

Special Report 2

Intra-Regional Traffic In Road Sector

1. INTRODUCTION

It is an established fact that road transport sector enjoys an advantage over other modes of transport in handling short-lead (distance) traffic. Hence the traffic movement within a region remains confined to road sector only. With the growing demand of transport sector reflected by the inter-regional flows, importance of intra-regional flows cannot be ignored. Further, the vehicle composition to handle intra-regional traffic is not akin to that of inter-regional movement which is inclined towards multi-axle vehicles keeping in view the economies of scale and increasing traffic demand between various O-D pairs.

While drafting the terms of reference for the Total Transport Systems Study, the importance of intra-regional goods movement was felt and a special reference was made to estimate the intra-regional goods flows at the national level. Since it was not feasible to estimate the national-level intra-regional flows by adopting the check-post approach as designed for inter-regional goods flows, an entirely different approach has been adopted in which sample regions have been selected for detailed assessment of the base year intra-regional traffic. While identifying the sample regions, due consideration has been made to capture all the important socio-economic features of Indian Economy through spatial coverage. The broad “Approach & Methodology” adopted to carry out the study is discussed in the following paragraphs.

2. APPROACH & METHODOLOGY

Intra-regional goods flows can be defined as movement of goods where both the origin and the destination of a trip fall in the same region. Since most of the regions (defined for the purpose of the present study) are coterminous with Civil Districts, intra-regional traffic can also be termed as intra-district movement of goods. Keeping in view the fact that due to time and financial constraints all the 623 regions cannot be covered in the present intra-regional traffic study, traffic estimation has been confined to some sample regions, as described above. Based on the information collected through the sample regions, parameters have been developed using various socio economic factors and adopted for the regions not covered in the sample study to arrive at the national-level estimates of intra-regional traffic.

For estimation of inter-regional commodity flows, numbers of check-posts have been identified (located) to capture movement of goods vehicles. Since all the roads connecting different regions cannot be covered, important (high density) corridors are selected for the surveys with a view to capture the maximum traffic. Since inter-regional movement involves comparatively longer leads, check-posts locations have been appropriately selected. Further, it is an established fact that for long distance (inter-regional) vehicle movements the operators generally follow National or State Highways or important Major District Roads which have better riding facilities. The check-posts were selected accordingly. In other words, the inter-regional traffic check-posts are located on high-density-corridors; hence as a result the traffic on low density roads such as the traffic between two consecutive check-posts and other short-lead traffic movement remains

uncovered. In this background, the Consultants claim to cover about 90 % to 95 % of the inter-regional traffic movement.

Based on the pilot surveys conducted by the Study Team, it was established that even with an increase in the number of check-posts, required level of authentic data could not be generated to estimate intra-regional flows. In the light of this, a different approach has been adopted, where under the requisite information is generate not through check-post approach alone but a number of other primary surveys are conducted, supported with secondary data as control figures.

3. IDENTIFICATION OF SAMPLE REGIONS

Identification of the sample regions for detailed study is the most important task, since it is imperative to capture all the parameters to represent various socio-economic implications affecting the transport demand of a region. Though the population is considered as one of the deciding factors the Consultants are of the view that by spatial coverage each and every socio-economic factors (like industrialization, urbanization, agricultural production, standard of living, etc.) would be appropriately represented. In view of the fact that some of the civil districts were divided into a number of regions, based on their independent transport demand e.g. Vishakhapatnam that has been divided into three regions to reflect independent transport demand as a Metro City, a Major Steel Plant and a Major Port. Similarly, a sizeable portion of traffic that moves within a limited area as inputs to major industries, comprising various types of mineral ores, involving road transport is also important from intra-regional traffic point of view. With this background, the entire study area has been delimited in to following three categories while mining activity has been considered independently:

1. Major Ports
2. Major Industries
3. Civil Districts
 - Metro Cities
 - Other Civil Districts
4. Mining

Major Ports

Major Ports act as independent economic hubs and generate huge transport demand within the port areas; hence, they are considered as self-regulating traffic regions. Amongst the 13 Major Indian Ports only one has been considered for the detailed intra-regional study. Since the sample is limited (one out of 13 ports), Haldia Port with container handling facilities has been selected with a view to capture both containerized and non-containerized traffic.

Haldia port is about 104 km away from Kolkata and has adequate rail and road connectivity. It also has connectivity by inland water transport. The port has installed capacity of 38.0 million tonnes of which 17.7 million tonnes have been assigned to POL products, using pipelines.

Major Industries

Like Major Ports, major industries also have a huge transport demand within their complexes. Although it was not feasible to cover all the major industrial units of the country as an independent traffic region, sample industrial units (mainly major steel plants) have been considered as the traffic regions. While distributing the traffic regions into various categories, such industrial units are considered under an independent category. In the current study, 14 such industrial units have been considered as independent traffic regions that comprise; 10 major steel plants, one oil refinery, two ship-breaking yards and one industrial city that evolved as the major steel re-rolling hub. For estimation of intra-regional transport demand of these units, Bhillai

Steel Plant has been taken as the representative region. Bhillai Steel Plant is located in the Chattisgarh State and is well connected by rail and road transport. The Plant has an installed capacity of 8.005 million tonnes, with captive coal and iron ore mines, the main source of raw materials.

For estimating intra-regional traffic, entire road movement of goods within the Plant; raw materials as well as finished products have been considered. Since coal movement involves Rail Merry Go Round System, it has not been considered. Similarly, excavation and processing of raw material within the mining area, before it is bought to the plant for final processing has not been considered, as the same has been covered under mining haulage. Transport demand estimated per thousand tonnes of output of finished products is taken as the norm to arrive at a consolidated annual transport demand of the sample industrial units.

Civil Districts

As described earlier, traffic regions considered for the purpose of this study are more or less coterminous with civil districts. In other words each civil district represents an independent traffic region, unless further classified, as discussed earlier in the case of Vishakhapatnam. In the light of this, in the current exercise, all the regions carved out of the civil districts, are regrouped into number of sub-categories based on their population strength. Although population has a direct relation with the economic activity, urbanization has major impact in the intra-regional transport demand. Keeping the level of urbanization in view, all the regions/civil districts have been divided into two categories i.e. civil districts covering Metro Cities and others. Further, in view of the fact that all cities with population above one million are regarded as metro cities do not justify, as there are metro cities with the population above 10 million also. Since there is a vast variation of population amongst the metro cities, they are further sub-categorized into two groups i.e. metro cities having population above three million and those below this level. List of metro cities have been drawn using 2001 population Census data.

Metro Cities

As per 2001 Census, in total 25 cities were designated as metro cities, of which only fifteen had population above four million. Delhi comprising seven administrative districts tops the list followed by Mumbai. For estimating intra-regional traffic Delhi is considered as the representative region of this category. Similarly, Jaipur is considered as the representative region from the remaining ten metro cities.

Other Cities/Regions

All the remaining regions (except the regions described above) are covered under the category of Other Regions. All the regions have been divided into six population categories. Based on the number of regions in the respective category, numbers of regions have been selected for in-depth study to estimate intra-regional traffic. The numbers of regions selected are given in Table 1.

Table 1 – Distribution of Regions Based on Population

SN	Population Range (2001 Census)	No. of Regions	Sample Covered (No. of Regions)
1	Up-to 1.0 Lakh	21	2
2	1.0 to 5.0 Lakh	63	2
3	5.0 to 10.0 Lakh	95	2
4	10.0 to 20.0 Lakh	207	6
5	20.0 to 30.0 Lakh	108	6
6	Above 30 Lakh	66	3
TOTAL		560	22

* Some districts that were carved out by bifurcation of other districts are not considered separately.

While arriving at the final list of regions for detailed study, due consideration has been made to draw a representative sample covering the entire country. For this purpose, state-wise distribution of regions under various categories is given in Table 2.

**Table 2 - State Wise Distribution of Regions/Civil Districts
(Based on 2001 Population Census)**

SN	STATE/UT	NO. OF REGIONS UNDER DIFFERENT POPULATION RANGES						Total No. of Regions/ Distt.
		Up-to 1.0 Lakh	1.01-5.0 Lakh	5.01-10.0 Lakh	10.01-20.0 Lakh	20.01-30.0 Lakh	Above 30.0 Lakh	
1	Jammu & Kashmir	0	4	6	4	0	0	14
2	Himachal Pradesh	2	7	2	1	0	0	12
3	Punjab	0	0	7	7	1	2	17
4	Chandigarh	0	0	1	0	0	0	1
5	Uttarakhand	0	6	4	3	0	0	13
6	Haryana	0	1	9	8	1	0	19
7	Delhi	0	1	2	3	3	0	9
8	Rajasthan	0	0	5	18	8	1	32
9	Uttar Pradesh	0	0	3	24	22	21	70
10	Bihar	0	0	3	12	13	9	37
11	Sikkim	1	3	0	0	0	0	4
12	Arunachal Pradesh	8	5	0	0	0	0	13
13	Nagaland	0	8	0	0	0	0	8
14	Manipur	0	9	0	0	0	0	9
15	Mizoram	5	3	0	0	0	0	8
16	Tripura	0	1	2	1	0	0	4
17	Meghalaya	1	5	1	0	0	0	7
18	Assam	0	1	9	11	2	0	23
19	West Bengal	0	0	0	2	3	13	18
20	Jharkhand	0	2	3	8	5	0	18
21	Orissa	0	2	9	15	3	1	30
22	Chhattisgarh	0	0	7	7	1	1	16
23	Madhya Pradesh	0	1	8	33	3	0	45
24	Gujarat	0	1	2	12	6	4	25
25	Daman & Diu	1	1	0	0	0	0	2
26	Dadra & Nagar Haveli	0	1	0	0	0	0	1
27	Maharashtra	0	0	3	11	11	10	35
28	Andhra Pradesh	0	0	0	0	8	15	23
29	Karnataka	0	0	3	17	4	3	27
31	Lakshadweep (Not covered)	1	0	0	0	0	0	1
32	Kerala	0	0	1	4	6	3	14
33	Tamil Nadu	0	1	3	11	12	3	30
34	Pondicherry	2	1	1	0	0	0	4
35	A&Nicobar Islands (Not Covered)	1	1	0	0	0	0	2
	TOTAL	22	65	96	212	112	86	593

Based on the foregoing discussions, 26 regions were selected for detailed traffic analysis, of which six regions could not be included in the final assessment because of data deficiencies. State wise regions identified are summarized in Table 3.

Table 3 – State-wise Regions Selected with Population Range

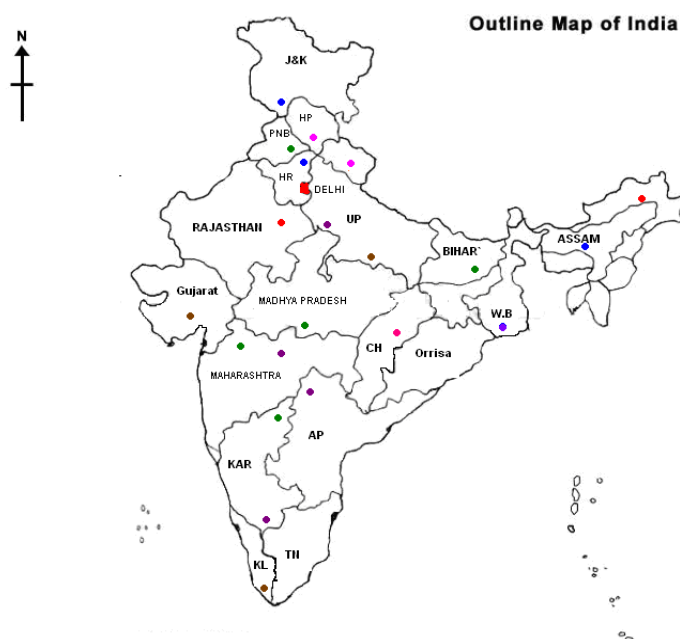
SN	State	Region	Category
1	Arunachal Pradesh	East Siang	Population up-to 1.0 Lakh
2	Arunachal Pradesh	Tawang	Population up-to 1.0 Lakh
3	Uttarakhand	Uttarkashi	Population 1.0 – 5.0 Lakh
4	Himachal Pradesh	Solan	Population 1.0 – 5.0 Lakh
5	Assam	Morigaon	Population 5.0 -10.0 Lakh
6	Jammu & Kashmir	Kathua	Population 5.0- 10.0 Lakh
7	Haryana	Yamuna Nagar	Population 10.0- 20.0 Lakh
8	Madhya Pradesh	Betul	Population 10.0 -20.0 Lakh
9	Punjab	Patiala	Population 10.0 -20.0 Lakh
10	Maharashtra	Dhule	Population 10.0 -20.0 Lakh
11	Karnataka	Bidar	Population 10.0 -20.0 Lakh
12	Karnataka	Raichur*	Population 10.0 -20.0 Lakh
13	Bihar	Munger*	Population 10.0 -20.0 Lakh
14	Maharashtra	Buldana	Population 20.0 -30.0 Lakh

SN	State	Region	Category
15	Maharashtra	Nanded	Population 20.0 -30.0 Lakh
16	Andhra Pradesh	Nizamabad*	Population 20.0 -30.0 Lakh
17	Andhra Pradesh	Cuddapah*	Population 20.0 -30.0 Lakh
18	Karnataka	Mysore	Population 20.0 -30.0 Lakh
19	Uttar Pradesh	Mathura	Population 20.0 -30.0 Lakh
20	Uttar Pradesh	Allahabad	Population above 30.0 Lakh
21	Kerala	Trivandrum*	Population above 30.0 Lakh
22	Andhra Pradesh	East Godavari	Population above 30.0 Lakh
22	Gujarat	Rajkot	Population above 30.0 Lakh
23	Rajasthan	Jaipur*	Metro City
24	Delhi	Delhi	Metro City
25	West Bengal	Haldia	Major Port
26	Chattisgarh	Bhillai Steel Plant	Industry

* Could not be processed because of incomplete data

Location of selected states for intra-regional traffic estimation is depicted in Map 1.

Map-1: Regions Selected For Intra-Regional Goods Flow



Mining

Mining of ores requires a special type of movement between the place of excavation and the place of final dispatch, because a number of activities may be performed within the mining area before it is dispatched to the concerned industry as an input. In the current study, mining movement of coal, iron ore, limestone and zinc have been covered. It has been observed that although the mining locations keep on changing within the mining area certain facilities like crushers, washeries, pre-processing units and railway sidings are fixed. All the movements to the industrial unit are organized from the dumps or rail sidings depending up on the mode to be used. Since, road transport is involved at a number of stages before the ore reaches the dump or consolidation point, all such movements are covered in the mining haulage. Importance of mining movement cannot be ignored at the national level, as it requires specialized road vehicles to accomplish the job, although the distance involved may or may not be significant. Based on the representative data collected from sample mining units an overall transport demand has been worked out by using 2007-08 through-put of various ores. Ores which are exported forms a part of the total transport demand, whereas the ores which are imported during the reference year have not been covered.

4. COMMODITY COVERAGE

Since the commodity composition differs from region to region, for the national level of intra-regional goods flows all commodities are taken together. However, for the purpose of data collection, intra-regional traffic of individual commodities has been considered. Certain commodities such as garbage, water, sanitation waste, etc which do not form a part of the inter-regional traffic are covered under intra-regional traffic assessment. Actually, no standard list of commodities has been prepared in advance, but each and every commodity has been considered independently.

5. TRAFFIC COVERAGE

As per definition, all the traffic originating and terminating within a region forms a part of the intra-regional flows. Although efforts have been made to capture all streams of traffic, certain traffic remain uncovered. Similarly, entire goods movement within the region cannot be estimated because of the use of various mechanized and non-mechanized modes of transport on the road sector. Keeping the above factors in view, estimation of intra-regional goods traffic does not include the following:

- Intra-regional traffic by Railways (as Marry Go Round system or otherwise), Inland Water Transport, Pipelines, Ropeways, etc. are not covered.
- Under road transport, goods movement by non-mechanized modes is not covered.
- Defense traffic of any nature is not covered.
- Goods movement by personalized vehicles (mechanized modes of transport) is not covered.
- Un-authorized goods movement by personalized mode is not covered.
- Goods movement within the Industrial Units, Ports (excluding those selected as independent traffic region), Airports, etc remain uncovered.
- Traffic handled by public or private transport under contract arrangement remains partly uncovered. Such vehicle trips, when intercepted at the check-post get covered in the sample, otherwise these vehicle movements are directly organized by the two parties (trader and the transporter), such trips remain uncovered as the local transport is not arranged through the organized truck operator unions, etc.
- To estimate overall through-put in terms of tonne-km, only loaded kms of the trips have been considered.

6. DATA BASE

For estimation of intra-regional flows, like the inter-regional flows, no secondary data is readily available. Thus, requisite information is collected through primary surveys. Moreover, check-post approach found most appropriate for generation of inter-regional flows alone do not serve the purpose, as a sizeable portion of intra-regional traffic cannot be captured even after increasing the number of such interception points by many folds, owing to very short leads. In order to capture relevant traffic streams a mixed approach has been adopted varying from region to region, depending upon the traffic movement mix. To collect requisite information, following steps have been taken:

- ◆ Firstly, the region under study is divided into number of sub-regions, wherein each sub-region represents a Block/Taluka/Tehsil or any other Administrative unit.
- ◆ Prepared District Profile, clearly bringing out information on various sectors contributing traffic demand.
- ◆ Listed (plotted) inter-regional traffic survey check-posts.

- ◆ Identified road survey locations (in addition to above) to capture intra-regional traffic with a view to intercept inter-sub-regional traffic, as most of the intra-regional movements are subjected to District headquarter.
- ◆ Identified industries or economic activities involving independent transport demand. A number of check-points were also identified covering important traffic generating per Lakhs/industrial units, where authentic transport flow data are not available to generate intra-regional flows, such as railway stations. At certain railway stations, there is a sizeable and regular inflow and/or outflow of goods, to ascertain the exact location or origin/destination of the commodity origin-destination surveys have been conducted. Same remarks hold good for building materials (sand, stone, bajri, etc.), which contribute voluminous traffic on short leads.
- ◆ Carry out goods origin-destination surveys at the selected locations. Although at most of the locations goods O-D surveys are conducted round-the-clock for 48 hours (except Metro Cities, where the surveys were conducted for 7 days) as in the case of inter-regional flows, at some checkpoints surveys were limited to day time only or only during the time traffic requires such survey. For example; near the river, which denotes originating point for building materials traffic, the surveys were carried out for 2 days limited to day light only, with a view to match traffic demand. Similarly, at railway stations, more specifically stations predominantly dealing in incoming traffic, the survey period was limited to availability of traffic.
- ◆ Based on the secondary data collected to reflect important industries in the region, sample small, medium and large scale units were identified for detailed investigation, such as; Stone Crushers, Brick Kilns, Sugar Mills, Plywood Factories, etc. Since, these units command independent short lead movement of goods as raw materials or finished products, which predominantly remain beyond the purview of check-post approach, sample units have been covered to generate commodity wise annual flows, based on the installed capacity and productivity.
- ◆ To avoid double counting of traffic, the commodities for which detailed investigations are carried out, distribution pattern discernible from check-post data and that collected from sample units have been used.
- ◆ All the commodity wise annualized flows in terms of tonnes and tonne-km are generated for each region.
- ◆ Since commodity composition is different for different regions, overall traffic estimates have been worked out using correlation of various socio-economic indicators of the regions under detailed study, to arrive at national level estimates.

7 ESTIMATION PROCEDURE

As described above the data are collected from various primary and secondary sources. The data collected at the check-posts covered information both on vehicle characteristics, such as; registration number, type of vehicle, number of axles and commodity movement, such as; pLakhe of actual origin, pLakhe of final destination, distance from origin to destination, commodity carried and its weight. As in the case of check-posts specifically designed to capture inter-regional traffic, intra-regional movement of goods is also covered, same hold good for additional check-posts located to capture intra-regional, where inter-regional movement of goods was also captured. To limit the data processing, all the intra-regional trips recorded in both the survey were segregated.

Since, at different check-posts the surveys were conducted at different dates and durations, information collected was brought to a common period (average daily traffic). At certain locations, the surveys were not conducted round the clock, keeping traffic demand in view. The information collected was apportioned depending upon the period of the survey represented

rather than the actual period of survey. For example at locations, where traffic movement observed was only during a particular period of the day (only during the day light) the surveys accordingly were conducted and the data considered as daily traffic.

As mentioned earlier, road sector is predominantly used to handle short lead traffic, thus a sizeable portion of goods movement remains beyond the purview of check-post approach. To cater to the missed traffic, commodity-based approach has been used. Important commodities are short listed based on the secondary data collected from various sources. Further, each commodity shows different transport behavior because of its type and volumes. Important commodities, identified for individual consideration are as under:

1. Building Materials (bricks, sand, stone, stone chips, soil, etc)
2. Agricultural Commodities
3. Important Industries (major, medium and small scale)
4. POL Products
5. Containers (ISO & Domestic)
6. Railway Traffic
7. Garbage
8. Water

Broad approach adopted to estimate individual commodities is given in the following paragraphs.

Building Materials

Building materials, comprising; bricks, sand, stone, stone chips, soil, etc. is one of the major commodity group showing movement at the intra-regional level. It involves a number of commodities with different originating points; hence a different approach has been used to capture traffic for each commodity. For bricks and stone crushers, the requisite information has been collected through market surveys (personal interview method) covering sample unit operators/association. For sand, stones, etc., check-post approach has been adopted and check-posts have been located close to the source of material to estimate the volume of traffic and its distribution pattern to work out the distances involved.

Agricultural Commodities

Commodities under agriculture are divided into three categories

- a) Food grains
- b) Fruits and vegetables and
- c) Raw materials for industries

Food grains are the major seasonal crops produced in bulk in different areas. In general two crop seasons are observed in most of the regions i.e. Rabi and Kharif. Major intra-regional movement of food grains is observed after the harvesting season, from field to the procurement point/mandi or up to the storage point. A predominant share of commodities is moved using tractor-trolleys, within a short period of 15 days to one month. To arrive at annual intra-regional traffic of each commodity (season), last season procurement at the designated mandis in the region have been used. Wherever feasible the distance involved from field to the mandi/storage point has been collected by erecting temporary check-post at the entry/exit point of the mandi, in the other case, information was collected using Delphi's Approach (knowledgeable persons approach). For distribution of food grains within the region under Public Distribution System the information has been collected from the district FCI office or the District Civil Supplies Department.

Similarly, for fruits and vegetables, requisite information has been collected from the established trading centres (fruit/vegetable mandis). Information both on incoming and outgoing commodities has been collected at the entry/exit gates using check-post approach to generate O-D flows. Since the incoming traffic is more organized, the level of accuracy could be maintained, whereas for out-going traffic, information was limited to mechanized modes of goods public transport as described earlier.

For agro-based industries, in certain regions, a major movement of agricultural out-put has been observed from field to the industrial units. These movements are also seasonal in nature, approach similar to food grains has been adopted and the relevant information was collected from the industrial unit for the last season.

Important Industries

Important industries located in the region are divided into three categories such as; major, medium and small scale. For each category sample units have been covered using market survey approach to elicit the requisite information to arrive at annual intra-regional traffic flows. Source of raw material and distribution of finished products forms the basis for traffic estimation. Installed capacity and capacity utilization were used as the control figures.

Petroleum Products

POL is another major commodity group contributing in the intra-regional traffic movement. Since source of petroleum products is limited to a small number of regions (refineries, ports, pipelines, etc), incoming traffic within the region is predominantly inter-regional in nature. A major portion of POL products arrive at the region through Railways in tank wagons. Within the region, distribution of POL products is done by road tankers up to the petrol pumps. No tertiary movement is considered as part of the intra-regional flow estimates.

Further, intra-regional movement of POL products within the industrial unit or port or airport remained beyond the scope of this study. It is pertinent to note that a sizeable quantity of POL products is supplied to these units by pipeline from the local distribution centre by creating a storage facility inside the unit, which distributes POL products within the unit by road transport. Such examples have been seen in metro cities in dealing with local Airports, where the Petroleum agencies maintain their storage points within the Airport linked to the regional storage facility and within the airport a major portion of ATF is distributed by road tankers to serve the Aircrafts.

Container Traffic

With the growing number of rail-based container depots to attract international and domestic traffic, container traffic is also considered as an independent commodity. Generally one leg of the traffic movement is intra-regional in nature. To estimate intra-regional traffic distribution of incoming goods and collection of outgoing traffic has been considered. Relevant secondary data have been collected to estimate the total quantity whereas flow patterns have been developed by carrying out goods O-D surveys.

Railway-Borne Traffic

Railway stations because of well established reasons, act as independent traffic generating centre for intra-regional flows. All the railway stations falling within the respective region have been considered. Like containers, secondary information has been collected from Station records whereas flows are generated based on O-D flows. In certain cases, where station receives any commodity for rail consumption locally (stone ballast) and do not reflect in railway movement, the traffic has been considered as part of the intra-regional flows.

Garbage

Movement of garbage is also considered as one of the important intra-regional commodity, based on its volumes and the specific types of vehicles required to deal with this commodity. It has been observed that in each city or town some area has been earmarked for dumping of garbage. Regions with low population range show dependence both on non-mechanized and mechanized modes to move garbage from city to dumping per lakhs whereas in big cities such movement is observed only by the mechanized modes of transport. In the current study movement by mechanized modes of transport has been considered. The relevant information has only been collected from the concerned local authorities like the MCD, Nagar Palika, etc.

Water

Like garbage, water is another commodity observed on the intra-regional movement. Although the water is distributed from the source to the consumption points by pipeline, in addition demand of water is also met by road transport in deficit areas. In each city there are authorized water supply points for drinking water whereas for industrial, construction or other uses, raw water is supplied. Relevant information has been collected from various sources to estimate water supply through road transport. Since water demand goes high in summer seasons, month wise authentic information has been collected from local authorities like Public Health Engineering Department.

Based on the information collected through various sources, base year commodity flows have been generated. Wherever secondary data were for period other than 2007-08, appropriate factors have been developed and used in consultation with the concerned agency to update quantities to common period. Thus, flows estimated relate only to the particular region or the class of region it represent. To arrive at National level, various socio-economic indicators that really affect intra-regional movement of goods have been considered, as a result the range of annual intra-regional flows in terms of tonnes and tonne-km have been worked out.

All the regions have been divided into a number of categories and sub-categories based on population or other economic considerations and the sample regions have been selected accordingly. While estimating the National level intra-regional goods traffic, two stage approach has been adopted. Firstly, the sample regional traffic has been applied to rest of the regions of the category it represents and secondly, the sum total of all categories/sub-categories is arrived to reflect annual National intra-regional traffic demand.

8. TRAFFIC ESTIMATION

Keeping in view the complexity of collecting requisite information and its behavior to arrive at annual estimates, each region required independent approach. Category or sub-category wise methodology adopted to estimate intra-regional traffic is described in the following paragraphs.

Ports

As discussed earlier, the country has 13 major ports and a number of intermediate and minor ports. Some of intermediate and minor ports have shown a tremendous traffic growth in the recent years. In the current report, as discussed earlier only one major port i.e. Haldia has been covered for detailed intra-regional study. Although, intermediate and minor ports have not been considered as independent traffic regions of the study, it was found necessary to account for their intra-regional traffic demand like major ports, as the same remains uncovered in the approach adopted to estimate intra-regional traffic. In this report, the norms arrived at based on Haldia Port data have been used for intermediate and minor ports also, which have been fine tuned by including the estimates for the representative intermediate and minor ports.

Since, POL traffic do not require intra-regional movement (pipeline movement not considered for intra-regional flows), while assigning port capacity, port handling capacity to deal with dry cargo alone has been considered. Port wise installed capacity of major ports is given in the Table 4. In the case of intermediate and minor ports for which detailed information on installed capacity was not readily available, actual traffic handled during 2006-07 has been used as the installed capacity.

Table 4 : Installed Capacity Of Ports (Excluding POL)

SN	STATE	REGION/DISTT.	INST. CAP. ('000T)	PORT CLASS
1	Tamil Nadu	Chennai/Madras Port	43,355	Major Port
2	Kerala	Cochin Port	9,925	Major Port
3	Tamil Nadu	Ennore Port	8,924	Major Port
4	West Bengal	Haldia port	37,802	Major Port
5	Maharashtra	JNPT (port)	34,258	Major Port
6	Gujarat	Kandla Port	43,747	Major Port
7	West Bengal	Kolkata Port	5,432	Major Port
8	Karnataka	Mangalore Port	28,200	Major Port
9	Goa	Mormugao Port	31,136	Major Port
10	Maharashtra	Mumbai Port	19,919	Major Port
11	Orissa	Paradip Port	32,457	Major Port
12	Tamil Nadu	Tuticorin Port	16,573	Major Port
13	Andhra Pr.	Vishakhapatnam Port	44,184	Major Port
14	Important Minor & Intermediate Ports		186,117	Minor+Int.
TOTAL INSTALLED CAPACITY			542,029	

By adopting the foregoing approach and methodology, the total commodity wise movement within the port area has been estimated. In the sample region, it was observed that some of the export material that could not be accommodated within the port area due to capacity constraint, had to be stored/dumped outside the port in the designated/bonded area, which has also been appropriately covered.

Commodity wise intra-regional traffic handled at Haldia Port showed iron ore as the major commodity followed by coal, containers, iron & steel, etc. Commodity wise traffic involved intra-regional movement within the port area during the year 2007-08 is given in Appendix-2. Overall norms worked out based on the installed capacity and intra-regional traffic both in terms of tonnes and tonne-km have been used to work out entire intra-regional traffic demand of the Port. Annualized intra-regional traffic demand is summarized in the Table 5.

Table 5: Intra-Regional Traffic Estimation - Ports

SAMPLE REGION	INSTALLED CAPACITY (T)	ANNUAL INTRA-REGIONAL TRAFFIC		
		TONNES	TONNE-KM (MILLION)	AV. LEAD (KM)
Haldia	20,300,000	9,275,120.6	26.19	1.26
Traffic for all the regions in this category	542,029,000	132,929,252	167.18	1.26

It is pertinent to note that lead of the commodity plays an important role in the intra-port traffic. While the lowest distance observed was to the tune of 0.2 km, the maximum lead registered was up to 8.0 km only. The commodities or traffic that is directly handled from/to the ship to outside region, using any mode of transport - rail, road or IWT, has not been considered in this exercise.

Based on the norms developed using Haldia port data, intra-regional traffic demand for the entire ports sector has been worked out. Port sector alone contributes around 132.9 million originating

tones. Overall traffic in terms of tonne-km worked out to 167.18 million, due to low average lead of 1.26 km.

Major Industries

While regionalizing the entire study area, 14 civil districts that covered major industries were bifurcated into two; one is representing the major industrial unit and the other being the district. Out of 14, ten regions represent major steel plants, one oil refinery, two ship-breaking yards and one as hub of iron & steel re-rolling units. Amongst the regions other than major steel plants, intra-regional traffic could not be estimated, because these regions represented a common activity by a large number of individual units, unlike steel plants where entire processing is under one agency and traffic movement pattern is captive in nature. In the light of this, the current exercise is limited to intra-regional demand of major steel plants in the country.

As discussed earlier, Bhilai steel plant has been considered as the representative unit. (For Facts and figures of Bhilai Steel Plant refer Appendix-1)

Based on the information collected, it is observed that both rail and road are used as the modes for intra-regional transport. Rail services are utilized as Merry Go Round System for specific bulk commodities whereas road transport is used in open earth mining and other movement of goods. Captive iron ore mines for Bhilai Steel Plant are located in Dalli and Rajja-Harra areas which are about 90-120 kms from the Bhilai plant site. Movement of ores in the mining area are not covered as a part of the steel plant firstly because, mining movement is considered independently and secondly, ore areas fall under different region thereby forming inter-regional movement of goods. Similarly, Limestone is bought from Nadini Mines which are spread over an area of about 9-20 km from the plant. Both the raw materials are moved up to the plant by Rail. Similarly, regular supply of coal is maintained through Rail as an inter-regional traffic, is kept beyond the purview of the intra-regional flows.

Table 6: Intra-regional Traffic Estimation – Major Industries (Steel Plants)

Sample Region	Installed Capacity (T)	Annual Intra-regional Traffic		
		Tonnes	Tonne-km (Million)	Av. Lead (km)
BHILAI STEEL PLANT	8005000	2146080	17.81	8.30
TOTAL (For All Regions in this Category)	47860000	12830904	106.49	8.30

Based on the installed capacity of Bhilai Steel Plant and its estimated intra-regional transport demand, other major industries have also been treated. Against the total installed capacity of 8.0 million, intra-regional demand worked out to 2.14 million tonnes and 17.81 million tonne-kms in the year of the study, corresponding figures of all the major industries thus worked out to 12.83 million and 106.49 million in terms of tonnes and tonne-km, respectively, resulting in over all average lead of 8.30 km.

Mines

Keeping in view the importance of road transport demand in mining areas, information from selected mines has been collected. Since Bhilai Steel is also considered as a sample major industrial unit, related movement of iron ore, limestone and dolomite have been assessed. Dalli and Raja Harra iron ore mines are located around 90 kms from Bhilai steel Plant. Open earth mining is in use. Presently, mining is carried out at five locations. Two big crushers and screening units are installed which are connected to the Rail system. The entire ores are bought to the crushers from various mining areas through big Road Dumpers. The movement from pithead to crushers by Dumpers is considered as the intra-regional. Similarly in the case of Limestone & Dolomite from Nadini Mines similar exercise has been carried out.

Since coal is one of the major commodities, sample collieries in District Dhanbad have been surveyed to estimate intra-regional transport demand. Although at national level Rail is the major mode of transport, in the current exercise, coal movement from pithead to the crusher/washery /rail siding by road transport has been considered.

Since zinc represents a set of low quantity ores, relevant information on transport demand has been collected through Jabar mines in Udaipur.

Average lead of movement estimated based on the sample ores is summarized below:

SN	COMMODITY	MINING LEAD (KM)
1	Coal	4.73
2	Dolomite	6.23
3	Lime Stone	2.3
4	Iron Ore	3.3675

Average lead is lowest in the case of Limestone and the highest in the case of Dolomite, mainly on reflects availability of crushing units within the mining area. To estimate overall intra-regional transport demand, different ores have been considered separately to match their handling and transportation characteristics to the sample commodities covered. Based on the total output of the year 2007, overall mining haulage transport demand has been worked out. Against the total domestic production of 848,647 million tonnes overall average mining lead is estimated as 3.91 km, as given below:

COVERAGE	ANNUAL INTRA-REGIONAL TRAFFIC		
	TONNES (MILLION)	TONNE-KM (MILLION)	AV. LEAD (KM)
Traffic for all the regions in this category	848,647	3,317.816	3.91

9. POPULATION BASED CATEGORIES

Non-Metro Regions

Sub-Category- POPULATION UP TO 1.0 Lakh

Twenty one regions fall under this category, of which seven are in Arunachal Pradesh State (List given at **Appendix-3**). The Yanam District of Pondicherry with population of 31,362 (2001 Census) is the lowest populated region in this category, whereas South Garo Hills (Meghalaya) region is on the other end with 99,106 people. In this sub-category, two regions have been selected for the detailed intra-regional study i.e. Tawang and East Siang, both falling in Arunachal Pradesh. Through this exercise, an attempt has been made to reflect the direct impact of population, as East Siang has a population of 87430 as against 34705 of Tawang, in the same state.

East Siang is located about 250 km from the State Capital of Itanagar, measuring about 7422 sq km. The region has six administrative blocks. The region has no direct rail connectivity and the nearest railway station is at Murkongselek. Further, the region Lakhks air connection and Passighat Airport serves this region. (For Facts and Figures of the region refer **Appendix-1**).

Tawang, the other region is having an area of 2172 sq km and have three administrative blocks. Like East Siang, Tawang also suffers from inadequate transport connectivity by rail and air. Nearest railway station is Bhalukpong (Assam) about 298 km from the Hq. Although Tawang

has Helipad facility of its own, the nearest Airport is at Tezpur in Assam. (For Facts and Figures of the region refer Appendix-1).

In inter-regional goods traffic surveys there was no check-post directly capturing the intra-regional flows. To estimate current (base year 2007-08) traffic flows, goods origin-destination data have been collected at 8 check-posts in East Siang and 5 check-posts in Tawang regions. Number of intra-regional goods trips intercepted during 48-hour surveys was 167 in East Siang and only 71 in Tawang Region.

Both the regions have shown a peculiar character, that a major portion of traffic intercepted was inter-regional in nature. It was mainly attributable to low population with poor connectivity by road transport. Based on the secondary data, it was observed that a major portion of goods were directly received as inter-regional traffic. The total annual (2007-08) intra-regional traffic estimated for East Siang region is 2, 11,402 tonnes as against 1, 70,053 originating tonnes for Tawang. Commodity wise annualized traffic for East Siang and Tawang, is given in Appendix-2.

For working out the sub-category total traffic, norms have been developed by summing up population, tonnes originating and annual tonne-km performed in the two regions and applied to the overall sub-category population. Norms and traffic estimates for the sub-category are summarised in Table 7.

Table 7: Intra-regional Traffic Estimates - Population upto 1.0 Lakh

SAMPLE REGION	POPULATION	AREA SQ KM	ANNUAL INTRA-REGIONAL TRAFFIC		
			TONNES	TONNE-KM (MILLION)	AVERAGE LEAD (KM)
EAST SIANG	87,397	7422	211402.5	7.88	37.29
TAWANG	38,924	2172	170053.5	4.98	29.28
TOTAL (For Sample Regions)	126321	9594	381456.0	12.86	33.72
TOTAL (For All Regions in this Category)	1,187,797		3586832.9	120.95	33.72

Sub-Category - POPULATION BETWEEN 1.0 Lakh and 5.0 Lakh

This sub-category covers 63 regions (list given at Appendix-3), of which only two have been selected for detailed intra-regional study, namely; Uttarkashi and Solan. In the current exercise only Solan region in the State of Himachal Pradesh has been included. Solan has a total population of 4, 99,430 (2001 Census) and is well connected to the national road network. On the rail sector, the region has Narrow Gauge connectivity, as a result for intra-regional movement it do not show any impact. The region has one large cement plant operational and another two cement plants are under different stages of implementation. A large quantum of lime stone movement highly affects the overall intra-regional demand of traffic. In addition, the region has three areas earmarked for industrial development, where the State Government has given adequate benefits to attract industrial development, namely; Parwanoo, Badi/Barotiwala and Nalagarh. Broad Facts & Figures of the region are given in Appendix-1.

In inter-regional surveys check-posts were located in only Solan region which also captured intra-regional traffic. In addition, 17 check-posts were surveyed, located mainly to capture intra-regional movement of goods. In total 1891 goods vehicle trips were intercepted of which 1342 trips were originating as well as terminating within the region. As defined earlier, together with goods traffic information collected through survey approach, requisite information has also been collected through field studies/discussions and secondary sources.

For estimating annual intra-regional traffic demand, approach similar to earlier category has been used. It is important to mention that cement industry alone contributed 3.7 million originating tonnes in the overall intra-regional traffic demand of 7.36 millions.

The second region selected in this particular group is Uttarkashi which has a population of 295013 (2001 Census). The region is geographically hilly and having very few industries. Broad Facts & Figures of the region are given at the Appendix I. Agriculture is one of the mainstays of the district's economy but again it is not done in very large scale. These factors contribute to the very low annual tonnes & tonnes-km if we compare it with other district of this group i.e. Solan. Uttarkashi is approx. 4 times bigger than Solan yet it has registered low annual intra-regional traffic. Comparative low volumes of traffic can be attributed to the presence of Industrial units in the case of Solan. Table 8, shows the comparative annual intra-regional traffic of the two regions and the estimated overall transport demand of all the regions falling in this category. Commodity wise goods flows of Solan and Uttarkashi, for the year 2007-08 are given in Appendix-2.

Table 8: Intra-regional Traffic Estimation - Population 1.0 - 5.0 Lakh

SAMPLE REGION	POPULATION	AREA SQ KM	ANNUAL INTRA-REGIONAL TRAFFIC		
			TONNES	TONNE-KM (MILLION)	AVERAGE LEAD (KM)
SOLAN	499403	1936	7368152.9	143.6	19.48
UTTAR KASHI	295013	8016	697332.50	7.84	11.24
TOTAL (For Sample Regions)	794416	9952	8065485.40	151.44	18.78
TOTAL (For All Regions in this Category)	187,107,670		170,941,000	3,208.88	18.77

Sub-Category - POPULATION BETWEEN 5.0 Lakh and 10.0 Lakh

This sub-category has 95 regions (list given in Appendix-3) of which Koderma (Jharkhand) Region is at the bottom with population level at 500,557 and Jorhat Region of Assam with population of 999221 lies on the other end of the spectrum. For estimation of intra-regional flows, keeping in view the wide range of population i.e. 5.0 Lakh to 10.0 Lakh, two regions have been identified, namely; Morigaon (Assam) and Kathua (J&K). Population of Kathua and Morigaon is 550,084 and 776,256, respectively. An attempt has been to assess the impact of spatial coverage of the regions for estimation intra-regional transport demand.

Morigaon is one of the two region covered under this category. The total intra-regional traffic estimated for the year 2007-08 is 718870 tonnes and 16.98 million in terms of tonne-km. Facts and Figures of the region and commodity wise traffic estimated for Morigaon is given at the Appendix-2.

The other region covered under this category is Kathua which has the population of 550084 (2001 census). It also acts as a gateway to the state of Jammu & Kashmir. Facts and Figures of the Kathua are given at the Appendix-1. The district is well connected with the rest of the country by road as well as rail network. The region registered a heavy intra-region traffic movement as compared to Moregaon, because its locational advantage as well as rivers passing through the region offering river borne building material. The total intra-regional traffic estimated during the reference period works out to 2167576.5 tonnes and 62.43 million tonne-km. Similarly average lead for the above traffic is 28.8 km which is higher than the other covered district of this group. The region has a number of stone crushers which has a huge effect on the movement of the intra-region commodity flows. The other major commodities are Food grains & Provisions/Kiryana goods. On the outskirts of Kathua, there is a well developed industrial estate, SICOP (State industrial cooperation), including the Chenab Textile Mill (CTM). This venture of Birla Group, established in the 1970s, contributed greatly to the development of today's Kathua.

In addition to CTM, there are several other factories, manufacturing cement, iron, and other products. Commodity wise traffic estimated for Kathua is given in Appendix-2.

Based on the traffic estimated for the two regions, traffic demand of population category between 5.0 Lakh and 10.0 Lakh has been worked out. The total population under this category is 70.53 million and the total intra regional traffic estimated for is 153.555 million in terms of tonnes originating and 4.224 billion in terms of tone-km performed. Estimated traffic for the year 2007-08 is given in Table 9.

Table 9 : Intra-Regional Traffic Estimation - Population 5.0- 10.0 Lakh

SAMPLE REGION	POPULATION	AREA SQ KM	ANNUAL INTRA-REGIONAL TRAFFIC		
			TONNES	TONNE-KM (MILLION)	AVERAGE LEAD (KM)
Morigaon	776,256	1704	718,869.7	16.98	23.62
Kathua	550084	2651	2167577	62.43	28.80
TOTAL (For Sample Regions)	1326340	4355	2886446	79.41	27.51
TOTAL (For All Regions in this Category)	70539141		153.555	4224.357	27.51

Sub-Category- POPULATION BETWEEN 10.0 Lakh and 20.0 Lakh

This is the largest sub-category covering 207 regions (list given as Appendix-1), of which, 5 regions have been identified for detailed study, namely; Betul (MP), Patiala (Punjab), Dhule (Maharashtra), Yamunanagar (Haryana), Munger (Bihar) and Bidar (Karnataka). Since this category includes the maximum number of regions, attempt has been made to capture regions with different socio-economic condition to draw appropriate intra-regional results. Where Patiala region covers, important cities like Mandi Gobingarh (hub of Re-rolling units in Northern India), Dhule is known for its importance in Cotton production. Similarly, other regions are selected to represent a peculiar socio-economic characteristic.

Out of the six regions, complete information from the five regions could be collected, i.e. Bidar, Betul, Dhule, YamunaNagar and Patiala and Munger could not be included because of incomplete information.

Amongst the regions under study, Yamunanagar showed the highest level of economic activity. The region covers a large number of small and medium scale industries both agro and non-agro based. On agriculture side, the region produces large quantity of rice, wood and sugarcane, as a result there are large numbers small and medium scale units involved in rice milling and Plywood manufacturing. There is one sugar factory in the region that receives a major share of sugarcane available locally. In addition the region gets advantage of Yamuna River in excavating sizeable quantities of various building materials, such as, stone, sand, stone chips, etc. The soil of the region is also very good for making bricks as a result there are nearly 200 brick kilns of different capacities.

The region has shown a peculiar character in movement of agricultural commodities using tractor-trolleys. Every day morning the twin-city of Jagadhari and Yamunanagar witnesses about 800-900 tractor trolleys loaded with raw wood for trading. A major share (60-65%) of the wood traffic is originating locally and about 85-90 per cent of the raw wood is processed in the plywood and related units located within the region.

All the above activities, involved multiple intra-regional movement, resulting in huge traffic demand. The same has been reflected in the base year traffic flows. In the year 2007-08, total intra-regional traffic was estimated at 16.71 million tonnes and 272.9 million tonne-km indicating

an average lead of 16.33 km. For other regions, intra-regional traffic contribution is quite low. It is pertinent to note that although Yamunanagar shows the highest volume of intra-regional traffic in terms of tonnes and tonne-km, the average lead traveled is the lowest in this category.

The overall volume of traffic estimated for the sub-category, (pertaining to 207 regions) is 1340.64 million in terms of tonnes originating and 25650.26 million as tonne-km. Traffic estimated for sample regions and that of the sub-category is summarized in the Table 10.

Table 10: Intra-regional Traffic Estimation - Population 10.0- 20 Lakh

SAMPLE REGION	POPULATION	AREA SQ KM	ANNUAL INTRA-REGIONAL TRAFFIC		
			TONNES	TONNE-KM (MILLION)	AVG. LEAD (KM)
Yamuna Nagar	1041630	1768	16710171.1	272.87	16.3
Betul	1395175	10043	2704423.6	62.88	23.3
Bidar	1502373	5449	2899219.7	99.19	34.2
Patiala	1844934	3627	3609359.0	61.04	16.9
Dhule	1707947	8060	2926815	59.77	20.42
TOTAL (For Sample Regions)	74,92,059	2894	28,849,988	555.75	111.12
TOTAL (For All Regions in this Category)	299,130,082		1523,480,000	26414.54	17.34

Facts and figures of the regions & commodity wise intra-regional traffic estimated for each is given Appendix-1 and Appendix 2 respectively.

Sub-category: POPULATION BETWEEN 20.0 Lakh and 30.0 Lakh

This sub-category covers 108 regions of the study (list given as Appendix-3). Like the earlier sub-category of 10-20 Lakh population, to appropriately represent this sub-category, six regions have been identified for detailed study, i.e. Nizamabad (AP), Buldana (Maharashtra), Cuddapah (AP), Mathura (UP), Mysore (Karnataka) and Nanded (Maharashtra). While the results have been drawn on the basis of four regions i.e. Buldana, Mysore, Nanded, Mathura, Nizamabad and Cuddapah could not included because of inadequate information. Facts and figures of Buldana, Mysore, Nanded and Mathura regions are given as Appendix-1.

Mysore region with population of 2641027 is spread over 6854 sq km. The region has tourist importance. The region has one big automobile manufacturing unit, as a result a large number of ancillary small units attached to it are located here. Mysore has one sugar factory, for which a major portion of sugarcane is procured locally.

Rail inward and outward traffic handled at various railway stations in the region heavily contribute towards intra-regional traffic moved by road. All the bulk commodities dealt with at the railway stations involved local transportation. In the year 2006-07 various stations in Mysore region showed inward traffic of 1.234 million tonnes against the outward traffic of 0.37 million tonnes. The commodities that involved intra-regional movement by road have only been considered in the present exercise. To arrive at 2007-08 commodity flows by rail, appropriate raising factors have been developed and used, after discussions with the concerned authorities. Rail traffic for the year 2006-07 and 2007-08 is given in Tables 11 and 12.

Table 11: Rail Terminating Traffic at Mysore

SN	COMMODITY	TONNES	
		2006-07	2007-08
1	Iron & steel wrought	123	132
2	Coal	28420	30409
3	Coke	3499	3744
4	Cement In bags	443144	474164
5	Chemical Manure & Fertilizers	135641	145136
6	POL Products	205063	219417
7	Others / Misc.	640	685
8	Others/ Misc.	4484	4798
9	Rice	195752	209455
10	Urea	76596	81958
11	Wheat	140818	150675
TOTAL		1234180	1320573

Table 12: Rail Originating Traffic at Mysore

SN	COMMODITY	TONES	
		2006-07	2007-08
1	Iron Ore booked for Export	298686	319594
2	Iron ore booked for steel plants JVSL	3685	3943
3	Military traffic	3359	3594
4	Sugar	64708	69238
TOTAL		370438	396369

Other regions have also been studied at length to estimate the base year intra-regional transport demand.

The other sample region which is showing the major traffic movement is Mathura. Building material predominantly stone chips is one of the major commodities contributing to the overall traffic scenario of the region. Out of total 3157390.112 annual tonnes & 107.2(in millions) tonne-kms, stone chips & other stone products contribute nearly 50 % of traffic due to the presence of many stone crusher in the region. It also shows the multiple movements of the building materials in the region. The other major commodity is Sugarcane. There is one sugar factory in the region for which Sugarcane is bought locally.

Nanded & Buldana the two other regions covered under this category are comparatively much bigger in size with approximately 10502 sq km and 9661 sq km in area, respectively but they are comparatively lower in intra-regional traffic demand, indicating a low economic development in these two districts. There are very few industrial activities in Nanded. Only a few small and medium scale industries are located here, serving the local needs (foundries, rice mills, construction, farm machinery manufacturing, etc. On the agricultural side, Nanded is famous for the production of the pomegranate and banana. In both the mentioned regions, the major commodities which are falling under the intra-regional goods flow are foodgrains and building materials which are contributing approximately 50 % of the total traffic of the region. The average lead of Buldana is 27.76 km which is higher than that of Nanded with 23.46 km.

Commodity wise traffic flows for all the regions surveyed in this particular group are given in **Appendix-2**. Intra-regional traffic estimates for the sample regions covered in the category are given in Table 13.

Table 13: Intra-regional Traffic Estimation - Population 20.0 - 30.0 Lakh

SN	SAMPLE REGION	POPULATION	AREA SQ KM	ANNUAL INTRA-REGIONAL TRAFFIC		
				TONNES	TONNE-KM (MILLION)	AVG. LEAD (KM)
1	Mysore	2641027	6854	3784813.7	109.80	29.01
2	Mathura	2074516	3332	3882451.71	108.28	27.89
3	Buldana	2232000	9661	1230462.95	34.20	27.76
4	Nanded	2868000	10502	1821776.15	42.74	23.46
TOTAL TRAFFIC		9815543	30349	10719504.51	295.02	27.52
Traffic for all Regions in this Category		264,775,804	678,608	289160307	7957.309	27.52

Sub-Category- POPULATION ABOVE 30.0 Lakh

This sub-category includes 66 regions. Although the number of regions are less in comparison to other sub-regional categories, 3 regions namely, Rajkot, Allahabad and Thiruvananthapuram, were identified for detailed surveys keeping in view the proportionate share of overall country's population level. Because of the incomplete data Thiruvananthapuram could not be included in the final estimation. Like population category of 20-30 Lakh, the regions under this category are more industrialized. Important intra-regional traffic contributing commodities such as, building materials (bricks, sand, stone & chips, etc), are restricted for excavation because of pollution and allied affects, hence some of the regions falling under this category are adversely affected. To meet such demand, inter regional flows are observed rather than intra-regional, as in the case of small populated regions. The regions under this category are highly affected by railway traffic. Majority of the traffic received or dispatched at various railway stations in each region are also dealt with by the local modes of transport between the actual pLakhe of origin and final pLakhe of destination. In the current exercise only one region has been thoroughly studied i.e. Allahabad. Facts and figures of Allahabad are given in Appendix-I.

Allahabad is spread over 5482 sq km and comprises 5 Tehsils and 19 Administrative Blocks. The region has three major railway stations handling a sizeable goods traffic, namely; Allahabad, Naini, and Subedarganj. The total commodity wise outward traffic handled at various railway stations during the year 2006-07 was 1.28 million tonnes, whereas the region has nearly the equal quantity of incoming traffic of 1.33 million tonnes. Major outgoing commodities are urea and sand. For urea the traffic is directly dispatched from the factory siding, thereby it do not require intra-regional movement, whereas sand is brought to railway station by road transport is considered for intra-regional movement. The 2006-07 traffic has been appropriately raised to 2007-08 levels. Commodity wise outgoing traffic handled at various stations is summarized in the Table 14.

Table 14: Outgoing Traffic from Various Railway Stations in Allahabad Region

SN	COMMODITY	TONNES	
		2006-07	2007-08
1	Bamboo chips	1242	1328.94
2	Fibre unpressed	945	1011.15
3	Urea	1243860	1330930
4	Others/ Misc.	120	128.4
5	Military traffic	0	0
6	Bamboo chips	2473	2646.11
7	Cement In bags	9874	10565.18
8	Rice	2455	2626.85
9	Sand	21514	23019.98
TOTAL		1282483	1372257

The incoming traffic handled at various railway station in the regions is summarized in Table 15.

Table 15: Incoming Traffic at Various Railway Stations in Allahabad Region

SN	COMMODITY	TONNES	
		2006-07	2007-08
1	Urea	36	38.52
2	Batteries	55	58.85
3	other cement manufactured	60	64.2
4	China ware(potteries)	63	67.41
5	Other stones, stone-ware and pipes	64	68.48
6	Motor cars including taxi cars	112	119.84
7	other cement manufactured	120	128.4
8	Pulses other than grams & gram products	123	131.61
9	Mango	198	211.86
10	Timber NOC	375	401.25
11	Ghee	486	520.02
12	Urea	693	741.51
13	Other edible oils - Div. E	931	996.17
14	Matches – Non-safety	1067	1141.69
15	Misc. Chemical Manure	1399	1496.93
16	Urea	1440	1540.8
17	Low sulphar heavy stock	1503	1608.21
18	Others/ Misc.	2336	2499.52
19	Other stones (MOC)	2426	2595.82
20	Other stones – Ballast	2434	2604.38
21	Food grains	2496	2670.72
22	Other stones (MOC)	2970	3177.9
23	Military traffic	3016	3227.12
24	Gypsum in powder	3611	3863.77
25	Commodities Carried by Departmental Wagons and trains for Home Line	4731	5062.17
26	ATF	4805	5141.35
27	Naptha Mineral	6617	7080.19
28	Turpentine oil or spirits	6637	7101.59
29	Fertiliser booked from ports (indigenous)	6913	7396.91
30	Petrol in bulk in tank wagons	6919	7403.33
31	Rice	7430	7950.1
32	Diesel oil bulk in conv. wagons	22702	24291.14
33	Furnace oil (FO)	23242	24868.94
34	Salt NOC	28082	30047.74
35	Petrol in tins	35181	37643.67
36	Iron & steel wrought	56903	55998.45
37	Wheat	62192	66545.44
38	Naptha solvent	76527	81883.89
39	Chemical Manure	77486	82910.02
40	Kerosene oil in bulk in tank wagons	88337	94520.59
41	Urea	91946	98382.22
42	Naptha Mineral	92963	99470.41
43	Cement In bags	256306	274247.4
44	Coal	350425	374954.8
TOTAL		1334358	1422875

Based on the foregoing information, intra-regional traffic of Allahabad region has been worked out, which formed the basis to estimate annual intra-regional traffic of this category. The quantum of traffic estimated for Allahabad regions is 13.86 million originating tonnes and 224.02 million terminating tonnes. Overall intra-regional transport demand of this sub-category is 725.61 million tones and 11725.97 tonne-km. Average lead is estimated as 16.16 km. The same has been presented in the Table 16.

By adopting the similar approach, the detailed analysis of Rajkot (a region in Gujarat State) has been carried out. The total traffic estimated against the total population of 3169881 in the year 2001 of Rajkot work out to 21.24 million tonnes resulting in an overall transport demand of 223.78 million tonne-km.

Facts and figures of the sample regions and the base year commodity wise traffic flows are given as Appendix 1 and Appendix 2 respectively. Overall annual intra-regional traffic estimated for this sub-category is given in Table 16.

Table 16 : Intra-regional Traffic Estimates - Population Above 30.0Lakh

SN	Sample Region	Population	Area Sq Km	Annual Intra-regional Traffic		
				Tonnes	Tonne-km (Million)	Average Lead (km)
1	Allahabad	4,936,105	5,425	13,863,268	224.0260	16.16
2	Rajkot	3,169,881	11203	21,241,043	223.78	10.54
Traffic for all the Regions in this Category		258635593		1,118,894,867	14273.10	12.76

10. REGIONS COVERING METRO CITIES

As per 2001 Census, 25 cities with population above 1.0 million have been designated as Metro Cities (list given as Appendix 3). Keeping in view the wide variation of population from 20.0 Lakh to above 100 Lakh two sub-categories have been framed for the purpose of the study. One sub-category covers regions above 40.0 Lakh population whereas the remaining regions are covered under the second category.

It is important to mention here that the regions covered under this category do not cover the metro city population only but the other population falling in the regions has also been considered under the same head. Secondly, some of the region where there may be more than one administrative district, but there is no clear cut demarcation of population between the districts, districts are clubbed to form a region for the purpose of this study e.g. Delhi, that comprises seven administrative districts. In the current exercise, only one region, namely Delhi has been covered. Like Inter-regional flows approach to capture Metro Cities goods traffic, seven days goods O-D traffic surveys have been conducted at the selected locations to generate intra-regional flows.

Like other developed regions covered under higher population range categories, Delhi also do not show huge volumes of intra-regional building material traffic. Factually, the regions falling under this category do not produce any agricultural output but because of their involvement in trade huge volumes of commodities are observed. All major commodities that are reflected in lower population categories, such as building materials, become inter-regional in these regions.

Railway traffic is contributing heavily in generation of intra-regional flows, because of obvious reasons. During the year 2006-07 Delhi received about 16.07 million tonnes against the total rail dispatch of 3.8 million tonnes. Commodity wise originating and terminating goods traffic in Delhi during 2006-07 is given at the Appendix-2. Summarized originating and terminating traffic at Delhi is given in Table 17.

Table 17: Goods Originating & Terminating Traffic at Railway Stations In Delhi Region

SN	COMMODITY	TONES	
		2006-07	2007-08
1	Goods Originating	3837733	4106374.31
2	Goods Terminating	16073304	17198435.3
TOTAL TRAFFIC		19911037	21304809.6

Rail originating traffic shows the highest contribution by containerized cargo, ISO flowed by DSO containers. Foodgrains comprising wheat, rice, grams and pulses are other important commodities observed in the originating traffic. Similarly, on terminating side, coal for thermal

plants followed by containerized traffic is the main. In depth study has been carried out to assess traffic of various commodities originating or terminating to arrive at their impact on intra-regional flows and the extent of lead involved within the region. In addition, there are certain commodities, which do not impact intra-regional flows in less populated regions, such as; Water, Garbage, etc. have also been studied, because of their growing importance.

An attempt was also made to cover Jaipur region as one of the Metro Cities. Because of inadequate data the same could not be included in finalizing the annual traffic flows of the category under consideration.

Facts and figures of the sample region and commodity wise intra-regional flows of the region are given in Appendix I and Appendix-2 respectively.

Overall intra-regional traffic estimated based on Delhi information worked out to 386.7 million in terms of tonnes and 7461.54 million in terms of tonne-km. Average lead is 19.30 km. The same has been reproduced in Table 18.

Table 18: Intra-regional Traffic Estimation - Metropolitan Cities

SN	SAMPLE REGION	POPULATION	ANNUAL INTRA-REGIONAL TRAFFIC		
			TONNES	TONNE-KM (MILLION)	AVERAGE LEAD (KM)
1	Delhi	13,782,976	42333623.3	816.9	19.30
Traffic for all the Regions in this Category		126,879,891	3866565269	7461.54	19.30

Considering that estimation of traffic with regard to Jaipur, could not be completed due to inconsistency of data collected, traffic for all the Metro cities has been assessed on the basis of data for Delhi, which might deflect the scenario marginally.

II. SUMMATION

Based on the foregoing details of all-India level intra-regional goods traffic estimates are given in Table 19. As described earlier, sample norms of tonnes and tonne-km worked out on the basis of sample units covered under each category or sub-category have been applied to all the regions falling in that category based on their overall installed capacity or population as the case was.

Out of the 623 regions, 15 regions where the population or independent installed capacity was not available, as they are formed by bifurcation of the parent district, could not be considered independently. In the current exercise their traffic contribution remains a part of their pre-bifurcated region. The regions covered represent the overall dry cargo handling capacity of 542.03 million tonnes of Indian Ports whereas on the industrial sector the overall capacity considered is restricted to major steel plants 47.86 million tonnes, the same has already been described under data not covered. Once all the industrial units are included the traffic would show a significant change.

In the current exercise, based on the data collected, covering 13 regions out of 623, the overall traffic in terms of tonnes work out to 3.95 billion tonnes originating and 69.37 billion in terms of tonne-km performed. Average lead worked out to 17.6 km.

The traffic estimated on the basis of population of the country (restricted to study area) works out to 3.27 billion in terms of tonnes originating and 66.62 in terms of tonne-km performed. The average lead worked out to 20.4 km.

For ports and major industries, since a small portion of traffic involves intra-regional movement by road (intra-regional movement by rail or IWT has not been considered) the total traffic contribution is 675.7 million in terms of tonnes and 2.75 billion in terms of tonne-km. The average lead traveled, as expected, is only to the extent of 4.1 km.

Table 19: INTRA-REGIONAL TRAFFIC SUMMARY

SN	REGIONAL CATEGORY	SAMPLE SIZE (NO. OF REGIONS)	TOTAL POPULATION/ INSTALLED CAPACITY (Tons)	ANNUAL TRAFFIC ('000 Tons)	TONNE-KM (MILLION)	AVERAGE LEAD (KM)	
1	PORTS *	13	355,912,000	132,929	167.181	1.26	
2	MAJOR INDUSTRIES	10	47,860,000	12,831	106.494	8.30	
	SUB TOTAL	23	403,772,000	145,760	273.675	1.88	
3 a	REGIONS COVERING NON METRO CITIES						
	Population up to 1.0 Lakh **	21	1,187,797	3,586.83	120.951	33.72	
	Population 1.0 - 5.0 Lakh **	63	187,107,670	170,941	3,208.876	18.77	
	Population 5.0 - 10.0 Lakh **	95	70,539,141	153,555	4,224.357	27.51	
	Population 10.0 - 20.0 Lakh **	207	299,130,082	1,523,480	26,414.540	17.34	
	Population 20.0 - 30.0 Lakh **	108	264,775,804	289,160	7,957.309	27.52	
	Population above 30.0 Lakh **	66	258,365,593	1,118,895	14,273.102	12.76	
	Regions not covered independently	15	-	-	-	-	
3 b	REGIONS COVERING METRO CITIES						
	METRO CITY	25	126,879,891	386,657	7,461.543	19.30	
	SUB TOTAL	600	1,207,985,978	3,646,275	63,660.677	17.46	
4	Mine Haulage (All Minerals other than Petroleum)			848,647	3,317.816	3.91	
	GRAND TOTAL	Including Mine Haulage	623	1,611,757,978.3	4,640,682.0	67252.169	14.5
		Excl. Mine Haulage			3,792,034.9	63,934.4	16.9
* Ports include traffic assessed for important Intermediate + Minor Ports							
** Population Based on 2001 Census							

It may be mentioned that since the above estimates are based on limited number of regions, the estimate would undergo a change when results of all the regions identified for surveys are included. Further, it is felt that the intra-regional flows estimated above are on a lower side, capturing between 80-85% of the traffic) due to the sample size and various factors explained under item no. 5 (Traffic Coverage).