- field survey on the DSC operation under OHE in China
- cost-benefit analysis on container operation system

2. Comparative Analysis of Technical Options
Comparison on Container Transport System

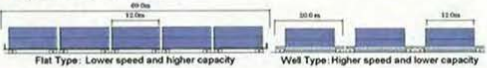
■ Chinese Railway:

- Reduced the reconstruction cost of existing ROB
 - Adopting Well type wagon
 - Lower Container: L=20ft, H=8.0ft
 - Upper Container: L=40ft, H=8.5ft
 - 8.5ft*9.5ft loading in plan
 - Loading/Unloading in non-electrified line
- Consideration for safety clearance
 - Minimum clearance 270mm between top of wagon and OHE.
 - 2 years of test running were executed before operation
 - Gale sections were excluded from DSC operation
- Transport based on scheduled time table



2. Comparative Analysis of Technical Options
Comparison on Container Transport System

■ Type of Wagon for DSC



Flat Type: Lower speed and higher capacity
Well Type: Higher speed and lower capacity

■ Result of Cost-Benefit Analysis

Stack Option	Wagon	Traction	IRR (%)	NPV (Cr.Rs.)	BC (D/R=12%)
SSC	-	Electric	22.6	857.2	1.73
DSC	Well	Diesel	18.4	192.8	1.57
DSC	Flat	Diesel	17.8	209.2	1.50
DSC	Well	Electric	19.5	882.3	2.54
DSC	Flat	Electric	18.5	819.0	1.46

2. Comparative Analysis of Technical Options
Comparison on Container Transport System

■ Result of Cost-Benefit Analysis

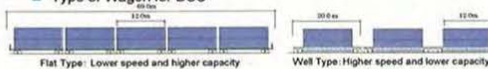
Item	SSC	DSC	
		On well-type wagon	On flat-type wagon
(A) Cost per train-km			
1) Depreciation cost (loco, ROB and electric facility)	21.52	34.30	46.62
2) Energy cost	76.04	91.20	119.08
3) O&M cost	62.49	74.94	97.86
Total	160.05	200.44	263.56
(B) Cost per TEU-km			
	1.78 (100%)	1.47 (83%)	1.46 (82%)

Unit Transport Cost of Two Types of DSC Wagon

(Rs.)	SSC	Well-DSC	Flat-DSC
Transport cost per TEU-km	1.78 (100%)	1.47 (83%)	1.46 (82%)

2. Comparative Analysis of Technical Options
Comparison on Container Transport System

■ Type of Wagon for DSC



Flat Type: Lower speed and higher capacity
Well Type: Higher speed and lower capacity


Stability Ratio Against Wind Load for each Wagon Type and Gauge

Case	A		B		C		D	
	Well Type		Well Type		Flat Type		Flat Type	
Container Combination	g12 + g12	g12 + g12	g12 + g12	g12 + g12	g12 + g12	g12 + g12	g12 + g12	g12 + g12
Stability Ratio	Standard Gauge	1.00	1.10	1.73	1.90			
	Broad Gauge	0.85	0.94	1.48	1.63			

2. Comparative Analysis of Technical options
Traction System

■ Energy Security Viewpoint

- Indian's national crude oil production covers only 8% of country's primary energy consumption
- Price of crude oil, the operation cost of diesel locomotive, tends to cost more
- Price of steam coal, the material for thermal plant, is relatively stable



OECD International Trade Values for Steam Coal and Oil

Presentation for Railway Board

September 27th, 2007

2. Comparative Analysis of Technical Options Traction System

Cost Analysis on Electric/Diesel Traction System (1)

Cost Items for the Analysis

	Electric traction	Diesel traction
Capital Cost	Loco., Elect. Facilities and Re-building of ROB's	Loco.
Maintenance Cost	Maintenance of Loco. and Elect. Facilities	Maintenance of Loco.
Operation Cost	Electricity Cost	Fuel Cost of Diesel Oil

- Evaluation Period = 35years (including 5 years of construction period)
- Container Stack Option = DSC x 50% + SSC x 50%
- Lifecycle of Locomotives
 - Electric Locomotive: 36 years
 - Diesel Locomotive: 36 years
- Procurement Plan of Locomotives
 - Demand for the year in 2011/12 shall be transported by utilizing the existing locos.
 - The existing locos shall be replaced to the new ones by 10% every year (All the locos will be replaced to new ones in year 2020/21)
 - The incremental demand after 2011/12 shall be transported by new locos

2. Comparative Analysis of Technical Options Traction System

Cost Analysis on Electric/Diesel Traction System (2)

- The Financial Index of Electric Traction against Diesel Traction
 - Gross Saving Cost = Rs. 6,927.8 Crore
 - Financial Internal Rate of Return (FIRR) = 19.2%
 - Net Present Value (NPV) at 12% of Discount Rate = Rs. 630.2 Crore
- Sensitivity Analysis

	-50%	-25%	+25%	+50%
Price of Diesel Oil	FIRR = -10.5% NPV = Rs. -851.0 Crore	FIRR = 11.8% NPV = Rs. -12.4 Crore	Electric traction is more advantageous	Electric traction is more advantageous
Transport Demand	FIRR = 10.4% NPV = Rs. -116.8 Crore	FIRR = 16.3% NPV = Rs. 354.70 Crore	Electric traction is more advantageous	Electric traction is more advantageous

2. Comparative Analysis of Technical Options Traction System

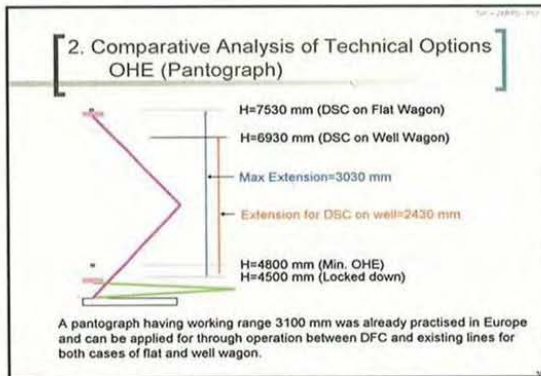
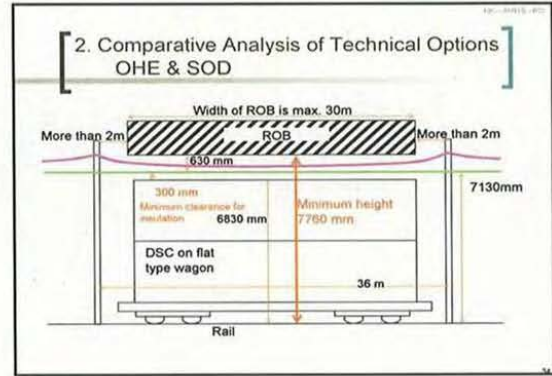
Environmental Viewpoint (CO₂ Emission)

- Emission level of Electric traction is less than half of Diesel traction

		CO ₂ Emission (kg-CO ₂)
Freight Train	Electric	0.006
	Diesel	0.012
Passenger Train	Electric	0.008
	Diesel	0.016

Conclusion

- Double stack container option is not the decisive factor of traction system
 - DSC requires the re-construction of overhead catenary in the existing electrified section nevertheless the traction systems
 - DSC requires re-construction of ROB's in DFC nevertheless the traction systems
- Electric traction has advantage to Diesel traction from Energy Security, Financial and Environmental point of view



3. Transport Planning

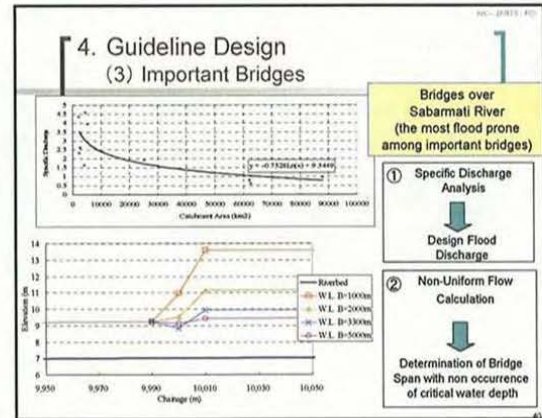
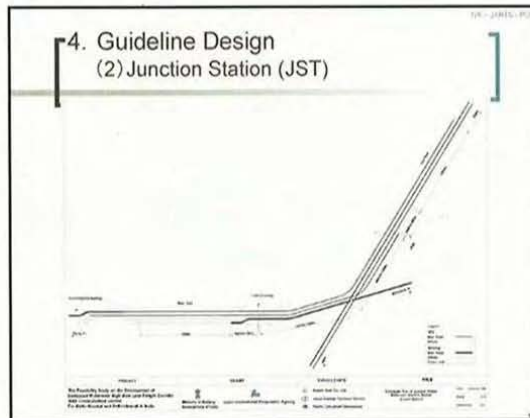
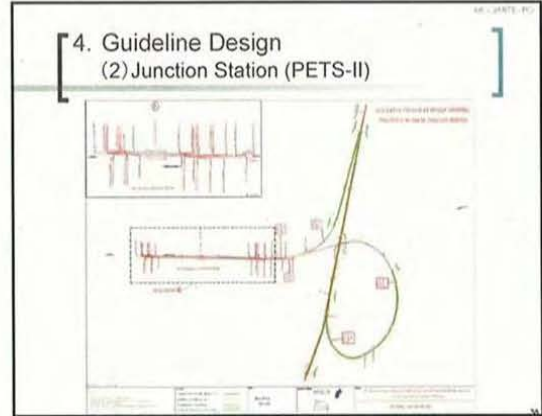
Yearly Required Number of Rolling Stock

Year	Eastern Corridor		Western Corridor		Total		
	Bulk	Container	Bulk	Container	Bulk	Container	Total
2013-14	80	2	37	49	117	51	168
2018-19	156	4	55	134	211	138	349
2023-24	165	5	59	202	224	207	431
2028-29	173	5	64	243	237	248	485

Source: JICA Study Team

Presentation for Railway Board

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5. Operation and Maintenance Plan
Staff Numbers per Unit

Function	Unit	IR	KRCL	JR	DFC (Proposed)	
Headquarters	Staff per route length	3.36	0.52	0.66	0.52	
Station staff	Staff per station	30.6	24.9	5.6	Major 35 Minor 10.5	
Drivers	Staff per 100 train km per day	6.53	1.42	1.0	1.0	
Maintenance	Track and structures	Staff per route length	5.0	2.0 Inspection 0.45 Structures 0.3	0.64	2.6
	Electrical facilities	Staff per route length	1.94	0.23	0.42	1.7
	Rolling stock	Staff per 100 train km per day	12.3	2.52	0.65	0.98

6. Environmental and Social Considerations

EIA clearance is one of essential requirements in project appraisal for international lending agencies such as JBIC, WB and ADB

↓

IEE Level of Environmental Study
For entire DFC
December 2006 - March 2007
1st Stage Stakeholder Meeting at a selected district in each state

EIA Level of Environmental Study
For Mughal Sarai-Dadri(East), Rewari-Vasai Road (West)
Socio-economic impact assessment was carried out
2nd and 3rd Stakeholder Meetings in each district affected by the project (37 districts)

Presentation for Railway Board

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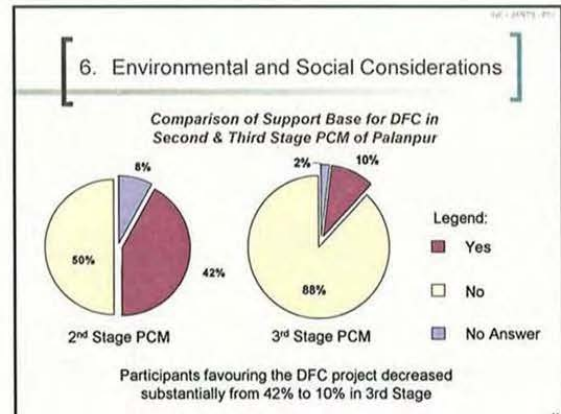
6. Environmental and Social Considerations

Results of Study (Western Corridor)

- ✓The social impact in the section between Rewari and Vadodara are relatively small
- ✓Large number of buildings and squatters subject to resettlement between Vadodara and Vasai Rd.

(Eastern Corridor)

- ✓Relatively small social impacts in the section between Mirzapur and Dadri
- ✓Large number of local residents subject to resettlement between Mughal Sarai and Mirzapur.



7. Project Cost

Items Included in the Project Cost

Items included in the DFC Project	Inclusion in the Project	
	JST	PETS II
PART OF DFCCIL		
Land Acquisition and compensation	YES	YES
Construction of infrastructure of DFC	YES	YES
Reconstruction of existing ROBs	YES	YES
Construction of new ROBs to replace existing level crossings	NO	YES
Construction of new ICD necessary for Phase I-a project	YES	NO
Employment of the general consultant /Tax Refund to GC	YES	NO
Contingency / Price Escalation / Interest during construction	YES	NO
PART OF MOR		
Procurement of electric locomotives	YES	NO
Construction of locomotive depots for Western DFC	YES	NO

7. Project Cost (1) Overall Project Cost

Description	Western Corridor (Million Rs.)	Eastern Corridor (Million Rs.)	Total (Million Rs.)	%
1)Construction Costs (DFCCIL portion)	163,587	108,775	272,362	54.4
2)Construction Costs (IR portion)	1,058	1,727	2,783	0.6
3)Rolling Stock Cost (EL-IR portion)	39,334	36,217	75,551	15.1
4)Consulting Service Cost	5,432	3,419	8,851	1.8
5)Physical Contingency	10,084	7,369	17,453	3.5
6)Price escalation	18,846	13,773	32,620	6.5
Sub-total	238,340	171,281	409,620	81.9
7)Land Acquisition and Compensation	26,640	25,495	52,134	10.4
8)Taxes	2,234	1,326	3,560	0.7
9)General Administration Cost	10,598	7,235	17,833	3.6
10) Accrued Interest during Construction	9,608	7,102	16,710	3.3
Total Project Cost:	287,421	212,437	499,857	100.0
Items excluded from DFC Project Cost				
*Wagon Cost	20,473	14,025	34,498	
*New ROB Construction & Land Cost (PETS2)	30,605	21,962	52,566	

7. Project Cost (2) Cost for Phase I-a

Description	Western Corridor (Million Rs.)	Eastern Corridor (Million Rs.)	Total (Million Rs.)	%
1)Construction Costs (DFCCIL portion)	91,001	61,255	152,257	47.0
2)Construction Costs (Depot-IR portion)	1,056	1,727	2,783	0.9
3)Rolling Stock Cost (EL-IR portion)	39,334	36,217	75,551	23.3
4)Consulting Service Cost	3,393	1,376	4,769	1.5
5)Physical Contingency	6,704	5,003	11,707	3.6
6)Price escalation	12,530	9,350	21,880	6.8
Sub-total	154,020	114,929	268,948	83.1
7)Land Acquisition and Compensation	16,339	15,143	31,482	9.7
8)Taxes	1,332	540	1,872	0.6
9)General Administration Cost	6,628	4,202	10,830	3.3
10) Accrued Interest during Construction	6,167	4,663	10,830	3.3
Total Project Cost	184,485	139,477	323,962	100.0

8. Economic and Financial Analysis

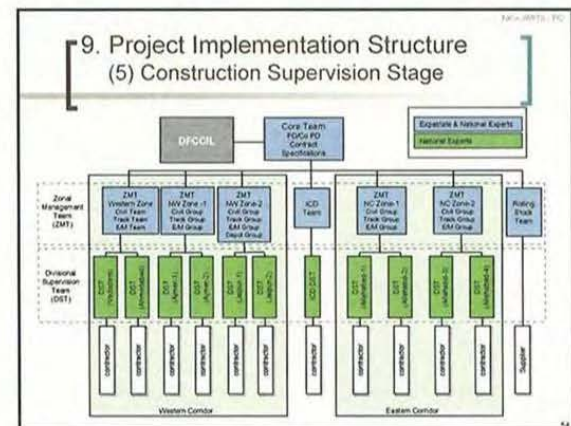
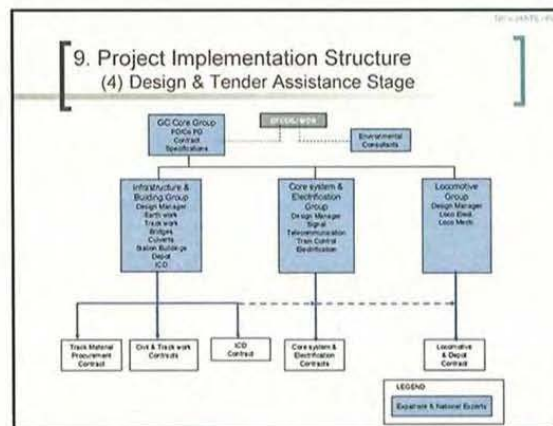
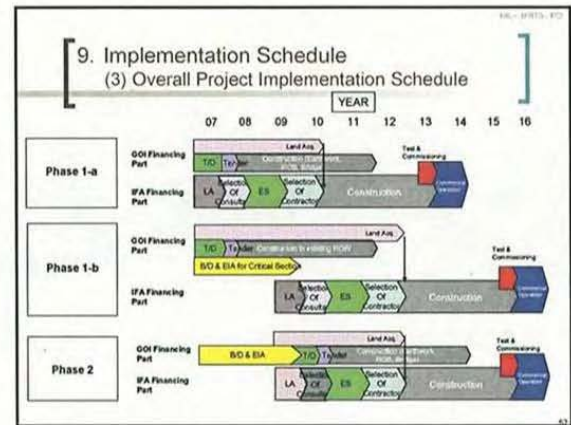
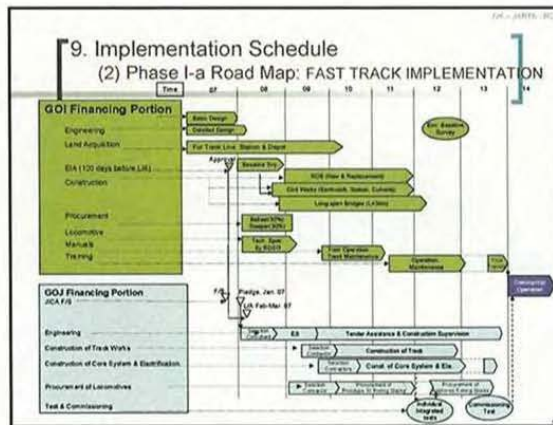
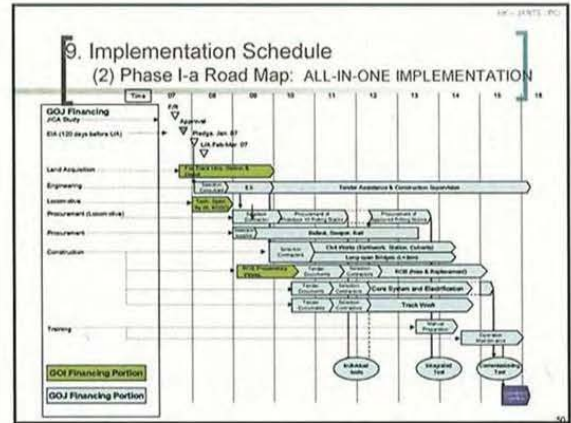
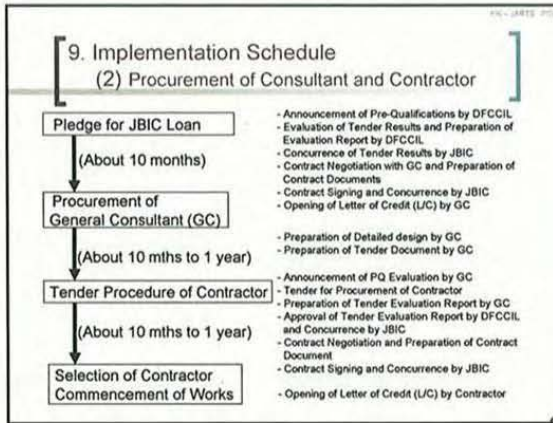
ALL PHASE

Indicators	Western DFC	Eastern DFC
EIRR (%)	14.0%	15.1%
B/C	1.20	1.35
NPV (Mil. Rs.)	33,484 Mil. Rs.	43,354 Mil. Rs.
FIRR (%)	9.1%	15.6%

⇒ Western DFC needs low interest with long repayment period finance to sustain the financial feasibility

Presentation for Railway Board

September 27th, 2007



Presentation for Railway Board

September 27th, 2007


10. Actions Required (1/2)

- 1) Immediate decision making by the MOR on the key technical options proposed in the JICA Study Report.
- 2) Approval by Government of India on the EIA-level report for those sections in Phase I-a, expected to be financed by JBIC Loan.
- 3) Start consultation with international lending agencies such as WB and ADB, in addition to JBIC, to secure low interest rate loans for DFC.
- 4) Domestic fund by the Government of India should be arranged immediately for land acquisition and early commencement of civil works.
- 5) Finish the preliminary engineering design and final location survey of the facilities in Phase I-a by December 2007.

10. Actions Required (2/2)

- 6) Immediate execution of engineering survey and preliminary engineering design of the existing ROB subject to reconstruction in consultation with road authorities.
- 7) Continuous effort for consensus building with the residents along the alignment is required through public consultation meetings initiated by MOR/DFCCIL.
- 8) Immediate decision making considering on the new ICD between Rewari and Delhi which is required for the Phase I-a Project of the Western DFC.
- 9) Actions necessary for the renovation of intermodal transport system should be taken immediately regardless of the DFC Project.

Thank You



MOR 側は、本説明会に臨むにあたり調査団の結論を聞き置くだけとし、議論は一切行わない方針が徹底されていたようで、説明途中でのマイナーな質問が多少出ただけで、説明終了後は何の質疑応答もなく MOR 側は全員そのまま退席という状況となった。

しかしながらプレゼン終了後、DFCCIL の Kaul 社長が調査団側に来て

「Very good presentation. Points are very clear. This seminar is necessary for them (board member) to make correct decision」との意見を発した。

この発言から判断すると、本説明会は Railway Board の健全な意思決定に一定の効果を持つものと判断される。また、今後 DFC プロジェクトの中で主役となる Kaul 社長の JICA 調査に対する基本的指示と評価を獲得できたのは、日印間の技術オプションに関する溝を埋めることについての進展に大きな効果があったものと判断する。

3.7.33 中央ステーク・ホルダー会議の開催（2007年9月28日）

第3ステージの現地ステークホルダー協議を2007年9月28日に開催し、環境社会配慮調査（EIA レベル）の調査結果についても情報公開する一方で、主に用地取得・住民移転に係る協議内容が集中した。そこで、環境社会配慮調査（EIA レベル）が全対象地域で終了し、その結果が9月26日に開催の第8回 EWG で発表され、内容が確認された。それを受けて、広く一般に情報共有するために中央レベルのステーク・ホルダー協議を JICA 調査団と MOR/DFCCIL との協議の結果、実施することとなった。当日の参加者は、Uttar Pradesh 州の Firozabad、Agra、Hathras、Aligarh、Brandshahar、および Gautam Budh Nagar の被影響民、Rajasthan 州の Sikar、Jaipur、および Alwar の被影響民、ADB、WB、JBIC、JICA インド事務所、Delhi ベースの3つの NGO、MOR、および DFCCIL であった。参加者からの主な意見は以下のとおりであった。

- 1) 各村における被影響者を適切に代表する仕組みを作り、土地等の損失に対する適切な補償が行われるべきである。
- 2) Uttar Pradesh 州では十分に土地が無いため、被影響者の代替農地の確保が難しい。
- 3) 平行区間の建設では既に既存鉄道が地域を分断しているが、事業の実施はさらに農業の実施を困難にする可能性がある。
- 4) 土地を失う農民にとって農地が不足しているため、移転先用地の開発が必要である。
- 5) 取得される土地と建物に対する適切な補償がなされるべきである。
- 6) 影響を被る構造物の評価を適切に行うための政策を公表すべきである。

3.7.34 インドのマスコミの取材対応および調整業務（2007年9月28日）

中央ステークホルダー会議の会場にはインドの全国紙の以下の3社が来場しており、3社から合同で調査団に対してインタビューの申し込みがあり、これに統合マネジメント（増沢、仲野）が応じた。

- The Indian Express
- The Hindu Business Line
- Mint

過去にインド側がニュースソースとなっているとおもわれる DFC 関連記事が各新聞を賑わしており、特に JICA 調査の事業費とインド側積算の事業費（PETS-II）との乖離や西回廊の機関車牽引問題などが両者間の相違点として対立を強調する形で報道されていたことから、調査団から「この点に関しマスコミに対して正確な情報を提供する必要がある」との判断から取材に応じたものである。

インタビューに当たっては最初に JICA 調査の位置づけを記者たちに説明し、質問には返答可能なものと、この場では返答できない（JICA の許可を要する）ものがあることを説明し、マスコミ側に了解を確認した上で取材に応じた。

先方の質問は以下の3点に集約された。

1. 調査団の算定した事業費と MOR の算定事業費の隔たりについて
2. 西回廊の電化・非電化問題および DSC 問題
3. JICA 調査提案の取扱い

1. 調査団の算定した事業費と MOR 算定事業費の隔たりについて

マスコミ側はすでに DF/R で調査団が算定した事業費の数字をどこかから入手していたと思われ、マスコミ側から約 5,000 億ルピーという数字を出してきて調査団側にこの数字の確認を求めた。マスコミ側は JICA 調査による積算事業費がインド側積算の金額より相当高額になっており、この原因が日本（JBIC）の権益のための誘導にあるような考えが予見としてあるようで、調査団に対しては挑戦的な態度で接してきた。これまでのマスコミの新聞報道も JICA 調査算定の事業費が不合理に高額になっているトーンでの報道があり（インド側からの情報に基づく報道）、調査団としてはこの点の認識の是正が必要との判断から以下の説明を行った。

- i) MOR の算定事業費に含まれる内容と調査団が事業費に含めた内容は異なっているので、単純に比較しても意味がない。JICA 調査では機関車調達、機関車デポ建設、新 ICD 建設のほか予備費、プライスエスカレーション、建中金利などの費用を事業費に含めている。事業が運営されるのに必要な項目はすべて含めているので、インフラ建設だけに費用を見積もっている MOR の事業費とは基本的に違うのでその点を注意して扱ってほしい。

- ii) (前回よりコストは低くなっているが、もっとコストダウンはできないのか?)

基本的にコストが下がる要素はないが機関車の調達台数を減らせば数字は小さくなる。一般的には今後のインフラの推移や本事業が市場の需給関係の与える影響の度合いによってはさらに事業費が嵩む可能性も考えられる。

- iii) 事業費を高く算定したからといって JBIC の便益にはなんらなるものではない。その点に関してはマスコミ側に誤解があるのではないか?

2. 西回廊の電化・非電化問題および DSC 問題

マスコミ側は日本側が DFC 西回廊の電化になぜ固執するのか尋ねてきた。すでにこの問題についてはインド側から吹き込まれているようで、「電化を採用するとダブルスタックコンテナ輸送ができない」という点についても調査団側の意見を求めてきた。電化がディーゼルに比べて有利であることの正当性を説明する良い機会であると考え、調査団から以下の説明を行った。

- i) 調査団が電化を推薦している理由は非常に簡単であり、電化のほうが経済的にも環境的にも有利であるためである。運転本数の少ないローカル線ならディーゼル牽引とすることは理解できるが、DFC のような幹線鉄道でディーゼル牽引を採用することは常識的にありえない。すべて列車がディーゼルエンジンと発電機と燃料と燃料タンクを積んで自家発電しながら走っている状態は不経済であることは一般の方にも理解いただけると思う。
- ii) 電化でダブルスタックを走行させることは JICA 調査でも検証した。中国にも出かけて電化区間の DSC の視察もし、DSC は電化区間でも問題なく走行できるとの結論に至った。電化+DSC で技術的に問題となるのはコンテナ上面と電車船線との離隔確保であり、30cm の離隔が確保できれば DSC も問題なく走行できる。DSC に対応した高さのパンタグラフも調達可能であることも確認済み。
- iii) (IR は Triple Stack も計画している? この場合は電化では対応できないのでは)
- Triple Stack は自動車輸送の場合の 3 段積み方式でありコンテナの 3 段積みではない。自動車 3 段積み (Triple rack) はコンテナ 2 段積みの MMD に収まるので DDC とおなじく西回廊電化の場合でも自動車 3 段積み貨車の走行は可能である。

3. JICA 調査提案の取扱い

JICA 調査の今後の予定およびインド側が JICA 調査の結果を受け入れない場合の状態について問われ、以下の説明を行った。

- i) DF/R は先週インド側に提出した。これに対するコメントを受領後 F/R を取りまとめ 10 月中旬-下旬の間に提出する
- ii) (DF/R に対する MOR の反応はどうか?) IR は調査団の DF/R での提案については

現在 under consideration の状態であると理解している。調査団の調査が拒絶されるようなことは一切ない

- iii)(西回廊電化問題も含めて、IR 側が JICA 調査の提案を受け入れなかった場合はどうなるのか?) 円借款のオペレーターは調査団の結果に基づき実施されることになっている。JICA 調査の提案とは異なる方針をインド側が選択した場合は円借の案件審査が困難になると思われる。

3紙の記者に対するインタビューは、コーヒーブレイク中に実施され、途中で時間切れとなったが、3紙のなかで Indian Express の記者のみが、その後もステークホルダー会議に残り、再度調査団にインタビューを求めてきたため、調査団側でこれにも応じた。ここでは上記と同じ質問が繰り返され同じことが確認された。

翌9月29日に3紙とも上記インタビューを記事として報道したが、2回のインタビューをおこなった Indian Express 紙が3紙の中でこの最も正確にインタビューの結果を報じており、JICA 調査に関する一定の情報をマスコミにも提供する必要性が痛感された。これまでのインド側からの情報による報道に対して、JICA 調査の内容及び考えをある程度一般に通知する効果はあったものと判断できる。

なお MINT 社の報道では「調査団が Triple Stack Container 輸送が電化区間でも可能であると言った」との内容の報道があったため、これに対しては同社に対して内容に不備があることを通告した。

本マスコミ報道についてのインド政府からの反応はその後も全く無かった。

3.7.35 MOR/DFCCIL/調査団合同現地調査にかかわる調整業務（2007年9月末-10月始め）

DFCCIL 本部で開催された調査団と V. K. Kaul 総裁および幹部技術者との協議で、および別途 MOR 関係者との協議で調査団が提案した段階整備シナリオの根拠になった現場状況報告を確認するため、MOR/DFCCIL/調査団による西回廊 Mumbai 付近の DFCCIL 計画ルート沿線の合同現場踏査を提唱し、2007年10月上旬の実施で MOR/DFCCIL が了解された。当初、MOR から Verma 局長および Pillai 部長、DFCCIL から Kaul 総裁および他幹部の参加予定であったが、Verma 局長は米国視察、Kaul 総裁は別件のため現場視察には参加することができなくなった。しかし、DFCCIL から現場駐在事務所副所長2名の参加が確定した。

視察に参加したのは、DFCCIL の Mr. Subash Gupta, AGM/Vadodra および Mr. D.S. Rana, GM/Mumbai で調査団とともに Vadodra をはじめ、Surat, Valsad, Vapi, Virar, Vasai Road, Panvel, Jasai という順に DFC 計画ルート沿線を辿り、住民の過密定住状態、ROB 建設予定地の交通状況および既存線と平行に DFC 計画ルートの建設が極めて困難な区間を確認し、RITES の計画ルートの見直しの必要性を共通の認識として持つことができた。

3.7.36 ADB および WB に対する DF/R の説明・協議（2007年9月21日、10月初め）

2007年9月21日にADBの塚田氏、また2007年10月4日にWBのTharakan氏と面談し、ドラフト・ファイナル・レポートを手交し内容の説明を行った（ADBにはJICA竹内チーム長も参加）。段階整備シナリオの設定、技術オプションの比較検討には両者とも興味を示し、JICA調査の提案に基本的な同意を得られた。

両者に対しDFCプロジェクトに対するインド側からの資金協力の要請があったかを当方側から質したが、その時点までにはインド政府からのアプローチは全くないとのことであった。

3.7.37 Final Report の提出日に決定に関する調整業務（2007年10月1-4日）

2007年9月中旬に統合マネジメントがDF/Rの提出、説明・協議のために現地調査に乗り込んで、すぐに日本大使館より「Final Report (F/R) をできるだけ早く、2007年10月中旬までに提出することはできないか？」との要請があった。これまでの日印政府間協議では以下の3点が日本側の意向としてインド側につたえられていた。

- 1) 円借対象としては西回廊を優先すること
- 2) STEP を適用すること
- 3) 西回廊は電化とすること

これに対しインド側は「JICA調査のF/Rが提出された後に、内容を検討し意思決定する」との方針を堅持しており、F/Rが提出されないと実質交渉が進まない状況があり、またJBICのプレアプレーザル協議が2007年10月中旬から予定されていた（最終的にこの時期のプレアプレーザルは見送られ一般情報収集となった）ため、“2007年10月下旬に予定されていたF/Rの提出を少しでも早めたい”という日本外交筋の判断であった。

またF/Rが提出されたことを内外に印象付ける必要性があったため、当初予定していなかったF/Rの手交式を実施する案がJICA本部より呈せられ、MOR側との調整を要請された。

上記要請をうけ、統合マネジメントはMOR側と調整作業を行った。

Final Reportを早期提出するためには、DF/Rに対するMORからのコメントが早く提出される必要があるため、MOR側は当初F/Rの繰上げ提出には難色を示した。本調査のS/W時のM/Mでは、「DF/Rに対するインド側コメントはDF/R提出後1ヶ月以内、F/Rはコメント受領後1ヶ月以内」となっており、MOR側にコメントの早期提出、F/Rの早期提出とうスケジュールを強制できない状況にあった。

3.7.38 DFCCIL との Vadodara~Mumbai 区間合同調査の実施（10月3日~5日）

西回廊のVadodara~JNPT区間のDFC整備はROB架け替えや沿線の用地収用および住民移転等の社会環境に問題があるため、その問題を解決するために第I-a事業に含めず第I-b

事業で行うことを調査団はファイナル・レポートで提言した。第6回ステアリング・コミッティー・ミーティング後に実施した MOR/DFCCIL の各技術部門長との協議で、調査団が指摘した同区間の現場状況および段階整備計画の根拠となる状況把握を MOR/DFCCIL に認識してもらうため、合同調査を行うことを調査団が提案し、DFCCIL と共に実施した。合同視察の結果、次ページ以降の共通認識を醸成することができた。

The Feasibility Study on
The Development of Dedicated Freight Corridor
for Delhi-Mumbai and Ludhiana-Sonagar in India

FIELD SURVEY REPORT
Oct 3rd-5th, 2007

1 OBJECTIVE

During various discussions with Ministry of Railway (MOR), DFCCIL and RITES it was felt a Joint field survey must be carried out to highlight alignment issues/problems and options for Phase I-b of Western DFC.

This report is based on field survey between Surat and JNPT from 3rd October 2007 to 5th October 2007.

During the field survey, Mr. Subash Gupta (AGM/Vadodara) and Mr. D.S.Rana (GM/Mumbai) from DFCCIL, accompanied with the JST members and held discussions at following site

Table 1 Date of visit locations with type of issue

Visiting Date	Place Name	Chainage of DFC (from JNPT)	Issue Type	Remarks
3 rd Oct	Surat	305.4 KM	Land acquisition	Page 2
3 rd Oct	Valsad	236.9 KM	ROB and Work Shop Issue	Page 4
3 rd Oct	Vapi	210.7 KM	ROB and Land acquisition	Page 4
4 th Oct	Virar	98.0 KM	ROB and squatter problem	Page 4
4 th Oct	Vasai Rd	89.4 KM	ROB and urban developed area	Page 4
5 th Oct	Panvel	25.0 KM	ROB and Built up area	Page 6
5 th Oct	Jasai	8.3 KM	Jasai Yard and cutting issue	Page 6

This report mentions "issue" and "result of discussion with DFCCIL"

2 RESULT OF FIELD SURVEY

2.1 SURAT – BHARUCH

(1) DFCCIL Idea

The RITES alignment for DFC in this stretch was modified by DFCCIL, as mentioned in the succeeding lines. This has been modified by DFCCIL so that the alignment close to Gothangam need not flyover the existing tracks, but remain on the east side and continue parallel to the existing tracks till after Sanjali then to follow JST's alignment by rail flyover to bypass Ankleshwar, Baruch and Chavaj Block Cabin on the west side of existing tracks. The Figure 1 shows the RITES, JST's (both in early stages and latest modified) alignment for DFC tracks.

A separate line flying over the existing tracks from the Gothangam Junction station will connect to the siding from M/s KRIBHCO and in the future from M/s RELIANCE Hazira port area.

(2) JST Comments

JST more or less agrees with the modifications suggested by DFCCIL and the detour routes of Surat and Baruch follow JST's alignment. The Gothangam Junction station for DFC will shift towards east side of existing tracks. The elevated feasibility of DFC tracks through Surat as one of the alternatives against to detour was seen not feasible. The Figure 1 shows the JST's modified alignment based on discussions with DFCCIL Representative.

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The Development of Dedicated Freight Corridor
for Delhi-Mumbai and Ludhiana-Sonagar in India

FIELD SURVEY REPORT
Oct 3rd-5th, 2007



Source of Basemap: Google Earth

Figure 1 Surat - Bharuch Detour

2.2 VALSAD

JST and DFCCIL Representatives visited Valsad station in order to check the feasibility of the DFC alignment encountering a ROB and Locomotive workshop siding. The alignment has to be modified in this area, one option is Valsad detour or double elevated DFC tracks. The technical and economic feasibility will be studied in order to conclude.

2.3 VAPI

At Vapi the DFC tracks have to cross an ROB in the middle of the city area, which cannot be either modified or rebuilt without affecting the city inhabitants. DFCCIL mentioned an alternative alignment for new ROB adjacent to the present one, this may entail some permanent property acquisitions.

2.4 VASAI ROAD-VIRAR

(1) DFCCIL Idea

The proposed RTTS alignment, as shown in Figure 2, is adjacent to existing alignment on the east side of tracks, since the station buildings lie on the western side of the tracks. The railway land being insufficient extra land needs to be acquired by DFCCIL for providing the DFC tracks. This land belonging to District Authorities, is currently either encroached or a permanent road or buildings exist. At all the three stations ROB, urban development and Squatters problem exists.

DFCCIL is contemplating elevating the tracks in order to reduce land acquisition. This would make the tracks higher, double elevated, to clear two existing ROB and one ROB under construction at Virar. DFCCIL are also looking at an alternate detour alignment, but have not decided the location. They also mentioned that DFC line needs to be linked to Central Railway tracks at Vasai Road Junction Station for operating freight trains to and from Mumbai and inland area.

(2) JST Idea

JST explained detour route is the only solution to avoid land acquisition problems at these stations. So an alternate route alignment from southern side, east of existing tracks was presented after leaving Juchendra Station and connecting the line from JNP to Vaitarna Station, with an operational connection with the proposed Vasai Road Junction station. Three alternatives for Junction Station are also shown in Figure 2, besides the JST proposed alignment.

This alignment was checked by visiting three locations where roads from Nalasopara and Vasai Road towards the National Highway No. 8 meet. From these locations feasibility of the detour alignment was confirmed. DFCCIL representatives will check this route once again to confirm its viability. Connectivity to Vasai Road by providing a DFC junction station was also checked. The location of Junction station did seem difficult since this area is close to a Reserved forest area and a wild life reserve area.

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Figure 2 Vasai Rd. - Virar Detour

2.5 JNP-PANVEL-JUCHENDRA

(1) DFCCIL Idea

The original RITES PETS II alignment for this stretch was along the existing railway tracks. DFCCIL's representatives did foot by foot survey from JNP to Vasai Road and came up with the following ideas to take care of various constraints.

The DFC alignment's 0.0 km starts away from the present JNP holding yard by about 2.5 km, which coincides with chainage 93.3 km from Mumbai central. Here 10 loop lines of 1500 m length are to be provided within the existing railway land. The DFC tracks are planned on the western side of existing tracks.

At the ROB no. 2 (JST) lowering of tracks by 1 to 1.5 m can be done to give vertical clearance of 8.3 m against the existing 6.8 m, Railway Board is considering increasing the clearance from 7.6 m to 8.3 for double stack container operation under OHE. Here another alternative of modification of existing ROB can be done by raising maximum by 1 m hence no track lowering is required if vertical clearance was kept at 7.6 m. At Jasai station rail flyover for Uran Port / Belapur new line construction works are underway which is currently stopped for final height of vertical clearance at existing track chainage of 85.67 km. At Jasai Station ROB no. 3 will require to be reconstructed. And 25 households at Kunde Wahal village will need to be rehabilitated.

Between Jasai and Panvel JST indicated a location of deep 11 m cut alongside existing line. This will be studied by DFCCIL and comments given to JST. Land acquisition is not a problem, about 2.5 km of soft ground is encountered between Jasai and JNP.

Close to Panvel station elevated tracks are proposed for DFC, since before Panvel station the DFC tracks have to cross existing tracks, river, station area, level crossings and main Panvel-Mumbai highway. Continuous elevated viaduct covers ROB nos. 6 and 7 at double elevation. At Panvel station coaching terminal horizontal curve of 700 m is proposed. Two village areas of Karjada and Mongali need some rehabilitation.

Near Diva junction sharper curves of existing tracks are proposed to be reduced to 700 m radius. At Kopar road station DFCCIL is aware of squatter and permanent structures in the vicinity of the DFC tracks, this will be dealt as Maharashtra state compensation laws. While the North side of Kopar Rd. Station shifting of existing line from 45.304 to 48.162 km is planned to avoid two six storied buildings 8 to 10 m apart. The DFC lines then replace the vacated existing right of way.

(2) JST Idea

JST's representatives agreed with most of the modifications suggested by DFCCIL but issue of 11m cut near Jasai – Panvel along the existing tracks needs to be resolved by them. Also an alternative detour alignment east side of Panvel was suggested to be reviewed by DFCCIL wherein two tunnels in the hills may need to be constructed in order to avoid double elevation near Panvel station. The DFC alignment of JST's proposal are shown in Figure 3.

A mangrove forest, national park and wild life reserves also are in the alignment of DFC, this should be confirmed by DFCCIL after discussion with Local Forests and Wild life District Forest officers.

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JST's detour after Juchendra station directly to Vaitarna was preferred by DFCCIL representative, who will look at this viable alternative.

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Figure 3 Jasai - Panvel Detour