

## **APPENDICES**

## **Appendix 1**

**THE DEVELOPMENT OF  
MULTIMODAL HIGH AXLE LOAD FREIGHT CORRIDOR WITH  
COMPUTERIZED CONTROL FOR  
DELHI-MUMBAI AND DELHI-HOWRAH IN INDIA**

**Project Appraisal on Large-scale Infrastructure Development**

**Suggestions from JICA's Preparatory Study**

**May 2006**

**Social Development Department  
Japan International Cooperation Agency (JICA)**

**TABLE OF CONTENTS**

- 1. BACKGROUND ..... 1**
- 2. MAJOR ISSUES FOR JICA PREPARATORY STUDY ..... 2**
  - 2.1 Needs for Cooperation with International Development Organizations ..... 2
  - 2.2 Issues Associated with Operations and Management Policies ..... 2
  - 2.3 Issues associated with Productivity Improvement ..... 2
- 3. ISSUES ASSOCIATED WITH INTERMODAL TRANSPORTATION STRATEGY ..... 3**
  - 3.1 Operational Method of Freight Trains (Unit Train Method) ..... 3
  - 3.2 Container Corporation of India Ltd. (CONCOR) and ICD ..... 3
  - 3.3 Introduction of Competition to Container Railway Transportation ..... 5
  - 3.4 Assignments of Roles in Freight Transport ..... 5
  - 3.5 Plans for Ports Improvement as Terminals of Freight Trains ..... 5
- 4. ISSUES ASSOCIATED WITH LOCOMOTIVE TRACTION AND CONTAINER TRANSPORTATION METHODS ..... 6**
  - 4.1 Field Surveys on “Single Track/Double Track Sections” and “Non-Broad Gauge, Sections in Feeder Railways” ..... 7
  - 4.2 Electrification Rate and Power Conditions of Railways in India ..... 7
  - 4.3 Requirements of Electrification ..... 7
  - 4.4 Fleet Composition of Locomotives Owned ..... 8
  - 4.5 Technology to Manufacture Large Scale Locomotives ..... 8
  - 4.6 Energy Resources, Energy Efficiency, and Air Pollution ..... 8
  - 4.7 Necessity of Multi-Dimensional Assessment ..... 8
- 5. ISSUES IN PROJECT APPRAISAL ..... 9**
  - 5.1 Overall Methodology ..... 9
    - 5.1.1 Benefit Measurement of DFC ..... 9
    - 5.1.2 Coverage of Project Appraisal ..... 11
  - 5.2 Other Technical Notes ..... 12
    - 5.2.1 Conformity to Safeguard Policy ..... 12
    - 5.2.2 Railways Technology and Sustainability ..... 13
    - 5.2.3 Special Purpose Vehicle (SPV) ..... 13
    - 5.2.4 Technology Transfer ..... 13
    - 5.2.5 Financing Options ..... 13

## 1. Background

The Government of India (GOI) has drawn up the 10<sup>th</sup> National Economic Social Development Plan (2002 – 2006) for the development of the national railways with a view to streamlining physical distribution systems in the country and facilitating the social and economic development. Through the plan, the country aims at the strengthening of the transportation capacity of six lines pertaining to the “Golden Quadrilateral”. More specifically, it aims at the development of new freight corridors; realization of a maximum speed of 100km/h for freight trains; improvement of rail tracks, freight trains and signaling systems; modernization of railway yards and stations; improvement of route connections between ports and inland areas; operation of double-stack container trains; construction of four large bridges; and others. This JICA Study (the Study) will be directed at the plan to develop new Dedicated Freight Corridors (DFC) to be built in the Western Corridor (approx. 1,400 km between Delhi and Mumbai) and in the Eastern Corridor (approximately 1,450km between Delhi and Howrah and approximately 410km between Khurja and Ludhiana), which form the northern portion of the “Golden Quadrilateral” cited above.

Once the Study has proved the viability of the project, construction of the DFC with a total length of 2,800km will be implemented; the total project cost may reach to the range of one trillion yen (Rs.40,000 Crores) if the cost of the construction of related port facilities, and the cost for strengthening transportation capacity of feeder lines are included. Neither Japan International Cooperation Agency (JICA), World Bank (WB), Asian Development Bank (ADB) nor Japan Bank for International Cooperation (JBIC) has ever experienced project evaluation of this scale. The most important factors in evaluations are their reliability, objectivity and transparency. Because of the huge cost of the Project, GOI may opt for joint financing, inviting JBIC, WB, ADB, and other international development organizations, as well as private financiers. It is one of the tasks for the Study to provide objective criteria with these entities and private firms, thus facilitating their timely decisions for investment.

The demand forecast for this project would be fairly complicated. In case of the Tokaido Shinkansen in Japan, WB extended funds for the construction of the railway between Tokyo and Shin Kobe which started in 1961 and operations commenced in 1964. While the total route length is approximately 600km, WB adapted a simplified method for the project evaluation, by dividing the entire route into a number of sections in which passenger stations were very much limited, making demand forecast rather simple. This was perhaps, because the evaluation was aimed at clarifying an appropriate size of individual construction projects, but also because it seemed to be the best available evaluation method at the time. This study, on the other hand, is required to make an evaluation of the Project with entire route length of 2,800km. And therefore it is important to carefully choose an appropriate evaluation method for the Project.

In undertaking the Study, JICA and GOI - represented by Ministry of Railways (MOR) - agreed that the Study will examine the validity of the Project by comparing alternative proposals. Under such circumstances, JICA in March, 2006, prior to initiating the Study, commenced a preparatory study, with a view to identifying suitable forecast methods for traffic demand and reliable and objective project evaluation methods. This report outlines the results of this Preparatory Study which will serve as useful guidelines for the Study to be followed. For this Preparatory Study, the following senior professionals participated in collaboration with JICA staff members:

Yuzo AKATSUKA	Dr Eng. Emeritus Professor	Toyo University (Infrastructure Systems)
Michihiro KAIYAMA	Dr Econ. Executive Director and Vice President Professor	School of Economics, Saitama University (Transport Economics)
Tsuneaki YOSHIDA	PhD Professor	Course of International Studies, Graduate School of Frontier Sciences, the University of Tokyo (Development Economics)

## **2. Major Issues for JICA Preparatory Study**

### **2.1 Needs for Cooperation with International Development Organizations**

During the course of JICA Scope of Work (S/W) Mission conducted in February 2006, some mission members had occasions to visit the local offices of WB and ADB to find the lessons and experiences learnt through the development projects financed by these international organizations, in particular in railway sector in India. While expressing concerns about the possible conflicts with their ongoing projects for the structural reform of the railway sector, they indicated understanding on the necessity of large-scale infrastructure improvement as proposed by GOI, stating that the current railway transportation capacity need to be reinforced in order to support the Indian economy which has had growth momentum. And they indicated their willingness to collaborate and to exchange views and information with the JICA Study Team (The Study Team). Therefore, the Study Team and its Advisory Committee should be well aware of the policy issues of the structural reform of the railway sector and the possible participation of these international organizations in financing the Project and its implications.

### **2.2 Issues Associated with Operations and Management Policies**

Currently, the Indian Railways, placing its priority to the passenger transport, operates freight trains squeezing into tightly scheduled passenger train services. As a result, the frequency of freight train operations is substantially affected by the frequent passenger train services. In other words, the current operation system of freight trains does not provide adequate services to meet demands for nation-wide freight transport services to sustain the national economic growth. The plan for DFC has been drawn up in consideration of these current situations.

As part of the socioeconomic policy, Indian government has subsidized passenger train fares, regardless passenger trains are operated at deficits. On the other hand, freight transport charges are set relatively high compared to the actual expenses on the grounds that cargo owners belong to the class affordable enough to bear the cost. In other words, in the Indian Railway's fare and charge systems, such a cross-subsidy mechanism has been incorporated as a part of national socioeconomic policies. In such circumstances, the new freight railways are likely to have less difficulty in profitability so long as the current fare and charge system is to be adopted. However, it is very important to identify the profit and cost centers through critical review of the financial position of the Indian Railways.

The Indian Railways is a huge state run company, providing more than 1.4 million jobs with their employees in overpopulated India. This may be one of the most critical points for the Railway to address to the structural reform issues. In this regards, the Indian Railways has some resemblance to the former Japan National Railways (JNR), which used to be a giant state-run monopolistic company, burdened with surplus employees, subsidiary transport services to remote areas and others. The JNR has been eventually resolved into profit making companies with higher productivity and improved service, even though privatization has been a long, hard and difficult process. Since the Study cannot overlook the issues concerned with the structural reforms, it may be advisable for the Study Team to learn lessons from the case of JNR for possible application to the Indian Railways.

While GOI's policy decision is still to be made on the entity responsible for the operation and management of DFC, it has been said that Special Purpose Vehicle (SPV) is under consideration by GOI, by separating it from the Indian Railways. While this is a matter of the national policy, the outcome will have serious impacts on the financial position of DFC, for which the Study is expected to address in the project evaluation. Therefore, close monitoring is recommended on this issue.

### **2.3 Issues associated with Productivity Improvement**

Railway transport service systems in India seem to have been designed with the primary emphasis on passenger transport, and currently there are no dedicated freight railways. In order to meet rapidly growing demands for both passenger and freight traffic, there seems to be a shift in GOI's policy towards separating freight trains from the current mixed train operations with DFC being the first step for this direction. While this policy shift needs to be confirmed, it is obvious that DFC is not only one solution to meet the increasing traffic demand. The issues associated with the productivity of operation

and management need to be examined through the Study.

In addressing the issues, it may not be appropriate to examine the productivity of the Indian Railways based on the evaluation criteria established in Japan, without due attention to the historical background of the Indian Railways and the country's current socio-economic conditions. The Indian Railways has been developed into the current systems over the many years, with its entire railway networks exceeding 63,000 km in route length and 1.44 million employees. Naturally, it has its own railway operation and management systems that have been forged over the years. It is also known as the sole national railway company in the world with an annual production of 30 electric locomotives with 6,000 horsepower traction.

### **3. Issues associated with Intermodal Transportation Strategy**

Neither the plan proposed by the Indian side nor the preparatory study are sufficient to provide information concerning facilities other than railways, and thus the Study is expected to face serious data constraints, so that it is necessary to clarify data to be collected or analyzed at an early stage. What is necessary is to draw up a draft document that immediately gives the situation of transportation within the corridors, so that the related parties concerned can share common information on the project. This section outlines the summary of information currently at hand concerning transportation methods and facilities other than railways, which are necessary to be noted when considering the intermodal transport strategy.

#### **3.1 Operational Method of Freight Trains (Unit Train Method)**

The Indian National Railways adopts the direct transportation method, called "Unit Train Method", for the operation of freight trains. The number of cars in one unit varies depending on the volume of cargos, but the minimum number is 20 cars, and the maximum number depends on the length of the loop at stations between starting and terminal stations. This method is used for ports, mines, coal mining regions, and inland container depots (ICD), etc., where a large volume of cargos is handled. In the same fashion, the terminals are also confined to commercial and industrial areas, large-scale factories, power stations, large-scale consuming regions, ICDs, etc. Therefore, when forecasting the demand for freight transport in the Eastern and Western Corridors, it is necessary to specify the locations and nearby areas of the starting and terminal stations of freight trains at an early stage of the Study.

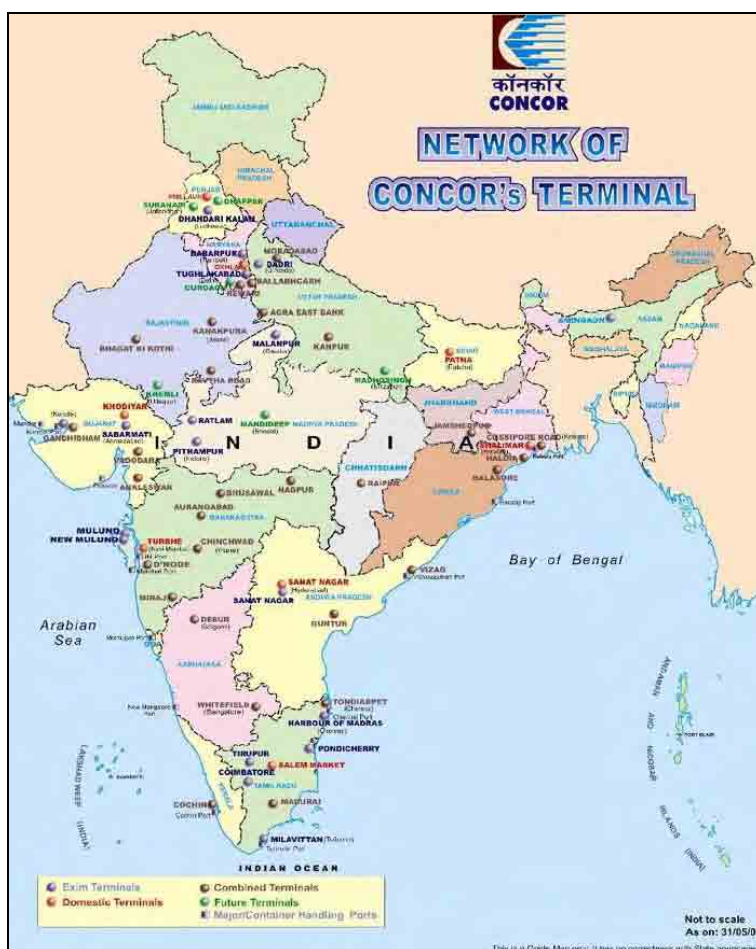
#### **3.2 Container Corporation of India Ltd. (CONCOR) and ICD**

Until recently, CONCOR has been exclusively responsible for railway transportation of containers. The CONCOR exclusively owns freight cars for the transportation of container cargos, being responsible, as consigner, for organizing container trains at departure stations or ICDs and for operating trains towards final destinations or ICDs. The operation of trains itself is carried out by the Indian Railways, whereas the cost of operations is borne by the CONCOR. While freight trains other than container cargos, such as those freight trains for grains, coals, caustic lime, oil, etc., are seemingly owned by the Indian Railways, but this information is not certain. It is necessary to research and clarify these facts, such as the ownership and operation methods of freight trains, because it has an impact on the efficiency of the operation of freight trains. It is also important to distinguish container transportation from other types of freight transport in the survey. There are 51 ICDs deployed by CONCOR across the country, whose locations are shown in the map below. In the Study, it is necessary to identify these locations on the railways network, and confirm the relationship between container trains organized at depots, and the Eastern and Western Corridors.

**Table3.1 Container Terminals of the CONCOR**

<b><u>Rail Served ICD with CFS</u></b>			
Dadri (G. Noida)	Coimbatore	Vadodara*	Jamshedpur*
Tughlakabad (Delhi)	Tondiarpet (Chennai)*	New Mulund (Mumbai)	Nagpur*
Jodhpur*	Madurai*	Miraj*	Daulatabad (Aurangabad)
Moradabad*	Sanatnagar (Hyderabad)	Dronagiri Node*	Milavittan (Tuticorin)
Agra*	Raipur (M.P)*	Chinchwad (Pune)*	Bhusawal*
Kanpur*	Tiruppur	Amingaon (Guwahati)	Malanpur (Gwalior)
Dhandari Kalan (Ludhiana)	Guntur *	Cossipore Road (Kolkata)	Rawtha Road (Kota)*
Jaipur*	Desur	Rewari	
Whitefield (Bangalore)*	Sabarmati (Ahmedbad)	Balasure*	
<b><u>Pure Domestic</u></b>	<b><u>Future Terminals</u></b>	<b><u>Port Container Terminal</u></b>	<b><u>Road Served ICD with CFS</u></b>
DCT/Okhla (Delhi)	Gurgaon (Haryana)	Harbour of Madras (Chennai)	Pithampur (Indore)
Phillaur (Ludhiana)	Bhopal (Mandideep)*	Kandla (Gandhidham)	Mulund (Mumbai)
Salem Market	Dhappar (Chandigarh)*	Haldia (Kolkata)	Pondicherry
Khodiyar (Ahmedabad)	Madhosingh (U.P)	Visakhapatnam*	Babarpur (Panipat)
Turbhe (Mumbai)	Suranasi	Shalimar (Kolkata)*	
Fatuha (Patna)	Kolkata Port		
Sanathnagar	Khemil		
Shalimar			
<b><u>Road Served ICD without CFS</u></b>			
Ratlam (Only container handling facility)			
Ballabhgarh (Only container handling facility)			
Cochin (Only container handling facility)			

\*Combined Terminals – Exim and Domestic services



**Figure 3.1 Locations of Container Terminals of the CONCOR**



### **3.3 Introduction of Competition to Container Railway Transportation**

Traditionally, CONCOR has monopolized the container railway transportation business, but in recent years, the principle of competition is beginning to be adopted in this sector more obviously. In February 2006, bidding for container transportation took place, in which 14 firms other than CONCOR participated. Pipavav Rail Corporation Ltd. (PRCL), which is reported to receive the order has already started operation of double-stack container trains between Gujarat Port and Jaipur in May 2006. At the moment, this company owns neither container freight trains nor any terminal facilities, but is certainly to procure facilities and equipment needed and participate in the container railway transportation business in a full scale once it succeeds in the bidding. The adoption of competition in the container railway transportation is likely to lead to the improvement of the transportation service as a whole, and to an increase in the share of railways to the transportation industry. All these are matters to remember when forecasting demand. Even if the principle of competition is adopted in the field of bulk cargo transportation, the transport efficiency will be improved and the transport volume will increase, which should be investigated, too.

### **3.4 Assignments of Roles in Freight Transport**

The responsibility of loading of cargos for railway transport varies depending on the organization to which stations of origin belong. The loading in harbor and port areas, for example, is carried out under the responsibility of those managing the areas. On the other hand, the relevant regional branch of the Indian Railways is in charge of the construction of railways siding in the harbor and port areas, whereas the organization managing the harbor and port is in charge of the maintenance of the railways siding, and the operation and management of freight trains with loaded cargos between the siding and the main line.

Currently, the CONCOR is in charge of the management and operation of the ICD, including the loading and unloading of containers of general, miscellaneous goods at container freight stations (CFSs). If the principle of competition is introduced to the container transportation, new ICDs will be launched as starting or terminal stations, so that it will be important to understand the new logistics flows. Even if end stations or ICDs on the Corridors do not belong to the corridors themselves, these facilities are fairly important for producing benefits of the transportation via the Corridors. Hence, it is necessary to incorporate, as the expenses related to the Corridors, the cost of developing loading-related facilities, management and operation, and maintenance and repair, together with the cost pertaining to containers, and the cost of constructing facilities on feeder lines to be used in the corridor transportation.

### **3.5 Plans for Ports Improvement as Terminals of Freight Trains**

#### **(1) Major Ports on the Eastern Corridor**

At the east end of the Eastern Corridor, Kolkata and Haldia Ports are situated under the management of Kolkata Port Trust (KoPT). Apart from these two ports, the construction work of Diamond Harbour is considered. At the same time, the construction of Sagar Port, as deep sea port, is being planned.

Kolkata Port, a port as the east gateway to the Indian subcontinent, consists of a number of docks constructed on the river bank 232 km up from the estuary of Rupnarayan River. Since it is a river port, it is difficult to maintain draft depth deep enough to serve as a waterway for large vessels, the current draft depth of the waterway being set at 7m. With the size of vessels becoming larger in recent years, Kolkata Port is no longer able to have vessels carrying mineral ores, fuel tankers, and container vessels, which resulted in the construction of Haldia Port as an outer port. Even so, Kolkata Port still continues to provide feeder services for small and medium-sized container vessels. In particular, cargo exported to Nepal is transported by train from Kolkata Port, while those to Bhutan are transported by truck from the port. Haldia Port is a modern port constructed in 1977, approximately 100 km above the estuary. The average draft depth of waterways is 8.5m, but the port is capable of having vessels of 10.5m-draft, making use of the tidal range. The port mostly deals with crude oil, coal, mineral ores and other bulk cargos, as well as containers, having the complementary relationship with Kolkata Port. The characteristics of Diamond Harbour are something in between those of Kolkata and Haldia Ports, a container port still under construction on the east bank of Hugli River. The average draft depth of waterways is 9m, but the harbor is capable of having container vessels of 10.3m-draft, making use of the tidal range.

The three ports under the management of KoPT shown above are all river ports of Hoogli River, and thus the type of vessels which are able to come into the ports are restricted in accordance with the draft depths of waterways: it is thus impossible for large-scale container vessels which go into major international sea routes to come into these ports. On the other hand, Sagar Port is still under consideration on Sagar Island near the estuary of Hoogli River. The average draft depth of waterways is 10m at present, but can be deepened to and maintained at 12m in the long run. It can thus have large-scale panamax container vessels, taking advantage of the tidal range. If the construction is completed, it is likely to be one of the leading deepwater ports, directly contributing to a sharp increase in demand for container transportation. In the Study, it is necessary to pay attention to long-term harbor construction plans.

## **(2) Major Ports on the Western Corridor**

Where the current handling of containers is concerned, JNP comprises JNP container terminal (JNPT) and NSIC container terminal (NSICT), both of which deal with 56% of all import and export containers in India. However, the share of railway transportation in domestic transportation as a whole is low in general, accounting for a mere 30% or so of the entire container cargos. The remaining 70% or so is transported by truck. This is perhaps because container transportation business is monopolized by a single company, CONCOR, and due to the unit train method adopted for freight train operation. The introduction of the principle of competition to the container freight transportation market, as described above, holds the potential for having a great impact on the share of railway transportation, so that attention should be paid to this when examining demand for transportation.

JNPT and NSICT, main entities to operate the container operation, are in charge of the loading of containers to freight trains, and JNPT in charge of carrying trains to feeder lines, and other operation and management. In the meantime, the Indian Railways is responsible for construction, maintenance, and development of feeder lines to the harbor and port area. The division of roles and cost burden concerning development, management & operation, maintenance and the repair of harbor and railway facilities have a great impact on the efficiency and economic viability of freight transportation. So these should be examined in detail in the Study.

Where the container terminals presently in operation are concerned, the draft depth alongside quay walls at NSICT and JNPT is 13.5m, insufficient to have large-scale container vessels which go into leading international sea routes, so that there is a plan to deepen the draft depth to 15.0m. In the meantime, Gateway Terminals International (GTI) is reportedly constructing a container berth with 15.0m of draft depth, which is expected to be put into operation within 2006. There is another plan to construct a new container terminal in preparation for an increase in container cargos. In conducting the Study, it is necessary to understand the facts about the operation of the existing facilities and long-term plans for the development of facilities and the related management and operation plans, and to reflect the understanding on demand forecasting.

In Gujarat state in the north of Mumbai, Mundra, Kandla and Pipavav ports deal with container cargos, while Navlakhi, Porbander and Sikka ports deal with bulk cargos: cargos shipped from and delivered to these ports are likely to make use of the West Corridor. Hence, it is necessary to examine in detail the state of affairs, expansion and development plans of these ports, and the state of affairs and expansion plans of related railway facilities.

## **4. Issues associated with Locomotive Traction and Container Transportation Methods**

In the preliminary study on this DFC project, a suggestion was raised concerning “double-stack container trains with diesel locomotives” for freight transportation between Mumbai and Delhi. It was in fact a suggestion that, from the viewpoint that the railway systems in the “Golden Quadrilateral” will be integrated in the long run into a electrified system, and therefore, the “single-stack container with electric locomotive” should be examined to the route between Mumbai and Delhi as well as the route between Kolkata and Delhi. While the matters concerning locomotive traction methods (electric or diesel locomotives), the container transportation methods (single-stack or double-stack), and others should be carefully examined in the Study, optimum solutions to these questions cannot be found simply through

combining and comparing various factors as such. Relevant issues to be surveyed are summarized as follows.

#### **4.1 Field Surveys on “Single Track/Double Track Sections” and “Non-Broad Gauge, Sections in Feeder Railways”**

The Indian Railways has the vast network of railway routes and for most of which the broad gauge is applied. However, due to the historical background, single-track sections still exist in the main route, in addition both the meter gauge and narrow gauge routes coexist in feeder routes. Currently, projects are in progress for the conversion to multiple tracks and for the conversion of non-broad gauge networks to broad gauge in the main routes. The cost of these projects should be counted as necessary expenses of the construction of the Eastern and Western Corridors.

#### **4.2 Electrification Rate and Power Conditions of Railways in India**

The electrification rate of the Indian railway networks during the period of 2003-04 was less than 28%. In recent years, projects for electrification have been carried out: about 1,300km railways are converted each year (an annual increase of 2% or so of the electrification rate), but it will take a considerable amount of investment and time to complete the electrification of all the railways in the main route.

The problem lies in the power supply system and the supply-and-demand balance. In India, the public sector has monopolized the electricity power supply for many years; in 1991, reform on the electricity industry was carried out, opening up the market to the private sector. However, the reform did not necessarily produce satisfactory results. As of March, 2003, state-related companies accounted for 59%, the central government-related companies for 30%, and the private sector for 11% of the entire power supply business. The rate of achievements of expansion of power generating facilities has been a mere 50% or so throughout the 8th and 10th Five-Year Plans: the fulfillment rate of power demand has remained at the 80% mark, the supply shortage being somewhat chronic.

The imbalance of power supply and demand is more than a matter of power generating facilities: an extraordinary high proportion, 20 – 45%, of the power supply is lost in the process of transmission, worsening the shortage of power supply in comparison with the transmission loss rate among OECD countries being less than 10%. Prior to the comparative examination of traction methods, such as a comparison between electric and diesel locomotives, it is necessary to conduct surveys on basic matters including the electrification rate, the power conditions, the administration concerning the electricity, possibilities for the Indian Railways to be equipped with private power generators, etc.

#### **4.3 Requirements of Electrification**

There is an opinion that the railways in the Golden Quadrilateral should be developed using the electric power system from the beginning. As stated above, however, in India where the power supply is insufficient, there is likely a high risk in unifying the power sources of all the railways with electricity. This has to be discussed thoroughly in the Study. Although India largely depends on imported oil in its energy supply, coal is available at home. Since the total length of the main railways is fairly extensive, it is realistic and efficient for the country to take advantage of its own resources, to proceed the electrification gradually while saving its foreign currency, and to complete the standardization of the power supply to electricity in the long term. In Japan, the electrification was carried out in a gradual manner: first, the electrification was introduced in urban areas and trunk lines; diesel-powered freight cars no longer used in the urban areas were transferred to local areas, then the electricity was introduced to the local areas step by step.

Incidentally, the Indian side intends to complete the construction of the new lines in five years. Since Japan has an experience of completing the construction of the Tokaido-Shinkansen line of approximately 600km railways in three years, it is presumably possible to construct the new freight railways if various conditions are all satisfied, partly thanks to little need to acquire new lands to construct the new line. Even so, as for the issue of electrification, the F/S will surely conclude that it is not reasonable to electrify the entire line from the beginning if it is true that the power supply is not enough.

#### **4.4 Fleet Composition of Locomotives Owned**

India is well-known for its dependence on railways, and at a fairly high level in terms of the number of train cars possessed and the capability of manufacturing large locomotive and other train cars. As of May, 2005, there are 4,699 diesel locomotives and 2,930 electric locomotives, that is, the ratio of the two types of locomotives is 1:0.6.

These figures include large locomotives for the main line, small and medium-sized locomotives for local lines, advanced locomotives, and old locomotives, so that the figure itself is not necessarily meaningful. It seems thus necessary in carrying out the comparison between electric and diesel locomotives in the Study to bear in mind the effective use of precious resources, while paying attention to the composition of locomotives currently owned.

#### **4.5 Technology to Manufacture Large Scale Locomotives**

Historically, the Indian Railways has produced and supplied locomotives necessary for the operation of its own railway network. It also owns a large factory in Chittranjan which specializes in manufacture of electric locomotives, produces 30 large electric locomotives with the world record of 6,000 horsepower every year. Even so, the demand exceeds the supply at the moment. Diesel locomotives are manufactured in other factories: currently, the largest locomotives are those with 4,000 horsepower, but the manufacture of 5,000-horsepower locomotives is reportedly at the experimental stage. On the other hand, under the management policy placing the emphasis on passenger trains, there are certain restrictions for large locomotives to be used as traction engines for freight trains. For the successful expansion of freight transportation capacity on the Eastern and Western Corridors, the improvement of manufacturing capacity of large engines may be a crucial issue, and should be investigated thoroughly, including fund-raising methods.

#### **4.6 Energy Resources, Energy Efficiency, and Air Pollution**

Endowed energy resources in India, energy efficiency, the cost of environment preservation, etc. will be crucial factors for a comparative analysis of electric and diesel locomotives as traction engines for freight trains. India, while being a leading producer of coal, it is one of the largest oil importers. As a result, in 1998, coal-fired thermal power generation accounted for 73% of all the power generation. Since the competition of acquiring oil resources is severe in the international oil market, it is unlikely for the proportion of coal-fired thermal power generation to fall for the time being. Although the environmental preservation policy for thermal electric power generator of India has not taken enough measures, it also means that advanced technologies in Japan and other developed countries, may be applied beneficially. At the same time, there is still room to improve the situation pertaining to energy efficiency via the replacement of the current power generating facilities with larger ones and the introduction of advanced technologies.

Where diesel locomotives are concerned, they are undeniably inferior to electric ones based on the updated thermal power generating system because the former depend on imported oil fuels, and because of the lower energy efficiency and greater negative impact on air pollution. However, it is also true that diesel engines are proof against the serious situations concerning the electricity supply, and can be used for the transportation of double-stack containers.

With recent growing concern for the environment, it is inevitable to pay attention to CO<sub>2</sub> reduction effect and other environmental issues. The Study team should carry out a survey in full consideration for air pollution, energy resources, and efficiency while paying attention to these issues in the assessment of alternative proposals, and calculate the impact on air pollution and the energy efficiency of railway transportation in comparison to the road transportation, even if the project is not regarded as a Clean Development Mechanism (CDM) project.

#### **4.7 Necessity of Multi-Dimensional Assessment**

In comparing various methods concerning the freight train traction and the container transportation, multi-dimensional assessment must be made from various viewpoints described above.

## 5. Issues in Project Appraisal

### 5.1 Overall Methodology

#### 5.1.1 Benefit Measurement of DFC

Since this is a large-scale infrastructure project, its impact will extend beyond the study corridors and reach the entire country. The types of its impact can be discussed from two different perspectives: namely; short-term and long-term perspectives. The short-term impact will be observed during the construction period, whilst, the long-term impacts (benefit) will be generated during operation of the project (after the construction). —The following sections summarize effect of the project in each term and some useful methods for their measurement. However, it must be noted that the most appropriate measurement method needs to be identified in a practical manner, that is, based on available data in a limited study period.

##### (1) Short-Term Effect (Multiplier Effect) and its Measurement

If the DFC project takes place, there will be an increase in the final demand for component goods to build the DFC, which will lead to an increase in the output of such component goods as producers react to meet the demand. This is the direct economic impact of the project. As the producers increase the outputs to meet the final demand, there will be an increase in demand of their suppliers. This is called indirect impact. As the result of the direct and indirect impacts, the household income will increase through an increase of employment opportunity. A proportion of this increased income will be re-spent on final goods and services. This is called induced effect. Three of these impacts are called multiplier effects.

The short-term effect is measured as a sum of the direct and indirect impact and induced impact during the construction period. As seen in the definition of the short-term effect, this effect will not be observed after completion of the project, that is, where there is no increase in the final demand associated to the project.

This short-term effect can be calculated by using an inverse input-output matrix. The amount after subtraction of land acquisition cost from the DFC project budget will be the value of investment for estimation of the short-term effect. The acquisition of land itself is not regarded as a final demand in this analysis because which will not lead to any associated production.

By specifying how much of this total value of the investment will be assigned to each industrial sector, you can calculate how much production will be made in each industrial sector both directly or indirectly by this investment.

The value obtained by the input-output matrix includes the value of intermediate products (products including raw materials that are intermediately pumped to produce other products). If you need to estimate an increase of net values generated by the project in terms of national income, it is necessary to use value-add-ratios to calculate the amount of added values by industry. A sum of the added values is regarded as an increase of total national income (or gross domestic product).

If you need to estimate the number of employees for each industrial sector, it could be obtained by multiplying the production value of each industry (produced by the inverse I-O matrix) by the employment multiplier of each industry.

In addition to the above analysis as Indian economy as a whole, it is possible to calculate the impact by region, by dividing the effects into regions if the inter-regional input-output matrices are available. The inter-regional input-output matrix is an consolidated matrix of each regional input-output matrix developed through identifying the export and import relationships between the regions. If this inter-regional I-O matrix is available, it is possible to measure the short-term effect (demand creation effect) that appears during this DFC construction period by region, and to quantitatively identify the regions that receive benefit from the project.

If there is no I-O matrix, another way to measure an increase in GDP during construction is to use the investment multiplier (an index for how much national income is generated directly or indirectly by an investment) , which is obtained from the India's macro econometric model (production/income/expense model).

In order to grasp the overall impact of the DFC project on Indian economy, above mentioned measures should be tried.

Incidentally, it is confirmed that input-output matrices exist for the years 1990 and 1999 on a national level, however, any practical inter-regional I-O matrices are not found at present. It is, therefore, recommended to explore inter-regional I-O matrices that can be used for this DFC project during the study period.

## **(2) Expected Long-Term Effects**

### Savings in freight transport

If the new freight train railway is constructed and put into service, some of the transportation companies (or their cargo owners) that depended on the conventional transport measures and routes (road transport by freight trucks, transport on existing railways in containers and other cargoes are expected to use the new railways. The transportation companies would change their conventional methods and switch to the new railways because it offers advantages to them. The advantages are savings in cost and time for transportation. These are the most important elements of the effects of freight train railway development in a long-term perspective.

### Savings in passenger travel

In addition, positive effects will appear in passenger transport as well if freight transport shifts from the existing railways to the new railways. That is, it is expected that the improvement of services and travel speed will lead to reductions in waiting time and travel time for passengers. Though this is not a direct effect, it is an “indirect effect” that is the effect of the freight train railway construction transmitted to the passenger transport market which has a close relationship with freight transport market. This is also an effect that cannot be missed.

### Supplier's surplus

Moreover, if a new corporate organization is established for the DFC, its net profits must be added as a part of economic benefit of the new railway project.

In the case of this DFC project, its financial viability is expected to be positive. Consequently its net income shall be added as a part of the benefits of the project in addition to the savings in the freight transportation and passenger travel. Thus this new railway construction project can be justified in terms of the national economy as long as the total of the current profits and reductions in the cost and time of transport exceeds the new railway construction cost (excluding land acquisition cost).

In the case of a tollway project in Japan, the net profits of the tollway company (= fare income – maintenance and management cost – debt services and redemption cost) is likely to be negative in many cases. However, many tollway projects can be justified in terms of the national economy if the savings in the cost and time of transportation produce a preferable economic internal rate of return (EIRR).

## **(3) Measurement of Long-Term Effect**

### Total Generation and Origin-Destination Matrix

To measure the long-term effect of the new railway construction, it is necessary, in the first place, to obtain an “origin-destination matrix (O-D matrix)” among major cities for each planning year by transported commodity and transport mode including overall transport volume, cost and time.

Regardless of construction of the new freight railways, freight transport volume is bound to increase due to India's economic growth. This increase is to be predicted first. Consequently, two different sets of O-D matrices should be prepared, namely one for “with” DFC case and the other for “without” DFC case by mode. The difference in overall cost for all freight transport, with and without the new railways, represents a benefit from the new railways development.

### Generalized Transport Cost and Modal shift

The following section describes the measurement methods with an example of a container from Mumbai (Origin) to Delhi (Destination), which is an element of the O-D matrix. As it has already been described, the start of the service in the new railways will cause some of the transport volume to shift from the existing railways to the new railways. A volume of shifting goods from the existing rail to the new DFC

line can be calculated by comparing the “generalized cost” (transport fee + value of time) of the two cases (existing and the new DFC). It is needless to say that terminal transport cost and time can be neglected if they don’t change by the development of the new railways.

Similar calculation is possible when freight transport shifts from roads to the new railways. The generalized cost of container transport by road is calculated as a sum of fuel consumption cost, various highway charges, and value of time of goods transportation  $\times$  travel time.

The benefit due to modification in the schedules of existing railways caused by the development new railway development is expected to be as follows:

The number of freight trains will decrease in the existing railways, and thus the number of passenger trains can be increased, leading to reduction in waiting time for passengers. Since the overall schedule is relieved even when the passenger trains are increased, the time required to a destination will be reduced. To calculate these, the first thing necessary is the present “passenger origin-destination among major cities (including all of passenger transport volume, fare and time).” Based on this, the difference in the generalized traveling cost (= waiting time + railway fare + value of time  $\times$  time on train) for passengers with and without the new railways shall be calculated as the benefit (the terminal section shall be neglected). This must be calculated using a new schedule, after the new railways starts its service. Furthermore, reduction in waiting time must be predicted separately based on it.

Similarly in the case of passengers, the transport volume in the future that will increase due to economic growth must be predicted separately to prepare two types of “passenger origin-destination matrix among major cities with and without the new railways.” The difference in generalized travel cost for passengers with and without the new railways should be calculated as a benefit from the new railway development.

## **5.1.2 Coverage of Project Appraisal**

### **(1) Cost Estimate**

It is necessary to include associated facilities of this DFC project such as feeder rail lines and ICD in order to understand true economic performance of the DFC project.

For example, huge amount of additional investments for railway feeder lines, port facilities, etc. are anticipated besides the DFC railways itself in order to improve the level of services of the freight transport as a whole. Though the pre-F/S study by RITES did not take these into consideration due to its limited TOR, this huge amount of investments should not be ignored in the JICA study.

The work volume of the Study Team will be enormous, if the all related facilities as mentioned above are to be evaluated. And, therefore, it is important to work out an analytical concept that the scenario must be set up with good contrivance as to understand freight corridor as between two points of freight transport, since investment should direct itself toward the current bottleneck in transportation.

### **(2) Benefit**

When considering the benefit of the DFC project, first it is necessary to identify the goals of this project and what kind of contributions are expected by the DFC project to achieve the goal.

In general, benefit of transport projects is identified in saving of travel cost and time when they reveal. At the same time it is important to know “who” will be beneficial by the project implementation. For example, the impact to poverty reduction is one of the most important elements to be discussed in this project. In India, majority of beneficiaries of passenger trains may belong to the poverty group. It is therefore necessary to demonstrate how the DFC project will bring benefits to such railway passengers.

In summary, the Study Team needs to properly grasp the increase in both consumer surplus and producer surplus (profit) as benefits. Considering that producer surplus equals net profit, it is necessary to figure out how much profits increased by the development of new railways.

### **(3) Evaluation of Alternatives**

The Scope of Work on the Study states that there are representative four alternatives, including “zero” option, development of new dedicated freight railways, new passenger railway and the improvement of the existing systems. In addition to these alternatives, there are some other points that must be examined,

such as possibility of shortening the block section, options of freight transport systems and method of power supply (electrification and or non-electrification). In some cases, it might be necessary to examine those issues before setting up alternatives.

Furthermore, road transport for fulfilling the forecasted demand may be taken as one of the most essential alternatives. In the case of road transport, relatively large spatial development of the corridors may be expected because of its flexibility in exit and entry points compared to the railway transport (entry and exit points are limited to at stations). Thus, there may be a significant issue in comparative analysis in this part of the Study.

It is necessary to discuss among the related parties so that they have a common recognition of how other non-rail systems but relevant systems such port development, inter-modal facilities, etc. should be treated in this Study. Even for the selection “Without” case, there are a few options as the “Without” case, and various different combinations are possible if modes other than railways are included in other alternative proposals. It is hence important to identify the definition of the DFC project in the initial stage of the Study.

As to the question of whether the freight transport system should be single-stack or double-stack, it will be necessary to consider the issues of transshipment of the cargo at the junction of non-electrified railways and electrified railways and/or change of the train formation if the transport system uses double-stack with diesel locomotives. The Study team needs to make a sufficient examination on what possible outcomes there will be in the short-term and long-term on this point. In addition, it has been said that India has already acquired some patent for double-stack transport of containers. Confirmation of such information is also inevitable in the Study.

In evaluating alternatives, it is important to identify proper evaluation indices that will clarify the features of each alternative as well as to evaluate with and without conditions. It is recommended to establish multiple evaluation criteria including investment costs (construction costs, maintenance and operation costs, cost of facilities other than railways, etc.), effects on the national economy, environmental effects, poverty reduction effects, and among others. In order to demonstrate the impacts on the national economy, it is necessary to evaluate the effects not only on freight transport but also on passenger transport. In the evaluation of a finally selected optimal alternative, the Study team must come up with a strategic approach with a view to facilitating the evaluation of the project from the viewpoints of financial viability, freight service, management method, environmental measures, feasibility and sustainability of socio-economic impacts on the national economy and other important issues.

Since the period of the Study is as short as within 18 months, it is extremely important to proceed with the study while obtaining consensus among the related stakeholders through presenting the menus of possible policies as proposed alternatives and the effects and influences of each policy when it will be applied rather than to proceed only after waiting for final evaluation results to present them simultaneously to the related stakeholders.

## **5.2 Other Technical Notes**

### **5.2.1 Conformity to Safeguard Policy**

In addition, in view of possible participation of international organizations such as JBIC, ADB and WB in the DFC project financing, it is inevitable that the project plan be evaluated in terms of the so-called safeguard issues including environmental and social consideration, organization, institution, and finance.

In fact, some international NGOs tend to demand strict evaluation of large-scale infrastructure projects in terms of environmental preservation and human rights protection (resettlement and concentration of in particular external diseconomy on some residents). Critical review of the recent safeguard policy of the JBIC, ADB and the World Bank as well as the application of JICA’s environmental and social consideration guidelines are strongly recommended with a view to confirming the proposed DFC project will never fail in screening by such safeguard policies.

As part of the safeguard issues, the effects on the poverty group who use passenger trains deserve to sufficient examination. It is recommended to classify the items to be evaluated at the stage of TASK1 of the Study and items to be evaluated at the stage of TASK2 of the Study beforehand and show the evaluation results at appropriate stages.



### **5.2.2 Railways Technology and Sustainability**

Application of new technology to DFC project needs to be done in realistic and pragmatic manners in full consideration of local conditions and mere imposition of either Japanese or other foreign technologies should be avoided. In overall project evaluation, the sustainability of the project must also be considered, and Japanese technologies do not have to be introduced unless they can be applied in a sustainable manner.

The Indian Railways possesses its own systems and technologies, developed over the long years history and therefore possible application of Japanese technology need to be critically examined with due attention to the current situation of Indian Railways. It is important for assess not only the current facilities and their performance but also India's own capability to construct, produce, maintain and operate, and develop new technologies in the future by itself. It is necessary that each of railway facilities, including civil structures, railroads, locomotives, coaches, wagons, signals, telecommunication systems, power supply, and others be reviewed and comprehensively studied in view of internationally advanced level of railway technology.

### **5.2.3 Special Purpose Vehicle (SPV)**

In connection with the structural reform of the railway sector, proposed introduction of a view to SPV and others, it maybe appropriate to examine the possible introduction of two-tiered system and principle of competition. Regarding the introduction of SPV, it is also necessary to assess its impacts on the structural reform of the Indian Railways and over all railways sector.

While the two-tiered system is expected to be introduced in the DFC project, the Study team needs to examine how attractive it may be in inducing investment from private sector. In this connection, the current trends should be noted, such as deregulation on container businesses and opening up of railway market to private companies.

### **5.2.4 Technology Transfer**

It is recommended that the Study Team and the Indian side should establish a close relationship during the study period. Interactive (or two-way) technical transfer is expected between the two sides towards development of better products of the study especially in the field of introduction of new technologies, organizational reform, railway business and administration development. In particular, a training program regarding Japan's new / advanced rail technologies should be carefully prepared by considering the local context of Indian Railway.

### **5.2.5 Financing Options**

Relating to the possibility of financing the associated project such as expansion of cargo handling capacity at ports, etc. other than the railways project, it basically depends on the policy of the Indian Government and the Japanese Government. Though it is unclear how much Japan can be involved eventually, the Study team needs to find common ground by listening to the opinions of both India and Japan.

At the end of this preparatory study report, it should be noted again that the viewpoints of "how the regional/corridors development effect is examined" and "how much investment can be attracted on their development" had rarely been presented in transportation projects under Japanese ODA. This DFC Study is expected to be a pioneer project for JICA in that it considers these points and co-financing with international agencies from the beginning.

---

Reference:

KUNIHISA Soutaro, KAIYAMA Michihiro, SUGITA Hiroshi: An analysis on cost burden of high-standard road development in the local region from a national economy standpoint. (written in Japanese), submission paper for "Kousoku-douro to jidousya", Express Highway Research Foundation of Japan, as of March 2006

KAIYAMA Michihiro: Theory of Evaluation of Social-capital development (written in Japanese), April 1993, Syakai-Hyoronsya

MORISUGI Hisayoshi: Benefit Evaluation of Social Capital Development, The Japan Research Center for Transport Policy, April 1993, Keiso-syobou

KAIYAMA Michihiro, KUNIHISA Soutaro: The Economic Effect of Highway Construction: A comparative Analysis for the U.K., German and Japan, Review of Urban & Regional Development Studies, Vol. 10 No.1 p.28-41, April 1998

KAIYAMA Michihiro, SASAKI Komei: The Effect of Urban Transportation Cost on Urban Spatial Structure With Endogenous Wage Income, Regional Science and Urban Economics, Vol.20, No.2 p.223-24, September 1990

KAIYAMA Michihiro, SASAKI Komei: The Study on Socio-Economic effects and roles of Logistics (written in Japanese), The Japan Research Center for Transport Policy, September 2000

OMATA Nana: The Study on Mongolian Economic Development Strategy and Transport Infrastructure Development (written in Japanese), Master's thesis, Toyo University, January 2004

Japan International Cooperation Agency (JICA): Methodology for Indicator of JICA's Technical Cooperation Project's Outcome (Written in Japanese), January 2004

Japan International Cooperation Agency (JICA): The Study on Economic Evaluation Methodology for JICA Development Study (Written in Japanese), March 2002

## **Appendix 2**

## Appendix 2 Traffic Count and OD Interview Survey

### 1.1 General

No.	Check Post	Location	16/24 hours	Survey Date
1	Saiyan Border	MP -RJ	16	27-07-06
2	Shahjhanpur Border	HR-RJ	16	27-08-06
3	Naubatput Border	UP-BIHAR	24	10,11-08-06
4	Koshi Border	HR-UP	16	26-07-06
5	Achhar/Bhillar Border	GJ-MH	24	07,08-08-06
6	Singhu Border	DL-HR	24	25,26-07-06

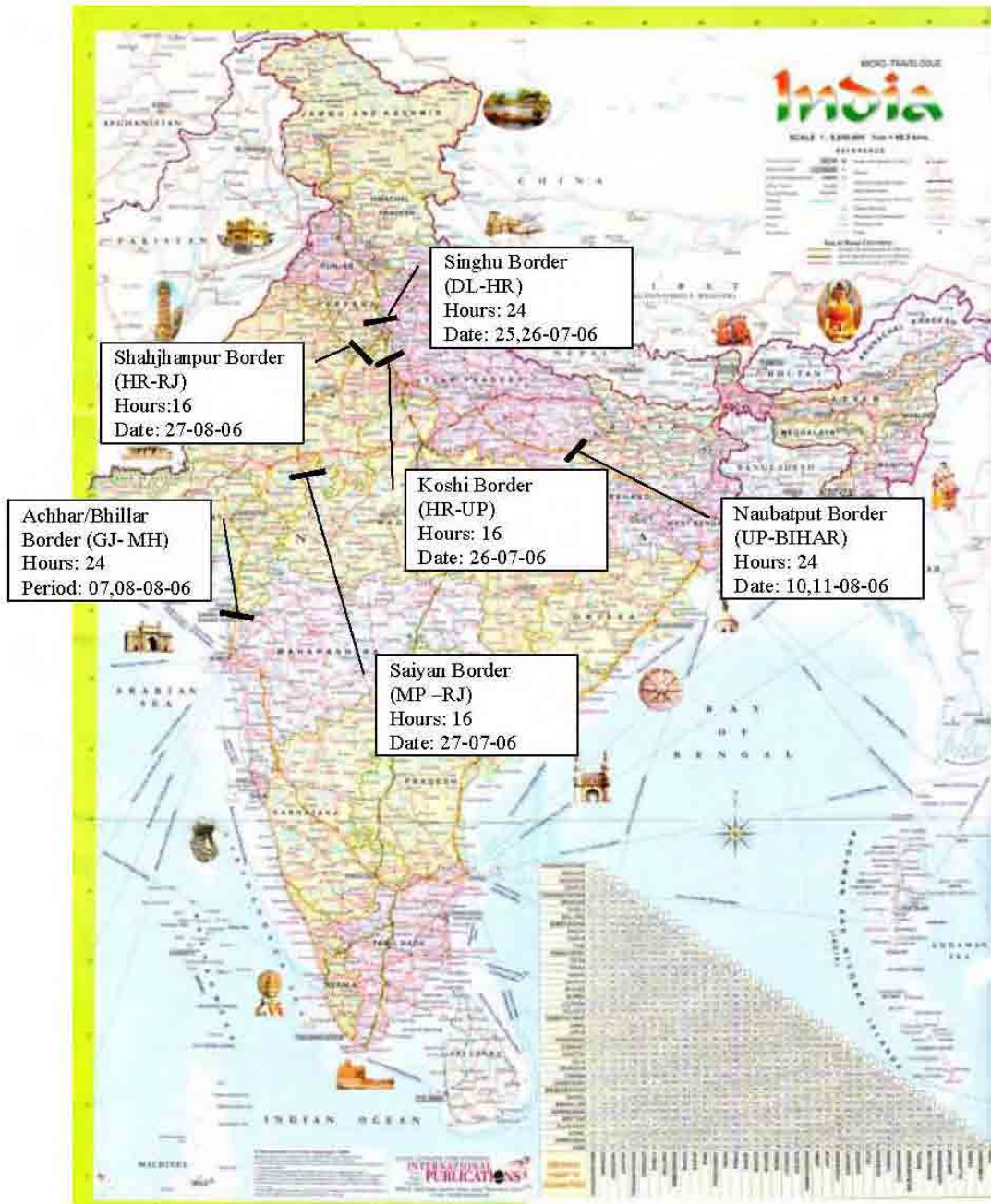


Figure Survey Location

## 1.2 Traffic Count Survey

### 1) Saiyan Border

Direction: 1 (To Delhi)	2 Axle Single Unit	3 Axle Single Unit	4 or more Axle Single Unit	3 or more Axle Single Trailer	Multi-Trailer	2 or 3 Axle Trailer (no cargo)
6:00-6:30						
6:30-7:00	39	--	--	1	--	--
7:00-7:30	27	5	--	--	--	--
7:30-8:00	26	7	--	--	--	--
8:00-8:30	14	2	--	2	--	--
8:30-9:00	19	2	--	--	--	--
9:00-9:30	10	3	--	1	--	--
9:30-10:00	18	8	--	--	--	--
10:00-10:30	20	4	--	1	--	--
10:30-11:00	20	2	--	--	--	--
11:00-11:30	11	--	--	--	--	--
11:30-12:00	16	2	--	--	--	--
12:00-12:30	12	2	--	--	--	--
12:30-13:00	22	--	--	--	--	--
13:00-13:30	21	3	--	--	--	3
13:30-14:00	16	3	--	--	--	--
14:00-14:30	29	2	--	--	--	--
14:30-15:00	29	3	--	--	--	--
15:00-15:30	44	8	--	1	--	--
15:30-16:00	35	3	--	--	--	--
16:00-16:30	18	6	--	--	--	--
16:30-17:00	41	4	--	--	--	--
17:00-17:30	33	7	--	2	--	--
17:30-18:00	7	1	--	--	--	--
18:00-18:30	27	3	--	--	--	1
18:30-19:00	18	2	--	--	--	--
19:00-19:30	17	4	--	--	--	--
19:30-20:00	18	5	--	--	--	2
20:00-20:30	18	--	--	--	--	--
20:30-21:00	7	4	--	--	--	--
21:00-21:30	6	1	--	--	--	--
21:30-22:00	17	1	--	--	--	--
22:00-22:30	14	3	--	1	--	1
16 Hour Traffic	669	100	0	9	0	7
24 Hour Traffic	915	161	0	10	0	9

Direction: 2 (From Delhi)	2 Axle Single Unit	3 Axle Single Unit	4 or more Axle Single Unit	3 or more Axle Single Trailer	Multi-Trailer	2 or 3 Axle Trailer (no cargo)
6:00-6:30						
6:30-7:00	13	6	--	--	--	--
7:00-7:30	11	--	--	--	--	--
7:30-8:00	5	1	--	--	--	--
8:00-8:30	10	1	--	--	--	--
8:30-9:00	13	--	--	--	--	--
9:00-9:30	15	--	--	--	--	--
9:30-10:00	18	--	--	--	--	2
10:00-10:30	13	1	--	--	--	--
10:30-11:00	20	3	--	--	--	--
11:00-11:30	9	2	--	--	--	--
11:30-12:00	16	2	--	--	--	--
12:00-12:30	8	4	--	--	--	--
12:30-13:00	19	2	--	--	--	--
13:00-13:30	15	2	--	--	--	--
13:30-14:00	12	5	--	--	--	1
14:00-14:30	15	1	--	--	--	--
14:30-15:00	31	5	--	--	--	1
15:00-15:30	16	2	--	--	--	--
15:30-16:00	12	5	--	--	--	--
16:00-16:30	14	1	--	--	--	--
16:30-17:00	20	4	--	--	--	--
17:00-17:30	11	1	--	--	--	--
17:30-18:00	15	9	--	--	--	--
18:00-18:30	9	1	--	--	--	--
18:30-19:00	20	4	--	--	--	--
19:00-19:30	9	3	--	--	--	2
19:30-20:00	25	3	--	--	--	--
20:00-20:30	17	5	--	--	--	2
20:30-21:00	43	9	--	1	--	2
21:00-21:30	40	10	--	1	--	--
21:30-22:00	68	4	--	--	--	--
22:00-22:30	27	1	--	--	--	--
16 Hour Traffic	589	97	0	2	0	10
24 Hour Traffic	731	127	0	2	0	12

## 2) Shahjhanpur Border

Direction: 1 (To Delhi)	2 Axle Single Unit	3 Axle Single Unit	4 or more Axle Single Unit	3 or more Axle Single Trailer	Multi-Trailer	2 or 3 Axle Trailer (no cargo)
6:00-6:30	27	27	7	3	--	--
6:30-7:00	45	38	10	6	--	4
7:00-7:30	62	54	28	8	--	--
7:30-8:00	53	47	18	9	--	3
8:00-8:30	48	40	9	--	--	--
8:30-9:00	46	30	10	9	--	5
9:00-9:30	43	37	17	5	--	--
9:30-10:00	22	21	7	--	--	--
10:00-10:30	20	20	15	3	--	--
10:30-11:00	43	39	19	11	--	--
11:00-11:30	45	37	12	7	--	3
11:30-12:00	23	34	13	--	--	--
12:00-12:30	28	28	8	3	--	--
12:30-13:00	38	37	20	1	--	--
13:00-13:30	42	42	9	3	--	6
13:30-14:00	38	37	7	2	--	--
14:00-14:30	42	28	13	5	--	--
14:30-15:00	30	37	7	3	--	--
15:00-15:30	43	42	19	6	--	8
15:30-16:00	41	37	9	5	--	3
16:00-16:30	38	36	13	7	--	6
16:30-17:00	41	43	11	3	--	5
17:00-17:30	43	45	13	6	--	9
17:30-18:00	56	58	11	9	--	3
18:00-18:30	49	45	9	5	--	--
18:30-19:00	39	39	10	7	--	3
19:00-19:30	30	33	7	9	--	3
19:30-20:00	67	48	26	12	--	--
20:00-20:30	68	67	30	18	--	--
20:30-21:00	78	75	22	15	--	8
21:00-21:30	50	45	17	12	--	5
21:30-22:00	86	48	28	14	--	8
16 Hour Traffic	1424	1294	454	206	0	82
24 Hour Traffic	1948	2077	953	226	0	101

Direction: 2 (From Delhi)	2 Axle Single Unit	3 Axle Single Unit	4 or more Axle Single Unit	3 or more Axle Single Trailer	Multi-Trailer	2 or 3 Axle Trailer (no cargo)
6:00-6:30	47	45	13	3	1	--
6:30-7:00	60	55	10	2	--	1
7:00-7:30	56	39	13	1	--	--
7:30-8:00	70	45	15	--	--	--
8:00-8:30	45	35	2	1	--	--
8:30-9:00	50	40	1	--	--	--
9:00-9:30	27	46	9	5	--	--
9:30-10:00	32	10	6	2	--	--
10:00-10:30	31	39	3	2	--	--
10:30-11:00	33	36	3	--	--	--
11:00-11:30	34	32	6	--	--	--
11:30-12:00	29	30	5	2	--	--
12:00-12:30	18	20	3	2	1	--
12:30-13:00	29	16	4	2	--	---
13:00-13:30	19	25	--	6	--	--
13:30-14:00	18	20	9	2	--	2
14:00-14:30	25	37	2	1	--	--
14:30-15:00	28	27	5	--	--	--
15:00-15:30	23	13	11	--	--	--
15:30-16:00	16	31	7	7	1	--
16:00-16:30	16	26	5	3	--	2
16:30-17:00	29	40	3	2	--	--
17:00-17:30	15	35	8	1	--	--
17:30-18:00	40	30	15	5	--	--
18:00-18:30	50	40	19	1	--	3
18:30-19:00	43	37	11	5	--	--
19:00-19:30	25	36	12	8	--	--
19:30-20:00	53	34	12	4	2	--
20:00-20:30	28	34	15	1	--	--
20:30-21:00	31	31	12	4	--	--
21:00-21:30	34	20	15	4	--	--
21:30-22:00	55	50	15	5	2	--
16 Hour Traffic	1109	1054	269	81	7	8
24 Hour Traffic	1377	1375	283	97	7	9



3) Naubatput Border

Direction: 1 (To Delhi)	2 Axle Single Unit	3 Axle Single Unit	4 or more Axle Single Unit	3 or more Axle Single Trailer	Multi-Trailer	2 or 3 Axle Trailer (no cargo)
6:00-6:30	--	--	--	--	--	--
6:30-7:00	12	51	11	3	---	--
7:00-7:30	22	48	8	1	--	--
7:30-8:00	18	38	12	2	--	--
8:00-8:30	27	20	--	--	--	2
8:30-9:00	31	42	--	3	--	5
9:00-9:30	18	29	1	11	--	--
9:30-10:00	17	22	--	5	2	--
10:00-10:30	5	9	1	1	--	--
10:30-11:00	17	16	1	4	--	--
11:00-11:30	15	27	--	7	1	--
11:30-12:00	13	13	2	4	--	3
12:00-12:30	5	12	2	4	--	1
12:30-13:00	8	20	2	1	1	3
13:00-13:30	12	11	3	2	--	2
13:30-14:00	10	14	4	3	--	--
14:00-14:30	9	13	--	5	--	2
14:30-15:00	14	16	2	4	1	2
15:00-15:30	20	15	1	6	--	7
15:30-16:00	17	18	3	7	1	6
16:00-16:30	19	23	3	8	--	4
16:30-17:00	14	18	--	5	2	4
17:00-17:30	13	19	4	3	--	2
17:30-18:00	11	17	1	3	---	6
18:00-18:30	16	19	--	5	--	2
18:30-19:00	17	18	2	4	--	3
19:00-19:30	8	31	1	3	--	13
19:30-20:00	31	43	--	8	--	7
20:00-20:30	11	25	3	1	--	3
20:30-21:00	12	30	--	6	--	3
21:00-21:30	19	28	1	3	--	6
21:30-22:00	8	30	--	1	1	1
22:00-22:30	37	40	2	6	--	2
22:30-23:00	16	31	--	--	--	4
23:00-23:30	14	33	--	2	--	--
23:30-00:00	17	30	--	4	--	3
00:00-00:30	11	15	--	--	--	--
00:30-1:00	8	6	--	1	--	--
01:00-1:30	8	14	---	--	--	--
01:30-2:00	9	11	--	--	--	--
02:00-2:30	6	19	--	--	--	---
02:30-3:00	4	10	1	--	--	--
03:00-3:30	7	20	1	1	--	--

03:30-4:00	23	49	1	4	--	1
04:00-4:30	23	32	--	1	--	--
04:30-5:00	9	18	--	4	--	--
05:00-5:30	11	12	3	1	--	--
05:30-6:00	15	19	--	4	--	--
06:00-6:30	6	18	2	3	--	--
16 Hour Traffic	506	775	70	129	9	89
24 Hour Traffic	693	1112	78	154	9	97

Direction: 2 (From Delhi)	2 Axle Single Unit	3 Axle Single Unit	4 or more Axle Single Unit	3 or more Axle Single Trailer	Multi-Trailer	2 or 3 Axle Trailer (no cargo)
6:00-6:30	--	--	--	--	---	--
6:30-7:00	19	34	2	3	--	2
7:00-7:30	31	57	19	3	--	1
7:30-8:00	28	32	13	2	--	1
8:00-8:30	8	12	--	--	--	1
8:30-9:00	10	22	3	--	--	--
9:00-9:30	18	29	2	3	--	--
9:30-10:00	13	25	--	2	--	1
10:00-10:30	16	16	1	4	--	--
10:30-11:00	16	16	1	5	--	--
11:00-11:30	16	25	2	4	--	--
11:30-12:00	10	22	2	6	--	--
12:00-12:30	13	12	3	4	1	1
12:30-13:00	6	14	--	3	--	--
13:00-13:30	7	14	--	2	--	--
13:30-14:00	10	10	3	3	--	--
14:00-14:30	9	14	--	1	--	2
14:30-15:00	9	13	1	3	--	2
15:00-15:30	7	13	2	4	--	2
15:30-16:00	9	14	3	5	--	1
16:00-16:30	16	17	5	7	1	3
16:30-17:00	14	16	2	6	--	1
17:00-17:30	19	16	2	9	1	3
17:30-18:00	5	21	2	8	--	4
18:00-18:30	7	17	--	4	--	--
18:30-19:00	7	20	1	3	--	--
19:00-19:30	20	33	--	2	--	--
19:30-20:00	23	63	1	2	--	--
20:00-20:30	15	37	3	2	--	--
20:30-21:00	13	31	1	--	--	--
21:00-21:30	12	27	1	1	--	--
21:30-22:00	17	34	--	--	--	1
22:00-22:30	22	31	3	2	--	1
22:30-23:00	21	33	--	2	--	1
23:00-23:30	16	35	--	--	--	--
23:30-00:00	32	53	--	2	--	6

00:00-00:30	19	11	--	--	--	--
00:30-1:00	13	16	--	1	--	--
01:00-1:30	8	11	--	--	--	--
01:30-2:00	19	21	1	6	--	--
02:00-2:30	10	17	--	1	--	--
02:30-3:00	16	16	--	--	--	--
03:00-3:30	16	18	1	1	--	--
03:30-4:00	17	28	2	1	--	--
04:00-4:30	32	35	1	2	--	--
04:30-5:00	10	20	--	1	--	--
05:00-5:30	19	8	3	2	--	--
05:30-6:00	13	20	--	5	--	--
06:00-6:30	17	25	--	3	--	--
16 Hour Traffic	445	757	78	103	3	27
24 Hour Traffic	723	1124	86	130	3	34

4) Koshi Border

Direction: 1 (To Delhi)	2 Axle Single Unit	3 Axle Single Unit	4 or more Axle Single Unit	3 or more Axle Single Trailer	Multi-Trailer	2 or 3 Axle Trailer (no cargo)
6:00-6:30	17	6	--	--	--	--
6:30-7:00	15	8	--	5	--	--
7:00-7:30	20	15	--	--	--	1
7:30-8:00	13	4	--	3	--	2
8:00-8:30	13	2	--	2	--	3
8:30-9:00	10	4	--	--	--	--
9:00-9:30	13	6	--	--	--	2
9:30-10:00	9	13	--	2	1	1
10:00-10:30	10	3	--	2	--	--
10:30-11:00	20	4	--	2	--	--
11:00-11:30	16	5	--	--	--	2
11:30-12:00	16	8	--	--	--	2
12:00-12:30	20	7	--	--	--	2
12:30-13:00	16	1	--	--	--	1
13:00-13:30	15	6	--	--	--	2
13:30-14:00	24	9	--	1	--	5
14:00-14:30	10	12	--	--	--	4
14:30-15:00	13	7	--	--	--	5
15:00-15:30	18	5	--	5	--	2
15:30-16:00	19	4	--	--	--	--
16:00-16:30	16	8	--	3	--	1
16:30-17:00	28	10	--	--	--	2
17:00-17:30	24	3	--	5	--	1
17:30-18:00	27	11	--	--	--	2
18:00-18:30	33	17	--	--	--	3
18:30-19:00	9	5	--	--	--	--
19:00-19:30	52	12	--	2	--	--
19:30-20:00	32	16	--	--	--	--
20:00-20:30	33	16	--	--	--	1
20:30-21:00	23	16	--	2	--	2
21:00-21:30	33	15	--	1	--	--
21:30-22:00	20	16	--	2	--	1
16 Hour Traffic	637	274	0	37	1	47
24 Hour Traffic	872	393	0	44	1	51

Direction: 2 (From Delhi)	2 Axle Single Unit	3 Axle Single Unit	4 or more Axle Single Unit	3 or more Axle Single Trailer	Multi-Trailer	2 or 3 Axle Trailer (no cargo)
6:00-6:30	18	18	--	1	--	--
6:30-7:00	16	22	--	1	--	--
7:00-7:30	21	21	--	--	--	3
7:30-8:00	20	15	--	--	--	--
8:00-8:30	58	24	--	2	--	2
8:30-9:00	44	19	--	--	--	--
9:00-9:30	36	8	--	--	4	--
9:30-10:00	18	12	--	--	--	2
10:00-10:30	37	16	--	--	--	3
10:30-11:00	32	17	--	5	--	2
11:00-11:30	35	8	--	--	--	--
11:30-12:00	21	2	--	--	--	1
12:00-12:30	20	4	--	2	--	2
12:30-13:00	15	3	--	--	--	1
13:00-13:30	10	7	--	--	--	--
13:30-14:00	16	13	--	--	--	2
14:00-14:30	14	10	--	--	--	--
14:30-15:00	18	3	--	--	--	3
15:00-15:30	19	7	--	--	--	--
15:30-16:00	29	10	--	2	--	--
16:00-16:30	22	8	--	3	1	--
16:30-17:00	34	7	--	1	--	4
17:00-17:30	17	3	--	--	--	--
17:30-18:00	20	9	--	2	--	--
18:00-18:30	24	15	--	--	--	--
18:30-19:00	29	6	--	--	--	--
19:00-19:30	19	16	--	1	--	--
19:30-20:00	19	16	--	--	--	--
20:00-20:30	19	7	--	4	--	1
20:30-21:00	28	12	--	7	--	--
21:00-21:30	13	6	--	1	--	--
21:30-22:00	13	6	--	1	--	1
16 Hour Traffic	754	350	0	33	5	27
24 Hour Traffic	1225	520	0	42	5	34

5) Achhar/Bhillar Border

Direction: 1 (To Delhi)	2 Axle Single Unit	3 Axle Single Unit	4 or more Axle Single Unit	3 or more Axle Single Trailer	Multi-Trailer	2 or 3 Axle Trailer (no cargo)
6:00-6:30	23	12	--	15	2	1
6:30-7:00	38	17	2	2	1	2
7:00-7:30	40	24	1	10	1	--
7:30-8:00	40	24	3	16	3	--
8:00-8:30	62	21	3	15	--	--
8:30-9:00	55	3	15	5	--	--
9:00-9:30	95	32	6	13	2	1
9:30-10:00	68	28	--	7	1	--
10:00-10:30	60	30	3	23	1	6
10:30-11:00	60	20	5	15	1	1
11:00-11:30	52	29	6	16	--	10
11:30-12:00	66	23	1	20	--	26
12:00-12:30	67	26	3	15	2	5
12:30-13:00	78	20	5	15	1	2
13:00-13:30	71	15	5	13	--	--
13:30-14:00	57	15	5	8	--	3
14:00-14:30	56	11	--	7	--	--
14:30-15:00	61	25	5	11	--	--
15:00-15:30	70	17	7	10	--	16
15:30-16:00	67	17	1	7	--	7
16:00-16:30	62	16	5	16	--	1
16:30-17:00	75	20	1	6	1	1
17:00-17:30	45	14	6	9	--	2
17:30-18:00	68	19	5	--	--	--
18:00-18:30	78	12	2	20	1	3
18:30-19:00	87	16	1	9	--	2
19:00-19:30	90	17	2	--	--	--
19:30-20:00	73	32	1	6	--	--
20:00-20:30	29	12	2	3	--	2
20:30-21:00	50	23	2	5	2	1
21:00-21:30	50	21	6	10	--	2
21:30-22:00	38	25	1	8	--	--
22:00-22:30	41	25	3	5	--	2
22:30-23:00	63	12	5	4	--	--
23:00-23:30	44	19	1	3	--	--
23:30-00:00	45	25	3	--	--	3
00:00-00:30	25	29	13	1	2	2
00:30-1:00	44	18	11	--	--	2
01:00-1:30	43	25	12	3	--	3
01:30-2:00	28	17	10	--	--	1
02:00-2:30	65	19	9	5	--	--
02:30-3:00	45	29	4	2	--	1
03:00-3:30	40	25	4	1	--	3

03:30-4:00	32	18	8	--	--	--
04:00-4:30	64	30	1	3	--	--
04:30-5:00	40	35	10	--	--	--
05:00-5:30	43	27	9	2	--	3
05:30-6:00	48	32	18	4	--	2
16 Hour Traffic	1931	636	110	335	19	94
24 Hour Traffic	2641	1021	231	368	21	116

Direction: 2 (From Delhi)	2 Axle Single Unit	3 Axle Single Unit	4 or more Axle Single Unit	3 or more Axle Single Trailer	Multi-Trailer	2 or 3 Axle Trailer (no cargo)
6:00-6:30	55	24	5	4	2	2
6:30-7:00	65	26	2	1	--	--
7:00-7:30	69	21	7	5	--	3
7:30-8:00	61	26	3	9	1	--
8:00-8:30	60	23	3	12	--	1
8:30-9:00	55	25	13	5	1	6
9:00-9:30	76	35	3	5	4	3
9:30-10:00	65	30	12	13	3	5
10:00-10:30	90	47	7	6	1	1
10:30-11:00	102	34	8	12	1	7
11:00-11:30	82	35	1	13	1	5
11:30-12:00	75	37	12	17	--	3
12:00-12:30	76	36	3	17	1	8
12:30-13:00	69	32	5	13	1	1
13:00-13:30	88	24	7	9	--	1
13:30-14:00	62	35	1	14	--	4
14:00-14:30	59	40	4	8	--	2
14:30-15:00	82	37	1	17	--	3
15:00-15:30	83	40	2	10	1	1
15:30-16:00	77	36	--	12	--	7
16:00-16:30	105	30	2	9	--	3
16:30-17:00	90	35	1	13	1	2
17:00-17:30	80	36	1	5	1	5
17:30-18:00	69	36	3	10	4	5
18:00-18:30	75	42	5	17	2	5
18:30-19:00	72	43	3	21	--	1
19:00-19:30	67	31	9	16	--	2
19:30-20:00	62	36	4	13	1	1
20:00-20:30	63	34	6	4	--	2
20:30-21:00	67	38	8	10	--	1
21:00-21:30	69	31	5	30	--	1
21:30-22:00	62	35	9	35	--	3
22:00-22:30	47	25	--	11	--	--
22:30-23:00	44	18	--	6	--	--
23:00-23:30	28	27	--	2	--	--
23:30-00:00	32	19	--	--	--	1
00:00-00:30	29	23	--	3	--	--

00:30-1:00	32	13	--	7	--	--
01:00-1:30	37	16	--	3	--	1
01:30-2:00	31	18	--	3	--	2
02:00-2:30	27	15	--	1	--	1
02:30-3:00	29	18	--	5	--	1
03:00-3:30	34	17	--	6	--	2
03:30-4:00	38	22	--	2	--	--
04:00-4:30	35	19	--	8	--	2
04:30-5:00	35	19	1	7	--	1
05:00-5:30	34	24	4	4	--	3
05:30-6:00	51	33	3	8	--	2
16 Hour Traffic	2332	1070	155	385	26	94
24 Hour Traffic	2895	1396	163	461	26	110



6) Singhu Border

Direction: 1 (To Delhi)	2 Axle Single Unit	3 Axle Single Unit	4 or more Axle Single Unit	3 or more Axle Single Trailer	Multi-Trailer	2 or 3 Axle Trailer (no cargo)
6:00-6:30	48	15	--	--	--	--
6:30-7:00	35	17	--	--	--	--
7:00-7:30	25	15	--	1	--	--
7:30-8:00	18	28	--	--	--	--
8:00-8:30	20	35	--	--	--	--
8:30-9:00	23	25	--	1	--	--
9:00-9:30	18	6	--	--	--	--
9:30-10:00	23	13	--	--	--	1
10:00-10:30	32	22	--	--	--	--
10:30-11:00	13	8	--	--	--	--
11:00-11:30	16	12	--	--	--	--
11:30-12:00	15	15	--	--	--	--
12:00-12:30	13	7	--	--	--	--
12:30-13:00	30	8	--	--	--	--
13:00-13:30	17	8	--	--	--	1
13:30-14:00	30	11	--	1	--	1
14:00-14:30	59	11	--	--	--	--
14:30-15:00	19	11	--	--	--	--
15:00-15:30	13	14	--	--	--	--
15:30-16:00	14	9	--	--	--	--
16:00-16:30	17	6	--	--	--	--
16:30-17:00	15	6	--	--	--	--
17:00-17:30	14	5	--	--	--	--
17:30-18:00	14	3	--	--	--	--
18:00-18:30	15	7	--	--	--	--
18:30-19:00	9	5	--	--	--	--
19:00-19:30	16	7	1	--	--	--
19:30-20:00	21	20	--	--	--	--
20:00-20:30	28	8	--	--	--	--
20:30-21:00	40	25	--	--	--	--
21:00-21:30	51	37	--	--	--	3
21:30-22:00	42	30	--	--	--	1
22:00-22:30	65	30	--	--	--	2
22:30-23:00	62	49	8	3	--	4
23:00-23:30	45	24	2	1	--	--
23:30-00:00	63	38	--	2	--	2
00:00-00:30	58	37	6	----	--	--
00:30-1:00	110	44	2	2	--	6
01:00-1:30	97	46	4	5	--	4
01:30-2:00	142	72	2	--	--	3
02:00-2:30	104	61	--	2	--	--
02:30-3:00	122	62	5	--	--	7
03:00-3:30	100	53	2	--	--	2
03:30-4:00	83	16	--	2	--	--

04:00-4:30	60	35	4	2	--	5
04:30-5:00	60	35	6	3	--	--
05:00-5:30	60	37	7	4	--	3
05:30-6:00	16	5	1	--	--	1
16 Hour Traffic	763	449	1	3	0	7
24 Hour Traffic	2010	1093	50	29	0	46

Direction: 2 (From Delhi)	2 Axle Single Unit	3 Axle Single Unit	4 or more Axle Single Unit	3 or more Axle Single Trailer	Multi-Trailer	2 or 3 Axle Trailer (no cargo)
6:00-6:30	12	22	--	--	--	4
6:30-7:00	31	11	2	1	--	3
7:00-7:30	25	13	2	2	--	--
7:30-8:00	11	21	1	--	--	--
8:00-8:30	25	22	--	--	--	--
8:30-9:00	24	10	--	1	--	--
9:00-9:30	22	16	3	--	--	--
9:30-10:00	20	24	2	--	--	--
10:00-10:30	25	16	8	2	3	7
10:30-11:00	20	25	1	6	--	6
11:00-11:30	18	22	5	5	1	3
11:30-12:00	31	20	1	--	--	--
12:00-12:30	26	24	--	--	--	--
12:30-13:00	30	37	--	--	--	--
13:00-13:30	26	27	--	--	--	--
13:30-14:00	32	24	4	4	--	--
14:00-14:30	33	16	--	1	--	--
14:30-15:00	25	20	--	--	--	--
15:00-15:30	32	16	--	--	--	--
15:30-16:00	108	37	--	1	--	--
16:00-16:30	37	16	--	--	--	--
16:30-17:00	34	10	--	--	--	--
17:00-17:30	28	15	--	--	--	--
17:30-18:00	34	13	--	--	--	--
18:00-18:30	23	12	--	--	--	--
18:30-19:00	10	5	--	--	--	--
19:00-19:30	13	8	--	--	--	--
19:30-20:00	65	32	--	--	--	--
20:00-20:30	56	22	--	--	--	--
20:30-21:00	10	6	--	--	--	--
21:00-21:30	20	18	--	3	--	--
21:30-22:00	65	20	--	1	1	--
22:00-22:30	102	42	3	1	--	--
22:30-23:00	67	25	1	1	--	3
23:00-23:30	62	37	2	5	--	1
23:30-00:00	97	28	3	3	--	--
00:00-00:30	65	32	5	8	--	5
00:30-1:00	62	30	5	11	--	3
01:00-1:30	40	37	8	8	--	7

01:30-2:00	78	32	--	2	--	2
02:00-2:30	34	22	--	6	--	3
02:30-3:00	73	17	2	8	--	4
03:00-3:30	61	15	1	12	-	7
03:30-4:00	40	25	3	5	--	11
04:00-4:30	60	30	8	2	3	7
04:30-5:00	60	18	1	6	--	6
05:00-5:30	36	10	5	5	1	3
05:30-6:00	35	22	1	--	--	--
16 Hour Traffic	971	600	29	27	5	23
24 Hour Traffic	1943	1022	77	110	9	85

### 1.3 OD Interview Survey

#### 1) Saiyan Border

TYPE OF TRUCK	Samples
1	111
2	170
3	73
4	22
Total	376

COMMODITIES CARRIED	Samples
1	12
2	7
4	6
5	7
6	44
8	45
9	140
10	15
11	4
12	4
13	11
14	8
15	8
16	16
17	1
18	13
19	17
22	18
Total	376

FACILITIES OF ORIGIN	Samples
1	176
2	25
3	1
4	1
5	9
6	29
7	100
8	2
9	38
Total	381

Tonnege Carried (Ton)	Samples
0	8
5	19
10	38
15	96
20	135

	25	40
	30	36
	40	1
Unknown		10
Total		383

Travel Time (Hours)	Samples
10	4
20	14
30	8
40	13
50	4
60	13
70	8
80	15
90	8
100	6
110	10
120	5
130	7
140	15
150	19
160	14
170	9
180	12
190	20
200	8
210	13
220	7
230	4
240	4
250	3
260	7
270	4
280	7
290	1
300	4
320	2
330	4
Unknown	102
Total	374

2) Shahjhanpur Border

TYPE OF TRUCK	Samples
1	211
2	367
3	66
4	4
Total	648

COMMODITIES CARRIED	Samples
1	19
2	11
3	7
4	9
5	15
6	59
7	15
8	207
9	113
10	26
12	7
13	26
14	3
15	4
16	63
17	3
18	7
19	16
20	7
21	1
22	72
23	1
Total	691

FACILITIES OF ORIGIN	Samples
1	298
2	50
3	2
4	21
5	158
6	119
7	7
8	4
9	38
Total	697

FACILITIES OF DESTINATION	Samples
1	187
2	41
3	1
4	10
5	138
6	203
7	5
8	13
9	95
Total	693

Tonnege Carried (Ton)	Samples
0	12
5	64
10	255
15	201
20	104
25	29
30	12
35	2
45	1
50	8
Unknown	16
Total	704

Travel Time (Hours)	Samples
10	3
20	5
30	23
40	27
50	22
60	18
70	22
80	27
90	33
100	24
110	32
120	29
130	26
140	31
150	37
160	43
170	26
180	39
190	29
200	10
210	33
220	13
230	19
240	7
250	7
260	5
270	3
280	7
290	2
300	4
310	1
320	2
350	1
520	1
Total	611

3) Naubatput Border

TYPE OF TRUCK	Samples
1	190
2	206
3	30
4	42
	1
Total	469

COMMODITIES CARRIED	Samples
1	42
2	43
3	10
5	16
6	63
7	7
8	55
9	97
10	19
11	5
12	3
13	5
14	13
15	4
16	11
17	4
18	10
19	38
20	3
21	1
22	16
23	4
Total	469

FACILITIES OF ORIGIN	Samples
1	225
2	2
4	6
5	52
6	70
7	61
8	3
9	60
Total	479



FACILITES OF DESTINATION	Samples
1	73
2	4
3	1
4	1
5	43
6	243
7	74
8	13
9	26
Total	478

FACILITES OF DESTINATION	Samples
1	128
5	11
6	176
7	62
8	1
9	2
Total	380

Tonnege Carried (Ton)	Samples
0	1
5	10
10	134
15	88
20	95
25	57
30	33
35	7
40	9
45	1
50	1
Unknown	52
Total	488

Travel Time (Hours)	Samples
10	14
20	7
30	7
40	9
50	9
60	6
70	4
80	16
90	13
100	14
110	13

120	5
130	12
140	9
150	12
160	13
170	9
180	3
190	7
200	2
210	3
230	1
240	1
260	4
270	2
300	1
310	5
320	1
330	2
350	1
390	1
420	1
Unknown	180
Total	387

4) Koshi Border

TYPE OF TRUCK	Samples
1	180
2	161
3	14
4	41
Total	396

COMMODITIES CARRIED	Samples
1	36
2	8
3	4
5	3
6	84
7	3
8	51
9	123
10	21
12	8
13	6
14	3
15	6
16	6
17	2

	18	6
	19	11
	21	1
	22	3
	23	1
Total		386

FACILITIES OF ORIGIN		Samples
	1	211
	2	10
	5	37
	6	9
	7	109
	8	1
	9	18
Total		395

FACILITIES OF DESTINATION		Samples
	1	122
	2	3
	3	1
	5	40
	6	102
	7	91
	8	7
	9	26
Total		392

Tonnege Carried (Ton)		Samples
	0	1
	5	23
	10	76
	15	92
	20	73
	25	40
	30	45
	35	4
	40	1
	50	5
		36
Total		396

Travel Time (Hours)		Samples
	10	21
	20	5
	30	9
	40	18
	50	6
	60	8

70	11
80	5
90	26
100	25
110	30
120	20
130	18
140	17
150	8
160	5
170	11
180	6
190	2
200	3
210	9
230	4
240	3
250	1
260	1
270	1
280	2
350	2
370	3
380	2
Unknown	80
Total	362

5) Achhar/Bhillar Border

TYPE OF TRUCK	Samples
1	186
2	193
3	42
4	6
Total	427

COMMODITIES CARRIED	Samples
1	42
2	2
3	1
4	1
5	5
6	51
7	13
8	73
9	143
10	25
11	3
12	10

	13	19
	15	5
	16	30
	17	1
	18	3
	19	24
	20	5
	22	38
	23	2
Total		496

FACILITIES OF ORIGIN		Samples
	1	366
	2	1
	4	5
	5	6
	6	63
	7	9
	8	7
	9	44
Total		501

FACILITIES OF DESTINATION		Samples
	1	257
	2	24
	3	1
	4	7
	5	6
	6	144
	7	15
	8	7
	9	40
Total		501

Tonnege Carried (Ton)		Samples
	5	42
	10	163
	15	80
	20	83
	25	24
	30	14
	35	4
	40	1
	50	37
	Unknown	57
Total		505

Travel Time (Hours)		Samples
	10	7

	20	32
	30	15
	40	34
	50	39
	60	42
	70	37
	80	40
	90	25
	100	19
	110	30
	120	17
	130	37
	140	22
	150	19
	160	16
	170	12
	180	10
	190	2
	200	4
	210	3
	230	1
	240	3
	260	2
	280	1
	290	2
	420	1
	580	1
Total		473

6) Singhu Border

TYPE OF TRUCK	Samples
1	408
2	215
3	10
4	1
Total	634

COMMODITIES CARRIED	Samples
1	61
3	6
4	1
5	12
6	73
7	8
8	160
9	235
10	9
11	3

	12	8
	13	9
	14	1
	15	4
	16	18
	18	1
	19	6
	20	7
	21	6
	22	11
Total		639

FACILITIES OF ORIGIN		Samples
	1	263
	2	12
	4	10
	5	63
	6	181
	7	42
	8	9
	9	77
Total		657

FACILITIES OF DESTINATION		Samples
	1	197
	2	3
	3	1
	4	2
	5	49
	6	275
	7	24
	8	20
	9	83
Total		654

Tonnege Carried (Ton)		Samples
	0	7
	5	114
	10	282
	15	91
	20	84
	25	8
	30	3
	35	1
	40	2
	50	6
Unknown		62
Total		660

Travel Time (Hours)	Samples
10	45
20	72
30	96
40	50
50	39
60	43
70	55
80	68
90	33
100	25
110	13
120	32
130	23
140	21
150	11
160	2
170	4
180	2
190	1
200	1
250	1
260	1
Unknown	10
Total	648



### 1.3 OD Matrices

#### 1) Saiyan Border

ORIGIN STATE	ANDHRA PRADESH	ARUNACHAL PRADESH	ASSAM	BIHAR	CHHATTISGARH	DELHI	GUJARAT	HARYANA	HIMACHAL PRADESH	JAMMU AND KASHMIR	JHARKHAND	KARNATAKA	KERALA	MADHYA PRADESH	MAHARASHTRA	NAGALAND	ORISSA	PUNJAB	RAJASTHAN	TAMIL NADU	UTRANCHAL	UTTAR PRADESH	WEST BENGAL	Unknown	Total	
ANDHRA PRADESH						5																			5	
CHHATTISGARH						3																				3
DELHI	9			1	1										3		8	3								15
GUJARAT						11		6	1	1									14							22
HARYANA	2	1	1					2							2	1	2	7	1						1	15
HIMACHAL PRADESH																										2
JAMMU AND KASHMIR																1	1									2
JHARKHAND						1																				1
KARNATAKA						11		6	1	3									9	2			12		44	
KERALA						3		1	1	2	1														10	
MADHYA PRADESH						12		3	1											2	2				6	26
MAHARASHTRA						33		8												11	1			14		67
PUNJAB	3			1									2	2	5	1									15	
RAJASTHAN						17	1	13												1				39		73
TAMIL NADU						6		3	1											8			2	1		21
UTRANCHAL						1											2									5
UTTAR PRADESH	2			1																						3
Total	12	1	2	3	1	102	4	41	7	5	2	8	2	16	9	7	1	50	6	15	6	81	1		382	

#### 2) Shahjhanpur Border

ORIGIN STATE	ANDHRA PRADESH	DELHI	GOA DAMAN AND DIU	GUJARAT	HADRABAD	HARYANA	HIMACHAL PRADESH	JAMMU AND KASHMIR	KARNATAKA	KERALA	MADHYA PRADESH	MAHARASHTRA	PUNJAB	RAJASTHAN	TAMIL NADU	UTTAR PRADESH	Unknown	Total										
ANDHRA PRADESH		1																	2							1	4	
CHANDIGARH							1																					2
DELHI	4				46	2		1			20	8	12	78						67	11	1					250	
GOA DAMAN AND DIU			2				1																				3	
GUJARAT			8				7																				23	
HARYANA	2	1	1	27		1				11	1	2	28			16				3							94	
HIMACHAL PRADESH				1																							8	
JAMMU AND KASHMIR										2	1	1	1			1				4	1						12	
KARNATAKA							2																				13	
KARNATAKA							9													3							14	
KERALA							3			1										4							12	
MADHYA PRADESH							2													1							7	
MAHARASHTRA			28				9			1										7							53	
PUNJAB	2				9						3		6	8						13	1						42	
RAJASTHAN		26			1		13							2						9							60	
TAMIL NADU		3					2													3							10	
UTTAR PRADESH		1			2	18				1																	64	
Unknown			6			4				2																	24	
Total	9	93	3	107	3	48	4	2	47	12	25	146	35	115	18	28										695		

#### 3) Naubatput Border

ORIGIN STATE	ANDHRA PRADESH	ASSAM	BIHAR	CHANDIGARH	DELHI	HARYANA	JAMMU AND KASHMIR	JHARKHAND	MADHYA PRADESH	ORISSA	PUNJAB	RAJASTHAN	UTRANCHAL	UTTAR PRADESH	WEST BENGAL	Unknown	Total	
ANDHRA PRADESH				4					1									5
ASSAM						1									3			4
BIHAR	3					1	6											46
DELHI				11						13								28
GUJARAT			1	10						2								13
HARYANA				9						9		1						23
HIMACHAL PRADESH										2								5
JAMMU AND KASHMIR																		1
JHARKHAND					1	6	11			6			11	9				88
MADHYA PRADESH				11														16
MAHARASHTRA				2					3									2
ORISSA						1	2											19
PUNJAB	2		2						6									27
RAJASTHAN				8					5			3						29
UTRANCHAL							1		1									2
UTTAR PRADESH			3	60					28		7			1				116
WEST BENGAL						15	10	1		3		4	2		19			54
Unknown						1			2		2	1			1			7
Total	3	6	117	1	25	30	1	72	9	13	25	11	5	108	59			485

#### 4) Koshi Border

ORIGIN STATE	ANDHRA PRADESH	ARUNACHAL PRADESH	ASSAM	BIHAR	DELHI	GUJARAT	HARYANA	JHARKHAND	KARNATAKA	MADHYA PRADESH	MAHARASHTRA	MANIPUR	ORISSA	PUNJAB	SIKKIM	UTTAR PRADESH	WEST BENGAL	Unknown	Total	
ANDHRA PRADESH					6															6
ASSAM					1															1
BIHAR							6													7
DELHI	6			14																20
HARYANA	4	1		4					6	10	41	2	2	4					91	
HIMACHAL PRADESH																				4
JAMMU AND KASHMIR												2								2
JHARKHAND					1		3													5
KARNATAKA					8										1					10
MADHYA PRADESH					16		5								6					31
MAHARASHTRA					25		7								5					42
PUNJAB	4			4																33
RAJASTHAN							1			2	19	1								1
RAJASTHAN																				1
TAMILNADU					1										1					2
UTRANCHAL						1														1
UTTAR PRADESH				4	10	22			17					2			2			65
UTTRANCHAL						3				1										3
WEST BENGAL					16		5													21
Total	14	1	18	18	97	4	44	7	15	79	17	2	6	13	2	35	24		390	

5) Achhar/Bhillar Border

ORIGIN STATE	DELHI	GUJARAT	HARYANA	HIMACHAL PRADESH	KARNATAKA	MAHARASHTRA	PUNJAB	RAJASTHAN	UTTAR PRADESH	Unknown	Total
ANDHRA PRADESH	1	2									3
DELHI					1	40					41
GOA DAMAN AND DIU	2	5	1			1		3			12
GUJARAT		3			1	162					166
HARYANA					1	8					9
KARNATAKA		1									1
KERALA		6									6
MAHARASHTRA	45	157	11	2			1	10	1		227
RAJASTHAN						28					28
TAMIL NADU		2	1								3
UTTAR PRADESH						2					2
Unknown						3					3
Total	48	176	13	2	3	244	1	13	1		501







6) Singhu Border

ORIGIN STATE	CHANDIGARH	DELHI	HARYANA	HIMACHAL PRADESH	JAMMU AND KASHMIR	KARNATAKA	MAHARASHTRA	PUNJAB	RAJASTHAN	UTTAR PRADESH	Unknown	Total
ANDHRA PRADESH			3									3
ASSAM			2									2
CHANDIGARH		1										1
CHATTISH GARH		14										14
DELHI	4	2	35	13	9			37				100
HARYANA		139	6		3	1		2	2	8		161
HIMACHAL PRADESH		68						1		2		71
JAMMU AND KASHMIR		5										5
MADHYA PRADESH			2									2
MAHARASHTRA		1	11					2				14
PUNJAB		245	10				1	1		5		262
RAJASTHAN		1	4									5
UTTAR PRADESH		3	2					2				7
WEST BENGAL			2									2
Unknown		3	4									7
Total	4	482	81	13	12	2	1	44	2	15		656

1.4 Questionnaire

**Heavy Vehicle Count Survey**  
**– Feasibility Study on the Dedicated Freight Corridor Project**

Survey Location ..... Direction: To Delhi From Delhi Date:

Category of heavy vehicle	2 Axle Single Unit 	3 Axle Single Unit 	4 or more Axle Single Unit 	3 or more Axle Single Trailer 	Multi-Trailer 	2 or 3 Axle Trailer (no cargo) 
6:00-6:30						
6:30-7:00						
7:00-7:30						
7:30-8:00						
8:00-8:30						
8:30-9:00						
9:00-9:30						
9:30-10:00						
10:00-10:30						
10:30-11:00						
11:00-11:30						
11:30-12:00						
12:00-12:30						
12:30-13:00						
13:00-13:30						
13:30-14:00						
14:00-14:30						
14:30-15:00						
15:00-15:30						
15:30-16:00						
16:00-16:30						
16:30-17:00						
17:00-17:30						
17:30-18:00						
18:00-18:30						
18:30-19:00						
19:00-19:30						
19:30-20:00						
20:00-20:30						
20:30-21:00						
21:00-21:30						
21:30-22:00						

### Road Side Interview Survey Sheet – Feasibility Study on the Dedicated Freight Corridor Project

Date		Time (24Hrs)		Direction		Survey location - Serial No.					
				1: To Delhi 2: From Delhi			-				

Type of Truck 1: Two axle single unit, 2: Three axle single unit, 3: Four or more axle single unit, 4: 3 or more axle single trailer, 5: Multi trailer

Origin/ Departure time	Destination/ Apprxmt arrival time	Facilities of Origin/Destination	Commodities Carried	Tonnage Carried
State: <input style="width: 100px; height: 30px;" type="text"/>  District: <input style="width: 100px; height: 30px;" type="text"/>  Landmark: <input style="width: 100px; height: 30px;" type="text"/>	State: <input style="width: 100px; height: 30px;" type="text"/>  District: <input style="width: 100px; height: 30px;" type="text"/>  Landmark: <input style="width: 100px; height: 30px;" type="text"/>  Approximate arrival date/time at destination: Date: <input style="width: 100px; height: 30px;" type="text"/> Time: <input style="width: 100px; height: 30px;" type="text"/>	Type Code Factory/Workshop 1 Port 2 Airport 3 Station 4 Truck Terminal 5 Market 6 Warehouse 7 Commercial Bldg 8 Others 9	Type Code Empty 1 Coal 2 Fertilizer 3 Salt 4 Cement 5 Iron & Steel 6 POL(Petroleum, Oil, and Lubricants) 7 Foodgrain 8 Others 9 Miscellaneous 10 Containers If container, tick the following → Unknown 11 Empty 12 Foodstuff 13 Chemical products 14 Textile and leather products 15 Iron, steel and metal 16 Machinery 17 Transport equipments 18 Electronic products 19 Garments 20 Paper and wastepaper 21 Home/Office stuff 22 Others 23 Miscellaneous(Consolidated) 24	<input style="width: 100px; height: 50px; border: 1px solid black;" type="text"/>

## Appendix 2 Consignee and Forwarder Interview Survey

### 2.1 Interviewees

Name of Company/Forwarders	Name of Company/Shipping Companies
BARWIL FORBES	CONFREIGHT SHIPPING
IAL CONTAINER LINE(INDIA L.M.D.)	DRAGON SHIPPING PVT LTD
ALLIGATOR SHIPPING SERVICES PVT. LTD.	BOXTRANS SHIPPING AGENCIES PVT LTD.
AMI INDIA LOGISTICS PVT. LTD.	COSCO (INDIA) SHIPPING PVT LTD
ADSTEAM AGENCY (INDIA LTD)	ADVANCE TRANSOCEAN SHIPPING PVT LTD
INTERNATIONAL LINER SHIPPING AGENCY PVT LTD.	FRANCSI SHIPPING AGENCY PVT LTD
EXPEDITORS INTL. INDIA PVT. LTD	CONTAINER MOVEMENT (BOMBAY) TRAN.PVT.LTD.
AHLCON PARENTALS (INDIA)	PRUDENT SHIPPING
AQUARIUS LOGISTICS PVT LTD	AXIS SHIPPING AGENCY PVT LTD
SIKHAR FORWARDERS PVT LTD	NYK LINE INDIA LTD
SUNITRANS LOGISTIC PVT LTD	IAL CONTAINER LINE
I I C CONTAINER LINE LIMITED	
MERIDIAN SHIPPING AGENCY PVT LTD	
EASTERN LOGISTICS	
SCANWELL LOGISTICS INDIA PVT LTD	
AIRLIFT ( USA) INC.	
CARGO CARE LOGISTIC INDIA PVT LTD	
AGIL FREIGHT LOGISTICS PVT LTD	
CRM LOGISTIC PVT LTD	
JAS FORWARDING WORLD WISE	
<b>Name of Company/Consignee</b>	
SUBROS LIMITED	
HIND AGRO INDUSTREES LIMITED	
MARUTI UDYOG LIMITED	
GOOD LUCK STEEL TUBES LTD.	
LEATHER- TECH.	
JEENA AND COMPANY	

## 2.2 Results of Interview Survey

### 1) Consignee and Forwarder

Name of Company/Consignee and Forwarders	JNPT			TUTICORIN			COCHIN			Pipavav			Kandla/Mundra			Chennai		
	Import TEUs (2003-2004, 2004-2005, 2005-2006)	Import Consolidated TEUs	Export Consolidated TEUs	Import TEUs	Export Consolidated TEUs	Import Consolidated TEUs	Import TEUs	Export Consolidated TEUs	Import Consolidated TEUs	Import TEUs	Export Consolidated TEUs	Import TEUs	Export Consolidated TEUs	Import TEUs	Export Consolidated TEUs	Import TEUs	Export Consolidated TEUs	
BARWIL FORBES	3800	1500	1000															
IAL CONTAINER LINE (INDIA L.M.D.)	1200	1500	2000															
ALLIGATOR SHIPPING SERVICES PVT. LTD.	50	750	2000															
AMI INDIA LOGISTICS PVT. LTD.	420	420	6000															
ADSTEAM AGENCY (INDIA LTD.)	126	126	310															
INTERNATIONAL LINER SHIPPING AGENCY PVT. LTD.	195	195	96															
EXPEDITORS INTL. INDIA PVT. LTD.	6300	6300	142															
AHLCON PARENTALS (INDIA)	270	270	5000															
SIKHAR FORWARDERS PVT LTD	2700	2700	1600															
SUNTRANS LOGISTICS PVT LTD	85	85	2															
WIRADAN SHIPPING AGENCY PVT LTD	50	50	1150															
SCANWELL LOGISTICS INDIA PVT LTD	405	405	5500															
AIRLIFT (USA) INC.	830	830	14300															
CARGO CARE LOGISTIC INDIA PVT LTD	9000	9000	10400															
AGIL FREIGHT LOGISTICS PVT LTD			350															
CRM LOGISTIC PVT LTD			2500															
JAS FORWARDING WORLD WISE			600															
SUBROS LIMITED			2500															
HIND AGRO INDUSTRIES LIMITED			800															
WARJIT UDYOG LIMITED			57 TON															
GOODLUCK STEEL TUBES LTD.			3100															
LEATHER TECH			3200															
JEENA AND COMPANY			1000															

Name of Company/Consignee and Forwarders	Import Containers												Export Container													
	Jul-05	Aug-05	Sep-05	Oct-05	Nov-05	Dec-05	Jan-06	Feb-06	Mar-06	Apr-06	May-06	Jun-06	Jul-05	Aug-05	Sep-05	Oct-05	Nov-05	Dec-05	Jan-06	Feb-06	Mar-06	Apr-06	May-06	Jun-06		
BARWIL FORBES	100	90	80	90	70	80	90	110	100	100	90	90	80	60	70	60	70	60	70	60	40	40	60	60	60	70
IAL CONTAINER LINE (INDIA L.M.D.)	1200	1250	1300	1280	1310	1300	1310	1250	1280	1250	1280	1250	1280	1250	1280	1250	1280	1250	1280	1250	1280	1250	1280	1250	1280	1250
ALLIGATOR SHIPPING SERVICES PVT. LTD.	50	55	60	70	80	85	90	95	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
AMI INDIA LOGISTICS PVT. LTD.	10	8	10	8	7	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
ADSTEAM AGENCY (INDIA LTD.)	1	2	2	3	4	3	4	3	4	3	4	3	4	3	4	3	4	3	4	3	4	3	4	3	4	3
INTERNATIONAL LINER SHIPPING AGENCY PVT. LTD.	6	5	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
EXPEDITORS INTL. INDIA PVT. LTD.	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
WARJIT UDYOG LIMITED																										
AQUARIUS LOGISTICS PVT LTD																										
SIKHAR FORWARDERS PVT LTD																										
SUNTRANS LOGISTICS PVT LTD																										
SCANWELL LOGISTICS INDIA PVT LTD																										
AIRLIFT (USA) INC.																										
CARGO CARE LOGISTIC INDIA PVT LTD																										
AGIL FREIGHT LOGISTICS PVT LTD																										
CRM LOGISTIC PVT LTD																										
JAS FORWARDING WORLD WISE																										
SUBROS LIMITED																										
HIND AGRO INDUSTRIES LIMITED																										
WARJIT UDYOG LIMITED																										
GOODLUCK STEEL TUBES LTD.																										
LEATHER TECH																										
JEENA AND COMPANY																										

Name of Company/Consignee and Forwarders	G																					
	1. Documents and Custom Clearance				2. Road Transport				3. Rail Transport				4. Port/ICD									
	1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	2.4	2.5	2.6	3.1	3.2	3.3	3.4	3.5	3.6	4.1	4.2	4.3	4.4	
BARWIL FORBES	2	2		1								1	3	1	1	1	4	3				
IAL CONTAINER LINE(INDIA L.M.D.)	1	0		1	2	2	1	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1
ALIGATOR SHIPPING SERVICES PVT. LTD.	2	2		2	3	2	3	3	2	3	2	2	2	2	2	2	2	2	2	2	2	2
AMLI INDIA LOGISTICS PVT. LTD.	2	4		3	2	4	4	3	3	4	2	3	3	2	3	2	2	2	3	4	2	3
ADSTEAM AGENCY (INDIA LTD)	2	2		1	2	1	2	2	1	2	1	2	2	1	2	1	2	1	2	2	2	2
INTERNATIONAL LINER SHIPPING AGENCY PVT L	2	1		2	0	3	3	2	2	3	3	3	0	2	1	2	0	1	1	1	1	0
EXPEDITORS INTL. INDIA PVT. LTD	3	3		3	2	0	2	0	2	3	2	3	3	2	2	3	2	3	3	0	2	2
AHLCON PARENTALS (INDIA)	3	2		2	2	2	3	1	0	2	1	4	3	1	1	1	1	3	2	1	1	1
AQUARIUS LOGISTICS PVT LTD	1	1		2	1	2	1	2	1	2	1	3	0	1	3	0	3	0	2	1	2	3
SIKHAR FORWARDERS PVT LTD	1	2		2	1	2	1	2	1	2	2	2	2	2	1	2	2	2	2	2	2	2
SUNITRANS LOGISTIC PVT LTD	1	2		3	2	3	3	2	3	3	3	1	3	2	1	2	2	2	1	1	2	2
ITIC CONTAINER LINE LIMITED	0	0		0	0	0	0	0	0	0	0	3	2	0	4	4	2	0	0	0	0	0
MERIDIAN SHIPPING AGENCY PVT LTD	2	1		1	2	3	2	1	1	3	3	2	3	1	3	2	2	1	2	2	3	3
EASTERN LOGISTICS	2	2		2	2	2	3	3	4	2	2	3	3	2	4	3	3	3	3	2	3	3
SCANWELL LOGISTICS INDIA PVT LTD	2	3		3	3	3	4	1	2	3	3	3	3	2	4	3	3	3	3	3	3	3
AIRLIFT (USA) INC.	0	0		0	2	0	2	0	2	2	2	2	3	2	3	2	3	2	3	2	3	2
CARGO CARE LOGISTIC INDIA PVT LTD	3	4		2	0	0	0	0	3	4	0	0	0	2	3	4	1	2	3	4	3	4
AGIL FREIGHT LOGISTICS PVT LTD	3	4		3	3	4	4	4	4	4	4	2	3	2	1	3	1	3	3	2	1	3
CRM LOGISTIC PVT LTD	2	1		1	3	3	3	2	2	3	3	4	3	1	1	0	1	0	3	2	1	2
IAS FORWARDING WORLD WISE	1	1		1	0	0	1	1	1	1	1	3	0	1	1	1	0	0	1	1	1	1
SUBROS LIMITED	2	2		2	1	1	1	2	1	1	1	1	2	1	4	1	1	2	2	1	2	2
HIND AGRO INDUSTRIES LIMITED	1	1		2	2	2	2	2	2	2	4	3	1	4	3	1	4	4	1	2	2	0
MARUTIUDYOG LIMITED	2	3		1	3	1	1	0	2	1	1	3	3	3	3	2	3	2	1	4	4	3
GOOD LUCK STEEL TUBES LTD.	2	4		4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
LEATHER TECH	4	4		5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
JEENA AND COMPANY	2	2		2	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

## 2) Shipping Company

Name of Company/Shipping Companies	Shipping Company Performance																							
	JNPT				MUMBAI				KOLKATA-HALDIA				CHENNAI				TUTICORIN				KANDLA-MUNDRA			
	Import TEUs (2003-2004, 2004-2005, 2005-2006)	Import Consolids led TEUs	Export TEUs	Export Consolids led TEUs	Import TEUs	Import Consolids led TEUs	Export TEUs	Export Consolids led TEUs	Import TEUs	Import Consolids led TEUs	Export TEUs	Export Consolids led TEUs	Import TEUs	Import Consolids led TEUs	Export TEUs	Export Consolids led TEUs	Import TEUs	Import Consolids led TEUs	Export TEUs	Export Consolids led TEUs	Import TEUs	Import Consolids led TEUs	Export TEUs	Export Consolids led TEUs
CONFREIGHT SHIPPING	40500	41800	41800	160000	21000	21000	21000	16000	16000	16000	16000	16000	16000											
DRAGON SHIPPING PVT LTD	190000	159000	160000	160000																				
BOXTRANS SHIPPING AGENCIES PVT LTD.	4100	4100	5100	5100																				
ADVANCE TRANSOCEAN SHIPPING PVT LTD	24300	24600	24300	24300				2063	2063	2728	2728	1450	1450	2490	2490									
FRANCIS SHIPPING AGENCY PVT LTD	1130	7150	7400	7400																				
CONTAINER MOVEMENT (BOMBAY) TRAN PVT.LTD	11000	17000	17000	17000				650	650	1122	1122	4500	4500											
PRUDENT SHIPPING	5125	5125	6555	6555																				
AXIS SHIPPING AGENCY PVT LTD	40000	40000	30000	30000				9644	9644	12279	12279	27753	27753	27122	27122									
NYK LINE INDIA LTD	66683	66683	68209	68209																				
IAL CONTAINER LINE	21500	21500	57500	57500																				

Name of Company/Shipping Companies	Export Container																							
	Import Containers												Export Container											
	Jul-05	Aug-05	Sep-05	Oct-05	Nov-05	Dec-05	Jan-06	Feb-06	Mar-06	Apr-06	May-06	Jun-06	Jul-05	Aug-05	Sep-05	Oct-05	Nov-05	Dec-05	Jan-06	Feb-06	Mar-06	Apr-06	May-06	Jun-06
CONFREIGHT SHIPPING	2500	2500	3000	3200	3050	3200	2800	2600	2600	2600	2600	2500	2500	2500	3000	3200	3200	3200	3200	2600	2600	2600	2800	2800
DRAGON SHIPPING PVT LTD	4000	4200	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500
BOXTRANS SHIPPING AGENCIES PVT LTD.	270	285	280	280	235	150	220	260	238	250	282	275	350	450	420	420	420	420	420	420	420	420	420	420
COSCO (INDIA) SHIPPING PVT LTD	750	750	800	800	800	900	750	800	800	900	900	900	900	900	900	900	900	900	900	900	900	900	900	900
ADVANCE TRANSOCEAN SHIPPING PVT LTD	30	28	25	30	35	27	38	40	45	35	30	40	350	338	342	350	380	380	315	375	350	375	350	375
FRANCIS SHIPPING AGENCY PVT LTD	300	350	250	300	300	300	350	350	300	300	350	300	300	18	25	13	12	12	15	15	18	20	17	18
CONTAINER MOVEMENT (BOMBAY) TRAN PVT.LTD	144	138	159	159	150	219	145	129	210	175	118	124	220	195	179	150	195	179	210	204	155	148	158	179
PRUDENT SHIPPING	1200	1000	1500	1500	1500	1200	1500	1400	1400	1300	1450	800	850	850	750	900	800	850	850	850	850	900	900	900
AXIS SHIPPING AGENCY PVT LTD	2655	2472	2971	1970	1891	2582	1834	1993	2215	2684	2404	2155	2069	1834	3059	2159	1904	2849	2348	2425	2429	2871	2976	2655
NYK LINE INDIA LTD																								

Name of Company/Shipping Companies	1. Documents and Custom Clearance					2. Road Transport					3. Rail Transport					4. Port/ICD						
	1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	2.4	2.5	2.6	3.1	3.2	3.3	3.4	3.5	3.6	4.1	4.2	4.3	4.4	
CONFREIGHT SHIPPING	2	2	2	3	3	2	2	2	2	1	1	2	4	2	1	1	1	3	1	1	3	1
DRAGON SHIPPING PVT LTD	2	2	2	2	0	2	2	2	2	2	1	1	1	2	0	1	0	1	1	1	1	1
BOXTRANS SHIPPING AGENCIES PVT LTD.	1	2	1	1	1	3	3	1	4	3	1	3	3	2	3	1	3	3	3	3	1	3
COSCO (INDIA) SHIPPING PVT LTD.	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0
ADVANCE TRANSOCEAN SHIPPING PVT LTD	3	3	2	2	2	1	1	0	2	2	1	0	0	0	0	1	1	1	1	1	1	1
FRANCSI SHIPPING AGENCY PVT LTD	2	2	2	2	2	0	0	2	2	2	2	3	2	1	4	1	2	2	2	2	2	1
CONTAINER MOVEMENT (BOMBAY) TRAN PVT LTI	2	2	1	2	3	0	4	1	2	2	2	3	3	2	2	1	1	4	0	0	0	4
PRUDENT SHIPPING	3	2	3	2	2	2	2	2	1	2	1	0	0	0	1	1	1	1	3	3	1	1
AXIS SHIPPING AGENCY PVT LTD	1	2	2	1	4	2	2	2	1	1	1	0	0	0	1	0	3	1	1	1	1	2
NYK LINE INDIA LTD	2	2	2	2	2	2	3	2	2	3	3	2	2	0	2	1	1	1	1	2	1	3
IAL CONTAINER LINE																						



Company Name	Port	State or ICD	Share of Rail(%)	Share of Truck(%)	Rail Average Dwell Time	Rail Haulage Time(days)	Rail Haulage Charge (Rs./FEU)	Road Average Dwell Time	Road Haulage Time(days)	Road Haulage Charge (Rs./FEU)
BARWIL FORBES	JNPT	TKD	100%	0%	7	2	36000			
	JNPT	Dadri	100%	0%	7	2	36000			
IAL CONTAINER LINE(INDIA L.M.D.)	JNPT	TKD	100%	0%	1	2	50000			
ALLIGATOR SHIPPING SERVICES PVT. LTD.	JNPT	Delhi	100%	0%	15	2	56000	15	3	40000
	JNPT	Ludhiana	75%	25%	15	2.5	56000	15	3	40000
	JNPT	Dadri	80%	20%	15	2	56000			
	JNPT	Ahmedabad	10%	90%	15	1		15	3	40000
	JNPT	Bangalore	100%	0%	15					
	JNPT	Jaipur	10%	90%	15	1.5	46000	15	2	
AMI INDIA LOGISTICS PVT. LTD.	JNPT	TKD	90%	10%	7	2	48000	7	4	53000
	JNPT	G.NoIda	100%	0%	7	2	48000	7	4	53000
	JNPT	TKD	90%	10%				10	4	53000
	Mumbai	TKD	100%	0%				7	4	62000
ADSTEAM AGENCY (INDIA LTD)	JNPT	G.NoIda	100%	0%	4	2	41648			
INTERNATIONAL LINER SHIPPING AGENCY PVT	JNPT	TKD	100%	0%	3	2	50000			
	JNPT	TKD	100%	0%	1	2	50000			
	Kandla	TKD	100%	0%	4	3	45000			
EXPEDITORS INTL. INDIA PVT. LTD	JNPT	TKD	100%	0%	3	3	53000	4	2	42000
AHLCON PARENTALS (INDIA)	JNPT	TKD	80%	20%	7	3	48000			
AQUARIUS LOGISTICS PVT LTD	JNPT	TKD	100%	0%	2.5	2	50000			
SIKHAR FORWARDERS PVT LTD	JNPT	TKD	100%	0%	1	2	48000	1	3	
SUNITRANS LOGISTIC PVT LTD	JNPT	TKD	100%	0%						
IT C CONTAINER LINE LIMITED	JNPT	TKD	100%	0%	3.5	3	53000			
	JNPT	Ludhiana	100%	0%						
	JNPT	G.NoIda	100%	0%	3	3	50000			
MERIDIAN SHIPPING AGENCY PVT LTD	JNPT	TKD	90%	10%	2	1	33000			
EASTERN LOGISTICS	JNPT	TKD	100%	0%	7	3	48000			
SCANWELL LOGISTICS INDIA PVT LTD	JNPT	TKD	100%	0%	3	3.5	53000			
	JNPT	Ludhiana	100%	0%	3	2	60000			
	Kandla	TKD	100%	0%	3	3	51000			
	JNPT	Jaipur	50%	50%				2	3	15000
	Kandla	Jaipur	50%	50%				3	4	20000
AIRLIFT (USA) INC.	JNPT	TKD	100%	0%	7	3	46000			
	JNPT	Ludhiana	100%	0%	7	3	50000			
	JNPT	G.NoIda	100%	0%	7	3	48000			
CARGO CARE LOGISTIC INDIA PVT LTD	Chennai	TKD	100%	0%	4	5	65000			
	JNPT	TKD	100%	0%	1	4	62000			
	JNPT	Ludhiana	100%	0%	1	5				
	JNPT	G.NoIda	100%	0%	1	5				
AGIL FREIGHT LOGISTICS PVT LTD	JNPT	TKD	70%	30%	3	5	52000	3	4	32000
	JNPT	Ludhiana	80%	20%	3	4	53000	3	4	32000
	Mumbai	TKD	75%	25%	3	6	50000	3	5	32000
	Mumbai	Ludhiana	85%	15%	3	4	53000	3	5	32000
	Kandla	TKD	85%	15%	3	5	39000	3	4	32000
	Kandla	Ludhiana	75%	25%	3	5	39000	3	5	32000
CRM LOGISTIC PVT LTD	JNPT	TKD	100%	0%	3	2	54000			
	Kandla	TKD	100%	0%	3	3	48000			
JAS FORWARDING WORLD WISE	JNPT	TKD	100%	0%	7	3	54000			
	JNPT	G.NoIda	100%	0%	7	2.5	54000			
	JNPT	Jaipur	100%	0%	3	3				

## 2.3 Questionnaire

Freight Survey Form D (Forwarders)

2) Please answer monthly cargo volume of EXIM containers at your company during Year 2005/06 at all the above-mentioned ports.

Port		Monthly Cargo Volume (TEU)											
		July 05	August 05	September 05	October 05	November 05	December 05	January 06	February 06	March 06	April 06	May 06	June 06
4 Ports	Import Container												
	Export Container												

C. Origin/Destination of EXIM containers and Mode of Inland Transport

1) Please answer state-wise annual cargo volume at each major port, which your company carried in Year 2005/06

Port		Origin/Destination in India (TEU)						
		Delhi	Punjab	Uttar Pradesh	Gujarat	Rajasthan	Andhra Pradesh	Karnataka
JNPT*	Import Container							
	Export Container							
Pipavav	Import Container							
	Export Container							
Kandla/Mundra	Import Container							
	Export Container							
Chennai	Import Container							
	Export Container							

\*: including GTI and NSICT

Please leave a blank, if no containers carried by your company.

### Freight Survey Form D (Forwarders)

**CONFIDENTIAL** This survey is prepared by JICA (Japan International Cooperation Agency) Study Team in alliance with Indian Government. Your answers are strictly confidential and never be used for other purposes.

#### Administrative Use

Name of Surveyor	
Survey Date	
Surveyor's Phone No.	

Please read this box and answer the questions.

This Freight Survey is part of the study on the Development of Dedicated Freight Corridor along Delhi-Mumbai and Ludhiana-Hawrah. It aims to grasp the annual cargo volume, carried by both a railway and truck in India. Our surveyor will visit you on ..... with a prior notice in order to collect this questionnaire form. If you need a further clarification, please contact our survey team at 98117 36848 (Mr. Deka) or 98119 50805 (Mr. Avrani). We very much appreciate your kind cooperation on this survey.

#### A. General Information

1) Please answer your company profile and yourself.

Name of Company	
Name	
Department	
Phone/ Fax	
Mobile Phone	
E-mail Address	

#### B. Annual Cargo Volume of EXIM Containers

1) Please answer port-wise container cargo volume, which your company carried during Year 2005/06.

Port	Export/ Import	Unit	2005/06 Annual Cargo Volume Consolidated Cargo in 2005/06
JNPT*	Import Container	TEU	
	Export Container	TEU	
Pipavav	Import Container	TEU	
	Export Container	TEU	
Kandla/Mundra	Import Container	TEU	
	Export Container	TEU	
Chennai	Import Container	TEU	
	Export Container	TEU	

\*: including GTI and NSICT

Freight Survey Form D (Forwarders)

2) Please answer the state-wise modal share of cargo carried at major ports during Year 2005/06. Please count mix-use of rail+truck into 'rail'.

Port		Share of Rail/Truck carried between Ports and Origin/Destination (%)													
		Delhi		Punjab		Uttar Pradesh		Gujarat		Rajasthan		Andhra Pradesh		Karnataka	
		Rail	Truck	Rail	Truck	Rail	Truck	Rail	Truck	Rail	Truck	Rail	Truck	Rail	Truck
JNPT*	Import Cont.														
	Export Cont.														
Pipavav	Import Cont.														
	Export Cont.														
Kandla/Mundra	Import Cont.														
	Export Cont.														
Chennai	Import Cont.														
	Export Cont.														

\*: including GTI and NSICT

\*\* : the modal share between rail and truck is estimated by the share between the number of cargos (TEUs) carried to the ICD by rail and cargos carried to CFS and ICD by road.

(example) Please answer 100% in total

Rail	Truck
36	64

Please leave a blank, if no containers carried by your company.

Freight Survey Form D (Forwarders)

D. Rail Service

1) Please answer average dwell time\* at each port and haulage charge\*\* per FEU (forty-foot equivalent unit) and time when carrying container cargo to the following **major ICD by railway**. If the haulage charge varies depending on the contract (one-way/round trip or volume discount), answer the average charge paid by existing shippers/consignees.

Port	ICD by Rail																			
	TKD (Delhi)			Dhandari Kalen (Ludhiana)			Dadri (G. Noida)			Sabarmati (Ahmedabad)			Kanakpura (Jaipur)		Sanat Nagar (Hyderabad)			Whitefield (Bangalore)		
	Average Dwell Time (days)	Haulage Time (days)	Haulage Charge (Rs. / FEU)	Average Dwell Time (days)	Haulage Time (days)	Haulage Charge (Rs. / FEU)	Average Dwell Time (days)	Haulage Time (days)	Haulage Charge (Rs. / FEU)	Average Dwell Time (days)	Haulage Time (days)	Haulage Charge (Rs. / FEU)	Average Dwell Time (days)	Haulage Time (days)	Haulage Charge (Rs. / FEU)	Average Dwell Time (days)	Haulage Time (days)	Haulage Charge (Rs. / FEU)		
JNPT***																				
Pipavav																				
Kandla/Mundra																				
Chennai																				

\*: dwell time is the time cargo remains in an in-transit storage area while awaiting shipment by rail transportation.

\*\* : haulage time/charge is the time/charge to transport the cargo by road/rail.

\*\*\*: including GTI and NSICT

(example) Please answer by the first decimal place

Average Dwell Time (days)	Haulage Time (days)	Haulage Charge (Rs. / FEU)
7.5	2.0	50,000.0

Please leave a blank, if no containers carried by your company.

E. Road Service

1) Please answer average dwell time\* at each port and haulage charge\*\* per FEU (forty-feet equivalent unit) and time when carrying container cargo to the following **major city by truck**. If the haulage charge varies depending on the contract (one-way/round trip or volume discount), answer the average charge paid by existing shippers/consignees.

Port	Major Cities by Truck																					
	Delhi (TKD)			Ludhiana (Dhandari Kalen)			G. Noida (Dadri)			Ahmedabad (Sabarmati)			Jaipur (Kanakpura)			Hyderabad (Sanat Nagar)			Bangalore (Whitefield)			
	Average Dwell Time (days)	Haulage Time (days)	Haulage Charge (Rs./FEU)	Average Dwell Time (days)	Haulage Time (days)	Haulage Charge (Rs./FEU)	Average Dwell Time (days)	Haulage Time (days)	Haulage Charge (Rs./FEU)	Average Dwell Time (days)	Haulage Time (days)	Haulage Charge (Rs./FEU)	Average Dwell Time (days)	Haulage Time (days)	Haulage Charge (Rs./FEU)	Average Dwell Time (days)	Haulage Time (days)	Haulage Charge (Rs./FEU)	Average Dwell Time (days)	Haulage Time (days)	Haulage Charge (Rs./FEU)	
JNPT***																						
Pipavav																						
Kandla/Mundra																						
Chennai																						

\*: dwell time is the time cargo remains in an in-transit storage area while awaiting shipment by truck.

\*\*: haulage time/charge is the time/charge to transport the cargo by road/rail.

\*\*\*: including GTI and NSICT

(example) Please answer by the first decimal place

Average Dwell Time (days)	Haulage Time (days)	Haulage Charge (Rs./FEU)
7.5	2.0	50,000.0

Please leave a blank, if no containers carried by your company.

Freight Survey Form D (Forwarder)

G. Perception of Logistics System and Inland Transport Service in India

1) Please rate constraints of the current logistics system in India using the following scale:

0 = No obstacle; 1 = Minor obstacle; 2 = Moderate obstacle; 3 = Major obstacle; 4 = Very severe

1. Documents and Custom Clearance
  - 1.1 Too many agencies involved in the approval of documents [ ]
  - 1.2 Too many documents required to be submitted for customs clearance [ ]
  - 1.3 Slow processing of documents by customs/technical control agencies at the port/ICD [ ]
  - 1.4 Slow processing (of documents) by customs/technical control agencies at the cross border of the states [ ]
  - 1.5 Exortionate charges for processing at customs/technical control agencies [ ]
2. Road Transport
  - 2.1 Poor road infrastructure which consumes more travel time (i.e., bad condition of the road surface) [ ]
  - 2.2 Too much traffic on the road which consumes more travel time [ ]
  - 2.3 Too few trucks available [ ]
  - 2.4 High risk of road accident [ ]
  - 2.5 No traceability of the cargo on the road [ ]
  - 2.6 Exortionate charges for inland road transport [ ]
3. Rail Transport
  - 3.1 Poor rail infrastructure which consumes more travel time (i.e., out-dated carriers) [ ]
  - 3.2 Small rail line capacity and long dwell time at the port/ICD while awaiting shipment by rail transportation [ ]
  - 3.3 High risk of rail accident [ ]
  - 3.4 No time table for the cargo transport service [ ]
  - 3.5 No traceability of the cargo on the track [ ]
  - 3.6 Exortionate charges for rail transport [ ]
4. Port/ICD
  - 4.1 Poor port infrastructure which consumes more dwell time (i.e., lack of the number of berths, stevedoring equipment) [ ]
  - 4.2 Too many vessels which consumes more dwell time for unloading [ ]
  - 4.3 No traceability of the cargo at the port [ ]
  - 4.4 Exortionate charges at the port (i.e., loading/unloading charge, free time at the container yard) [ ]

**Thank you for completing the survey! We appreciate your contribution to the JICA study on the DFC project.**

## **Appendix 3**

### Appendix 3 References

**Name of Study: Dedicated Multimodal High-axle Load Freight Corridors with Computerized Train Control System on Mumbai-Delhi and Delhi-Howrah - Study on Development of Intermodal Freight Transport Strategy**

**Type of Study: JICA Development Study**

**Study Period : June 2006 ~ March 2007**

No.	Title	Publisher	Year	Type of Report	Original/Copy/Data
1	Total Transport System Study	Planning Commission, GOI	Sep-87	Report	Copy
2	Study on Decline in Railway's Share in Total Land Traffic in India	Ministry of Railway, GOI	Oct-97	Report	Copy
3	Study on Decline in Railway's Share in Total Land Traffic in India	Ministry of Railway, GOI	Oct-97	Report	Copy
4	Japan-India Joint Research Report	Japan-India Joint Research	Jun-06	Report	Copy
5	List of Japanese Companies in India (328 Companies)	Embassy of Japan in India	2005	Others	Copy
6	India Rail Passenger OD-related database	Center for Railway Information Systems	2005/06	Others	Data
7	India Rail Freight OD-related database	Center for Railway Information Systems	2003/04-05/06	Others	Data
8	Broad Objective and TOR of Total Transport System Study	Planning Commission, GOI	N.A.	Others	Copy
9	North India Import Haulage	Nissin ABC	Apr-06	Others	Copy
10	EXIM Newsletter India	EXIM	Jun-06	Newsletter	Original
11	India - Tourist Road Guide & Political	International Publications	2005	Map	Original
12	India Railway Atlas	Indian Map Service	2006	Map	Original
13	The Atlas of Indian States	TTK Maps	N.A.	Map	Original
14	Saugor (General Information on Saugor Port Development)	Kolkata Port Trust	N.A.	Brochure	Copy
15	Enter a World of Efficiency	Gateway Terminals of India	N.A.	Brochure	Original
16	Harbouring Dreams Navigating Prosperity	Jawaharlal Nehru Port Trust	N.A.	Brochure	Original
17	Mundra Port	Gujarat Adani Port Ltd.	N.A.	Brochure	Copy
18	Inland Container Depot - Dadri, Greater Noida, UP	Container Corporation of India Ltd.	N.A.	Brochure	Original
19	Multimodal Logistics Professionals	Container Corporation of India Ltd.	N.A.	Brochure	Original
20	Transport Corporation of India	Transport Corporation of India	N.A.	Brochure	Original
21	MOL India	Syosen Mitsui	N.A.	Brochure	Copy
22	India Demographic Details	Syosen Mitsui	N.A.	Brochure	Copy
23	Sekai no Tokei 2006 (World Statistics 2006)	Ministry of Home Affairs, Japan	2006	Statistics	Data
24	World Energy Outlook 2004	International Energy Agency	2004	Report	Data
25	Global Logistics Indicators	World Bank	2005	Others	Data
26	Global Logistics Indicators	World Bank	2006	Others	Data
27	India Transport Sector Long Term Issues	World Bank	1995	Report	Data
28	Global Economic Prospects	World Bank	2006	Report	Data
29	Creating Global Value Through Efficient Trade Logistics	Warren H. Hausman, Hau L. Lee, Uma Subramanian	2005	Presentation	Data
30	Global Trade Logistics Indicators	UmaSubramanian	2005	Presentation	Data
31	India Road Transport Service Efficiency Study	World Bank	2005	Report	Data
32	India's Transport Sector: The Challenges Ahead	World Bank	2002	Report	Data
33	Mumbai Urban Transport Project (MUTP) Final Report	Mumbai Metropolitan Region Development Authority	2005	Report	Data
34	India Country Framework Report for Private Participation in Infrastructure	World Bank and Public-Private Infrastructure Advisory Facility	2000	Report	Data

35	Global Logistics Indicators, Supply Chain Metrics, and Bilateral Trade Patterns	Warren H. Hausman, Hau L. Lee, Uma Subramanian	2005	Report	Data
36	INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT- INTERNATIONAL DEVELOPMENT ASSOCIATION AND INTERNATIONAL FINANCE CORPORATION - COUNTRY STRATEGY FOR INDIA	India Country Management Unit, South Asia Region International Finance Corporation, South Asia Department	2004	Report	Data
37	Supply Chain Analysis: Implications for WBG Operations	Uma Subramanian	2004	Presentation	Data
38	Trade Logistics for Development: Challenges and Actions	Marc H. Juhel	2003	Presentation	Data
39	Quick Response Freight Manual	CAMBRIDGE SYSTEMATIC INC. COMSIS CORPORATION UNIVERSITY OF WISCONSIN -MILWAUKEE	1996	Report	Data
40	ANNUAL REPORT 2004-2005	MINISTRY OF SHIPPING, ROAD TRANSPORT & HIGHWAYS	2004	Report	Data
41	Country Strategy and Program Update India (2006-2008)	Asian Development Bank	Oct-05	Report	Data
42	COUNTRY STRATEGY AND PROGRAM (2003–2006) INDIA	Asian Development Bank	Apr-03	Report	Data