

# POTENTIAL OF FREIGHT DISTRIBUTION THROUGH URBAN RAIL SYSTEM, CASE STUDY - DELHI

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# STRUCTURE OF PRESENTATION

- URBAN FREIGHT TREND IN INDIA
- PROFILE OF DELHI
- FREIGHT PROFILE OF DELHI
- BEST PRACTICES
- CASE COMMODITY PROFILE
- URBAN RAIL NETWORK CHARACTERISTICS
- DEVELOPMENT OF ALTERNATE SCENARIOS
- CONCLUSION AND RECOMMENDATION

# URBAN FREIGHT TREND IN INDIA

- The movement of goods within urban areas is vital as **cities are the center of economic and social life.**
- Cities can be perceived as an **economic, social, political and cultural entity.**
- **Very limited studies** have been carried out in India on Urban Freight movement.

## Daily Goods Flow

City	Population (lakhs)	Intercity Inbound		Intercity outbound		Intracity Flow	
		Vehicles	Tonnes	Vehicles	Tonnes	Vehicles	Tonnes
Ahmedabad	32.97	7060	42994	2087	12811	7019	13996
Nagpur	16.61	2754	18556	1112	6501	8517	8234
Indore	11.04	3699	23236	1183	11988	1863	4237
Vizag	10.52	2604	18026	267	829	1244	645
Agra	9.56	2934	17103	1551	5873	3185	2888
Asansol	7.64	798	4115	423	143	1677	556
Nashik	7.22	2731	16558	348	1854	879	1715
Bhuwaneshwar	4.16	2206	15494	118	660	185	215
Ajmer	4.02	1469	7618	4	51	1534	1413
Yamunanagar	2.2	2648	14956	1294	10805	210	1567
Adani	1.36	642	2884	517	2329	501	528
Darjeeling	0.73	140	557	39	66	524	326
Samastipur	0.58	1650	6319	134	237	242	302
Chickballapur	0.47	210	943	79	154	27	43

Source: CRRl Study (1998)

• Study by **MITES (1998)** for 21 cities concluded that **freight traffic generation is a function of city size and its economic activities and tends to increase with city size.**

• **CRRl Study (1998)** observed that **goods traffic generally tends to vary consistently with respect to city size, its economic base and its location.**

# ISSUES IN URBAN FREIGHT SECTOR IN INDIA

- Absence of a comprehensive understanding of supply chain and freight logistics.
- Significant disconnection between industry and the government bodies.
- Absence of effective scientific traffic management strategies.
- Non-standardization of goods delivery vehicles.
- No statutory planning norms.



*Sanjay Gandhi Truck Terminal*



*Pollution due to trucks*



*Truck Accidents due to uncontrolled speed and tonnage carried*



*Loading & unloading causing congestion*



*Old Delhi*



*Trucks lined up for entering into Delhi at Badarpur*

# SUSTAINABLE STRATEGIES

- Preferential zoning or property tax relief for properties used in urban goods movement.
- Low Emission Vehicles, environmentally friendly modes (through existing RAIL system), and alternate fuels.
- Underground Freight Transport System
- Low Emission Zones (LEZ)
- Combined Use Lanes
- Unattended Delivery Systems
- Retail Delivery Stations
- Freight Villages
- IT and driver training

## To boost revenue, airport Metro to carry cargo now

**Times News Network**  
**New Delhi:** After slashing fares to bring in more commuters, the Delhi Metro Rail Corporation is trying other ways of increasing revenue on the Airport line. From March 1 this year, DMRC will start cargo services on the Airport Express line on an experimental basis, said a Delhi Metro spokesman.  
 The cargo, said Metro officials, will be carried in the area earmarked for luggage that is available on the Metro line. At present, this space is kept for commuters who may be travelling with luggage.  
 "The agency will utilise the Airport Express line for transporting cargo between

**The cargo, said Delhi Metro officials, will be carried in the area earmarked for luggage that is available on the airport line**

the New Delhi and IGI airport Metro stations on a trial basis for three months. Prohibited items as per statutory rules or as notified by DMRC from time to time shall not be allowed and the cargo will be transferred after the necessary security checks," added the Delhi Metro spokesman.  
 This, Delhi Metro claimed, will be the first time that

a Metro system in India is being used for the transportation of cargo. "Based on the experience, a tender for a long term arrangement shall be floated," added the DMRC official.  
 According to Delhi Metro, the initiative will help "reduce the consumption of fossil fuels, carbon dioxide emission and improve the air quality as less number of cargo vehicles will ply on the roads as a result," said the DMRC spokesman.  
 He also added that since trains on the Airport Express line have dedicated coaches for luggage, the introduction of cargo services will not cause any inconvenience to the general commuters.

## 24th Jan'16 Modernise Ring Railway: Rai to Prabhu

**Times News Network**  
**New Delhi:** The Delhi government has written to the Union railway ministry to modernise the existing Ring Railway in the city. "The system, which has 35 stations, connects all parts of the city to central Delhi," said transport minister Gopal Rai. He added that the letter, written on Friday, urges the railway minister Suresh Prabhu to modernise the stations and the system so that people can use it regularly. "We have promised that for our part, we will provide last-mile connectivity from the stations," said Rai.

Rai said he had written to the Union transport minister Nitin Gadkari to expedite the work on the Eastern and Western Peripheral Expressways. "The benefit of the odd-even scheme wasn't reflecting in the areas near the border," said Rai. The Delhi government has now asked that non-destined vehicles not be allowed to enter the city, which is only possible if there is an alternative route. "The expressways will allow people to bypass Delhi if they are not heading for the city," Rai added.

The Delhi government has also written to the neighbouring states seeking their cooperation, said Rai.

## 17th Jan'16 Ring Rail, an idea gone off the track

**No Proposals Yet On Plans To Revive Service**  
**LORD OF THE RINGS? NO...**  
**ABOUT 3,700 PEOPLE USE RING RAIL DAILY...** ... **ADDING Rs 1.02 LAKH TO RLY OFFERS EVERY DAY**  
**Despite growing demand for public transport, railways isn't interested in reviving the Ring Rail service. Why?**  
 > Poor connectivity to Ring Rail stations  
 > Financial loss due to declining ridership  
 > Heavily encroached tracks, especially at Naraina Vihar, Inderpuri, Kirti Nagar halt, and between Patel Nagar & Daya Basti  
 > No approach road to stations like Patel Nagar, Naraina Vihar and Inderpuri  
 > Broken, isolated, encroached and short platforms  
 > Expansion of Metro leading to decline in ridership  
 > Inadequate security arrangements  
 > Tracks used beyond capacity (127%) as the stretch is used by other trains—Express and goods—as well

**VITAL STATS** 35-4KM JOURNEY | DURATION: 185 MINUTES | 9 BLOCK STATIONS, 12 HALT STATIONS

**BRIDGING THE GAP**  
 RING RAIL

city government, in December 2015, proposed that a corridor be formed to link into the Ring Rail revival. Till date, it's yet to receive a single proposal.  
 The corridor was developed with the express objective of diverting heavy freight traffic entering the New Delhi station line during peak hours. While the route definitely shares a huge freight burden, it has failed on the passenger service front.  
**BRIDGING THE GAP**  
 "There is no scope of increasing traffic on the line. Every day, five trains each run in the morning and the evening. With the decline in number of passengers, the route is already running under loss. At present, there are no plans for expansion," said Arun Arora, divisional railway manager of Delhi division, Northern Railway.  
 The third phase of Delhi Metro, connecting Mayapuri

# AIM & OBJECTIVES

**AIM:** To explore the potential of Urban Rail system for distribution of freight, Case Study – Delhi.

## OBJECTIVES

- To review the existing trends and practices of urban freight in Indian cities and identify issues.
- To review global best practices of urban rail as a potential mode for freight distribution.
- To assess the existing logistic landscape along urban rail network in case study- Delhi.
- To assess the characteristics of present freight generation establishment and distribution centers.
- To evolve and evaluate ‘alternate scenarios’ of urban freight deliveries by rail system as a sustainable urban freight delivery process.
- To recommend proposals for urban freight distribution through rail system.

# RESEARCH METHODOLOGY

To assess the potential of Urban Rail System for Urban Freight Distribution

AIM

OBJECTIVES

To assess the trends and practices of urban freight distribution

To assess the existing logistic landscape along the Ring Rail & Metro Corridor

To assess the characteristics of present freight generation and attraction establishments

To evolve alternate scenarios and recommend policies

LITERATURE REVIEW

Case Study

CRR, SPA Study

Master Plan & Zonal Development Plan Study

Reconnaissance Survey of establishments (India Post & Courier) along the Ring Rail & Metro Corridor

Research Need

Data Requirement

Surveys

DATA COLLECTION

Primary Survey (India Post & Courier)

Secondary Survey

Establishment Survey

Truck Operator Survey

Census

Metro Ridership

Ring Rail Ridership

Goods Handled

DATA ANALYSIS

Generation & Attraction Rate

ATL, No. of Vehicles, Tonnes Carried

Spare Capacity

Goods Handling Characteristics

Horizon Year Projection

Emissions & Energy

Alternate Scenarios

PROPOSALS

Evaluation

Recommendations & Policies

# PROFILE OF DELHI

## PHYSICAL PROFILE

Delhi with an area of 1483 sq. km is a National Capital Territory of India is a metropolitan region, consists of three municipal area-

- Municipal Corporation of Delhi (1397 sq. km, 94% of total area of Delhi)
- New Delhi Municipal Corporation (42.47 sq. km, 3% of total area of Delhi)
- Delhi Cantonment Area (42.97 sq. km, 3% of total area of Delhi)

## POPULATION FORECAST

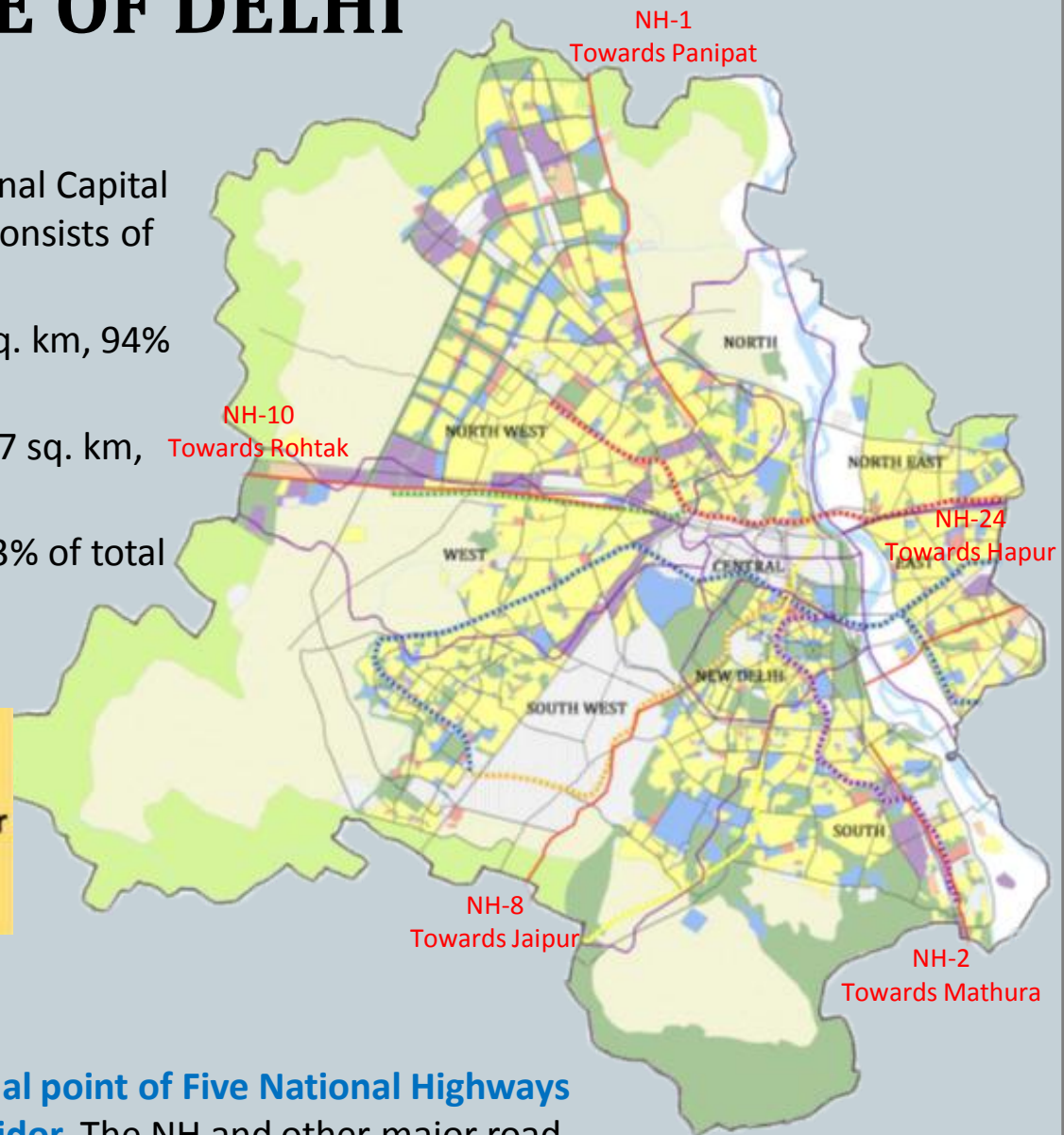
From MPD - 2021, AAGR of 3% for the time period 2011 to 2021 is considered for the population projection for the horizon year.

Source: Census (2011); MPD- 2021

Year	Population (in mil)
2011	16.75
2015	18.85
2021	22.51
2025	25.34
2031	30.25
2035	34.05

## TRANSPORT SYSTEM

The city act as the **nodal point of Five National Highways and Inter-city rail corridor**. The NH and other major road network carry intra-city and inter-city traffic traversing to and from the different parts of country.





# FREIGHT PROFILE OF DELHI

## REGIONAL GOODS MOVEMENT, MPD-2021

With the expansion of commercial and industrial activities in Delhi Metropolitan Area, the **goods movement within urban area and outside has grown** considerably, leading to environmental deterioration in the city.

ROAD	68808 vehicles / day
RAIL	1463 wagons / day
AIR	Air 644 tonnes / day

## ESTIMATION OF FREIGHT DEMAND IN DELHI

CRRRI Study equations  
Used to validate with  
SPA Study

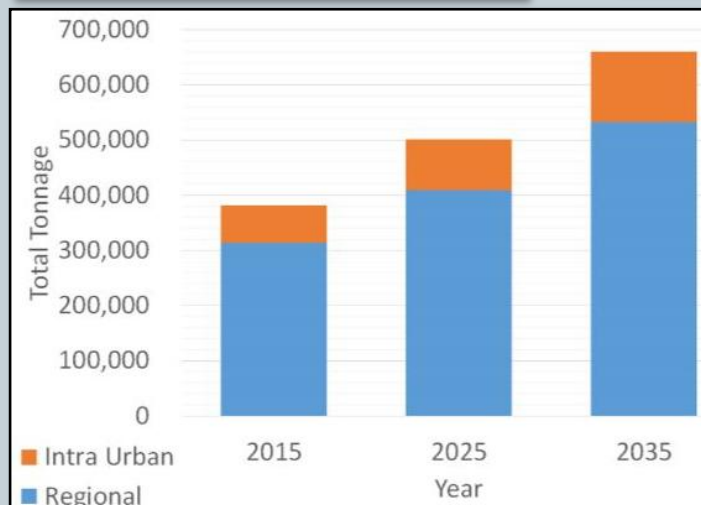
Movement	2015
Intra City Vehicles	54,690
%	56.76%
Intra City Tonnage	67,120
%	17.62%

## SPA STUDY - 1996

Traffic Type/ day	1993	1996	AAGR (%)
Originating Tonnage (Tonne)	58,114	90,488	15.9
Destined Tonnage (Tonne)	76,108	101,750	11.2
Total Tonnage Handled/ day	134,222	192,238	

Source: SPA Study - 1996

<b>Inter City Inbound</b>
IIV = 33.1 (P) <sup>0.63</sup>
IIT = 91.2 (P) <sup>0.75</sup>
<b>Inter City Outbound</b>
IOV = -333.4 + 1.3613 (P)
IOT = -2683 + 9.01 (P)
<b>Intra-City Flows</b>
IV = 1.32 P <sup>1.08</sup>
IT = 1.62 P <sup>1.08</sup>



Share of Intra-City demand in total city's demand is increasing over time from 17.6% to 19.2%. The consumption rate in 2015 is 3560 tonnes/ lakh of population and it increases to 3733 tonnes/ lakh of population in 2026

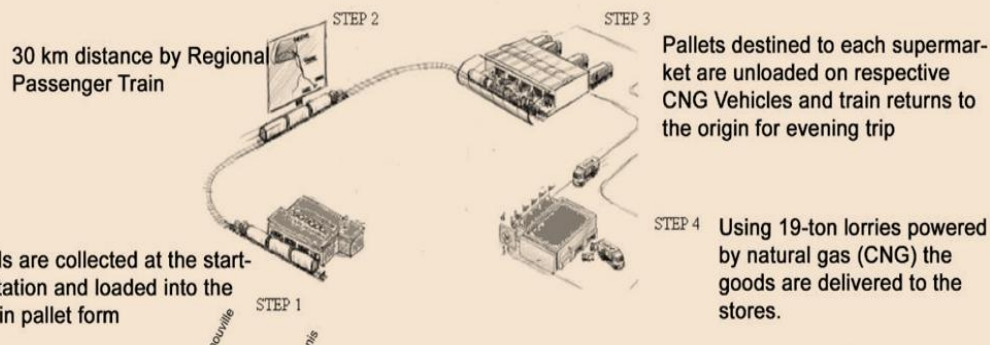
# BEST PRACTICES

## CarGo-Tram (Dresden)

Used for the transportation of automobile parts.



Reduction in CO2 Emissions and Congestion on Road



## Monoprix (Paris)

Used for distribution of goods from suburban to city center

## CityCargo (Amsterdam)

Distribution of goods from various parts of city to old city cross-docking facility



## CarGo-Tram for Reverse Logistics (Zurich)

For bulk refuse collection

# BEST PRACTICES

	Amsterdam	Dresden	Paris	Zurich
Length of Track (km)	14	5	30	15
Capacity (ton)	30	60	19	15
Max. Ton/ Year (t/a)	7380	3,00,000	1,20,000	964
Fleet (unit)	2	2	1	1
Frequency (per unit)	1	10	1	1
Formation (unit/ day)	3 tramway cars	2 traction units + 5 tramway cars	1 traction unit + 6 boxcars	1 traction unit + 2 four-wheeled platforms
Commodity Handled	Small retail Products	Automotive parts & modules	Household, personal care, soft drinks	Bulky refuse, e-Waste
Population	8,11,000	5,25,105	1,05,50,350	3,90,474
Per Capita Freight Rate (t/a/ person)	0.01	0.57	0.01	0.0025
Advantages	No delays for passenger service	Easy loading and unloading (30 min)	Faster than truck	No rolling stock investment (use of old trams)
	Efficiency (1 cargo tram = 4 trucks)			
Disadvantages	Promotion of new technologies	Low investment cost	High investment cost for terminal	Low investment cost
	Long payback period	Suitable just for shuttle service (lack of flexibility)		Manual loading/unloading
	Not effective financial planning			Limited use (just for the bulky refuse, electronic devices)

# DATA BASE

## DATA REQUIREMENTS

- GIS Map of Delhi (Land use and Transport network),
- India Post demand and supply,
- Courier demand and supply,
- Ring Rail and Metro spare capacity assessment, and
- Truck Operator opinion.

## COMMODITY CHARACTERISTICS

	India Post	Courier
Number of Establishment	493	400
Number of Sample	20	38
Establishment within 1km catchment	213	142
Average tonnage handled/ establishment (kg)	143	22
Modes Used	LCV, MCV, Tempo	LCV, Tempo, 2W
Average Trip Length (km)	53	61

## OPERATOR SURVEY CHARACTERISTICS

Number of Sample Surveyed	75
Type of Modes	LCV, Tempo, Van, Auto
Type of Goods Carried	FMCG, Electronic, Postal, Vegetables
Average Tonnage Handled (tonnes)	1.5
Average Time taken (min)	30
Average Trip Length (km)	4
Willing to shift to the new system (no )	49

# CASE COMMODITY PROFILE

## POSTAL SERVICE CHARACTERISTICS IN DELHI

<b>Number of DPOs</b>	<b>493</b>
<b>Population served by each DPO</b>	<b>38,235</b>
<b>Area served by each DPO (sq. km)</b>	<b>3</b>

On average a Post Office serves an area of 21.22 sq. km and population of 8221 people at country level whereas this figure for Delhi state average area served by each Delivery Post Office (DPO) is three sq. km and population served is 38,235 people

## COURIER SERVICE CHARACTERISTICS IN DELHI

<b>Number of Courier Agencies (Estimated)</b>	<b>400</b>
<b>Population served by each Agency</b>	<b>47,125</b>
<b>Area served by each Agency (sq. km)</b>	<b>3.71</b>

The estimated number of courier agencies in Delhi are 400, whereas each agency serves an estimated population of 47,125 people and over an area of 3.71 sq.km.

# CASE COMMODITY PROFILE

Article Type		Maximum Weight (Units)
Postcard		5 gm
Letter		5 gm
Parcels	Registered	10 kg
	Unregistered	4 kg
Packets		2 kg
Registered Newspaper		5 kg

## MAXIMUM WEIGHT LIMITS FOR COMMODITY

The India Post services are being provided under certain regulations of weight, the average values will be considered to for each article type to calculate the total tonnage generated or attracted that is daily postal demand of Delhi.

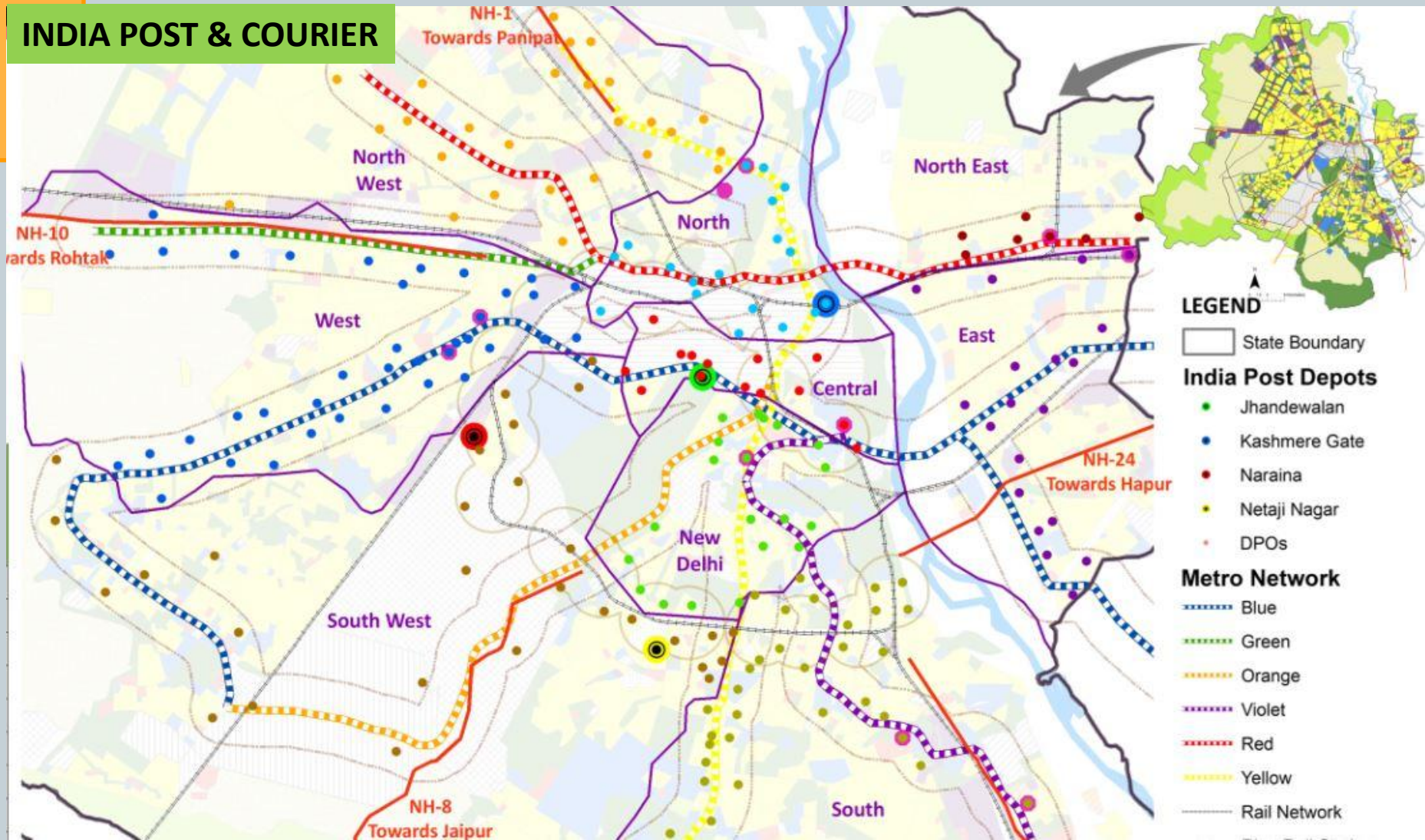
The total tonnage generated is **90 tonnes per day** and the average weight of the commodity is found out to be 300 grams.

## DAILY POSTAL DEMAND OF DELHI (2016)

Article Type	Postal Demand at Country Level			Postal Demand of Delhi		
	2013 (million/ year)	% share	% growth/ year	2016 (million/ year)	2016 (articles/ day)	2016 (tonnes/ day)
Postcard	1145.44	19	-0.76	1128.03	42,649	0.11
Letter	3499.29	58	0.37	3525.12	1,33,278	0.33
Registered Newspaper	478.32	8	2.47	502.25	18,989	47.47
Parcels	93.55	2	1.43	96.25	3,639	8.73
Packets	838.8	14	1.85	870.17	32,899	32.90
<b>TOTAL</b>	<b>6055</b>	<b>100</b>	<b>5</b>	<b>6122</b>	<b>2,31,455</b>	<b>90</b>

# CASE COMMUNITY PROFILE

## INDIA POST & COURIER



	Delivery Post Office	Courier Agency
Metro	186	113
Ring Rail	27	29
<b>TOTAL</b>	<b>213</b>	<b>142</b>

# TOTAL TONNAGE OF CASE COMMODITY WITHIN THE CATCHMENT OF URBAN RAIL

The total share of tonnage lying within the catchment area is considered with respect to the percentage share of establishment lying within the one kilometer catchment (as 43% of Postal Service and 36% of Courier Service)

	Number of Establishments	Tonnage/day
India Post	213	36.7
Courier	142	2.9
<b>TOTAL</b>	<b>355</b>	<b>39.6</b>

Total tonnage generated from the both postal and courier service lying within the one kilometer catchment of the Metro and Ring Rail is estimated to be **40 tonnes per day** with **355 establishments** that to be handled by the Metro Rail and Ring Rail.

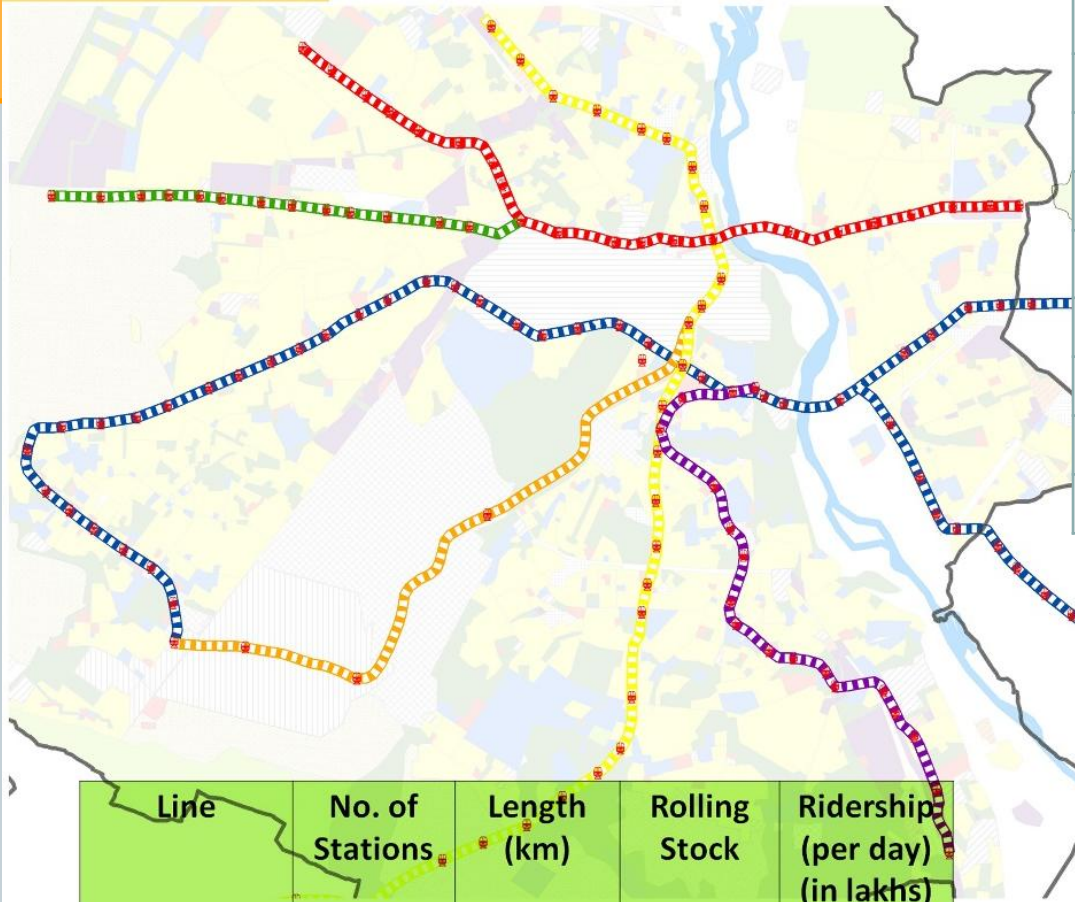
## DAILY POSTAL DEMAND OF DAILY FOR HORIZON YEAR (2021 AND 2026)

Article Type	2021 (articles/day)	2021 (tonnes/day)	2026 (articles/day)	2026 (tonnes/day)
Postcard	60,454	0.25	73,659	0.21
Letter	1,84,686	0.75	2,25,026	0.69
Reg. Newspaper	25,245	63	30,759	77
Parcels	4,937	12	6,016	14
Packets	44,270	44	53,940	54
<b>TOTAL</b>	<b>3,19,592</b>	<b>120</b>	<b>3,89,400</b>	<b>146</b>



# URBAN RAIL NETWORK CHARACTERISTICS

## METRO NETWORK



Year	Ridership (per day)	CAGR (%)
2009	842,268	
2010	1,259,243	49.51
2011	1,664,830	32.21
2012	1,925,887	15.68
2013	2,190,750	13.75
2014	2,156,030	-1.58
2015	2,329,351	8.04
2016	2,554,883	9.68

Source: DMRC Ltd., 2016; DMRC Ltd., 2014

State Boundary

### Metro Network

- Blue
- Green
- Orange
- Violet
- Red
- Yellow

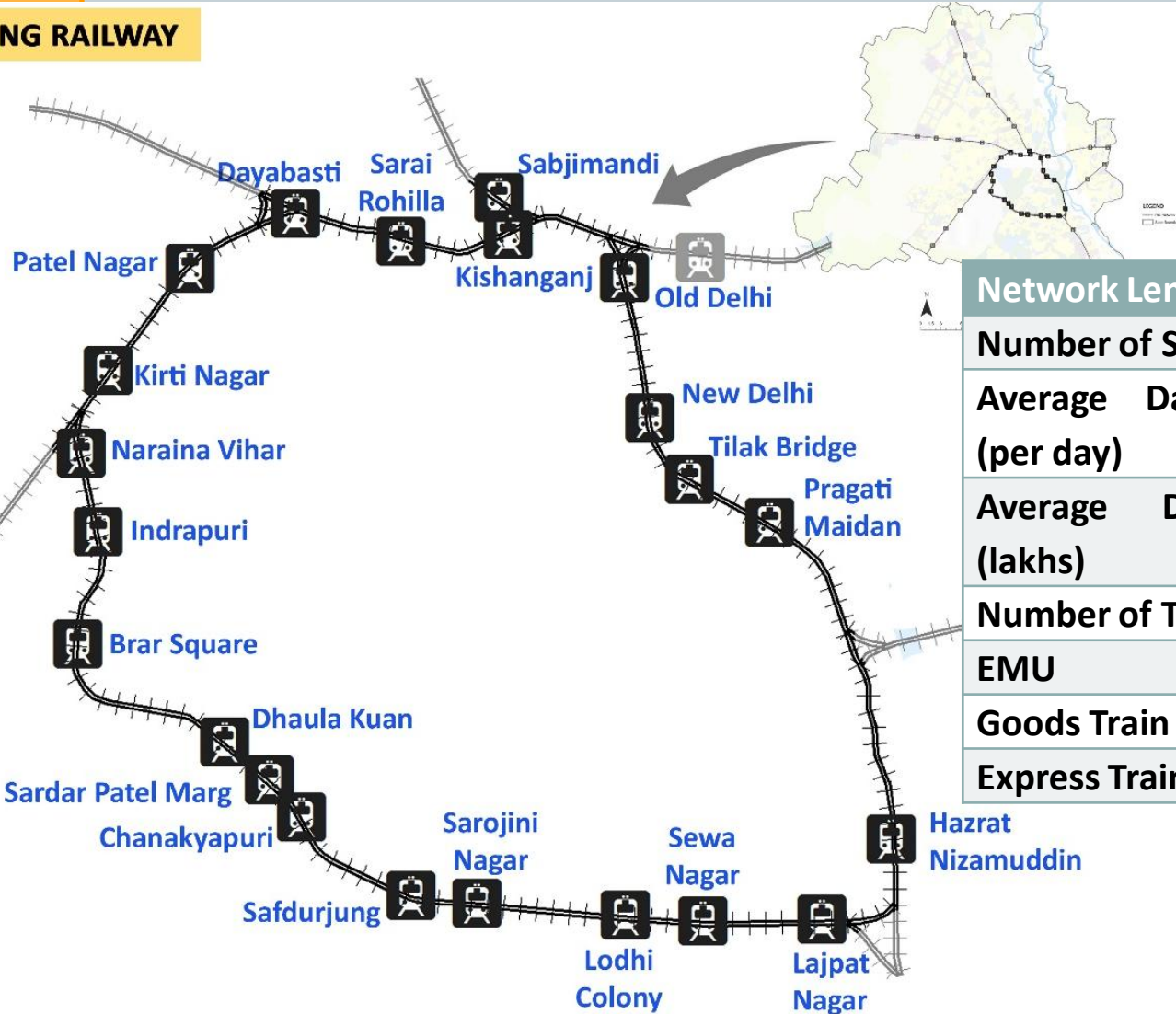
Line	No. of Stations	Length (km)	Rolling Stock	Ridership (per day) (in lakhs)
1 Red	21	25.09	31	3.5
2 Yellow	37	49	60	9
3 & 4 Blue	51	58.67	140	9.6
5 Green	16	18.46	32	0.95
6 Violet	28	35.17	38	2.48
Total	153	186.39	301	25.55

Source: DMRC Ltd.  
(Jan'15 - Jan'16)

The network consists of five color-coded regular lines and faster Airport Express line, with a **total length of 213 km** serving **160 stations** (including 6 on Airport Express line).

# URBAN RAIL NETWORK CHARACTERISTICS

## RING RAILWAY



Network Length	35.4
Number of Stations	21
Average Daily Ridership (per day)	3700
Average Daily Income (lakhs)	1.02
Number of Trains Running on this Network	
EMU	10
Goods Train	80
Express Trains	2



Ring Rail was conceived in 1975 for freight trains but during Asian Games in 1982 passenger service was initiated to facilitate alternate service to the road users with 24 EMU service.

# SPARE CAPACITY CALCULATION

After studying the spare capacity availability of Metro and Ring Rail, the total actual capacity available is as follows –

For Metro, certain assumptions which are considered while calculating capacity are:

- Per person weight = 75 kg (Average person's weight = 68 kg and average baggage weight = 7 kg)
- Capacity of each Car = 375 persons
- For spare capacity calculation first and last trips were considered to avoid interference in passenger service.

Urban Rail		Total Capacity Available (tonnes)	Capacity Available in First and Last Trip (tonnes)
Delhi Metro	Red	1,695	1,030
	Yellow	1,662	1,662
	Blue	5,156	2,509
	Green	31,854	1,373
	Violet	1,302	758
Ring Rail		230	230
TOTAL		41,899	7,562

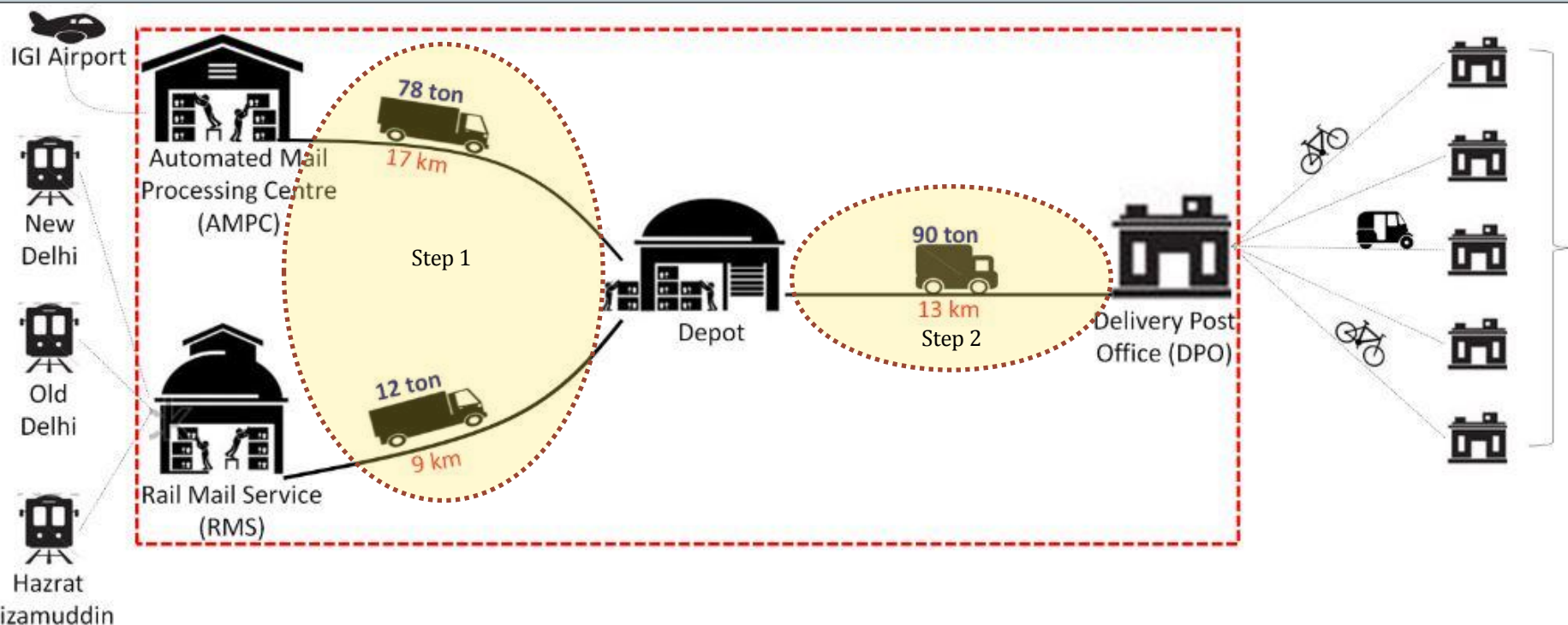
The spare capacity available in Metro Rail is 7,332 tonnes.

Whereas spare capacity available in Ring Rail is 230 tonnes (capacity of one Vendor's Coach = 23 tonnes; number of trains available = 10)

**Therefore, total spare capacity available in both the rail systems is 7,562 tonnes.**

# DEVELOPMENT OF ALTERNATE SCENARIOS

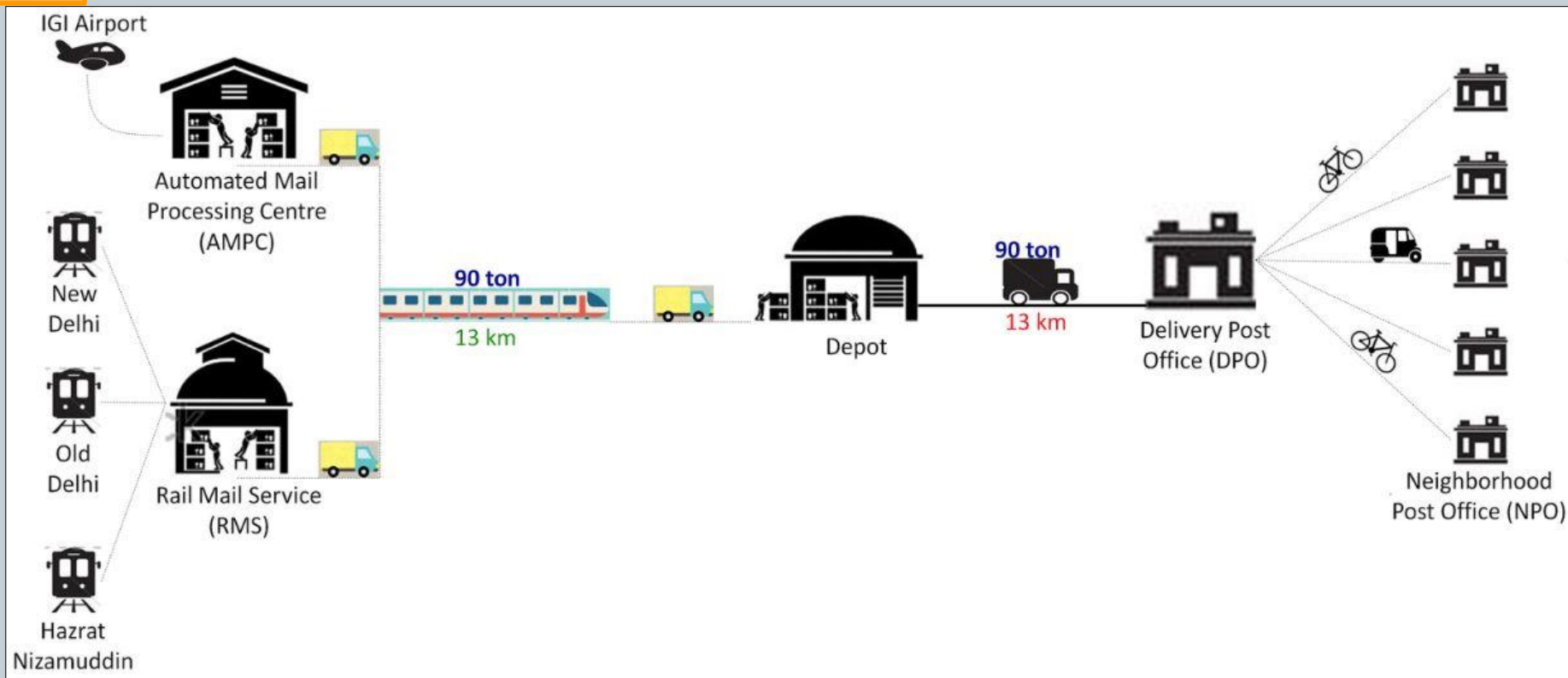
## BUSINESS AS USUAL



The **existing supply chain** shown in Figure of **Postal Service** and the **courier service** is considered, considering all the aspects of the handling, time, infrastructure as well as modes used for transfer of the respective commodity involved in the supply chain.

# DEVELOPMENT OF ALTERNATE SCENARIOS

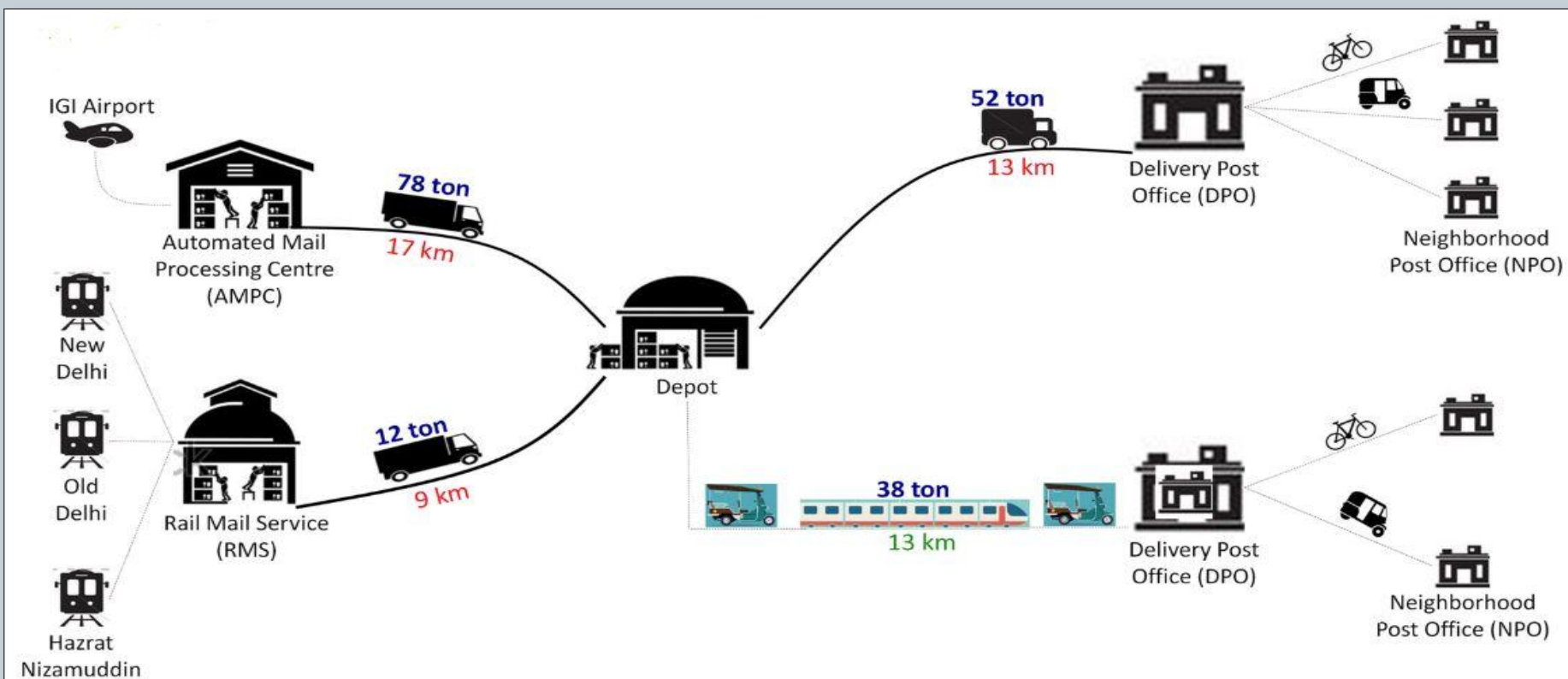
## SCENARIO I: IMPROVEMENT IN FIRST LEG OF MOVEMENT WITHIN THE SAME SUPPLY CHAIN



The **first step movement between the AMPC/ RMS to the four depots will be exchanged with the existing Ring Railway and Metro system** as all the four Depots are within the one km catchment of urban rail corridor and both the AMPC and RMS has connectivity with nearest Metro and Ring Rail stations thus 100% of tonnage can be transferred to the rail.

# DEVELOPMENT OF ALTERNATE SCENARIOS

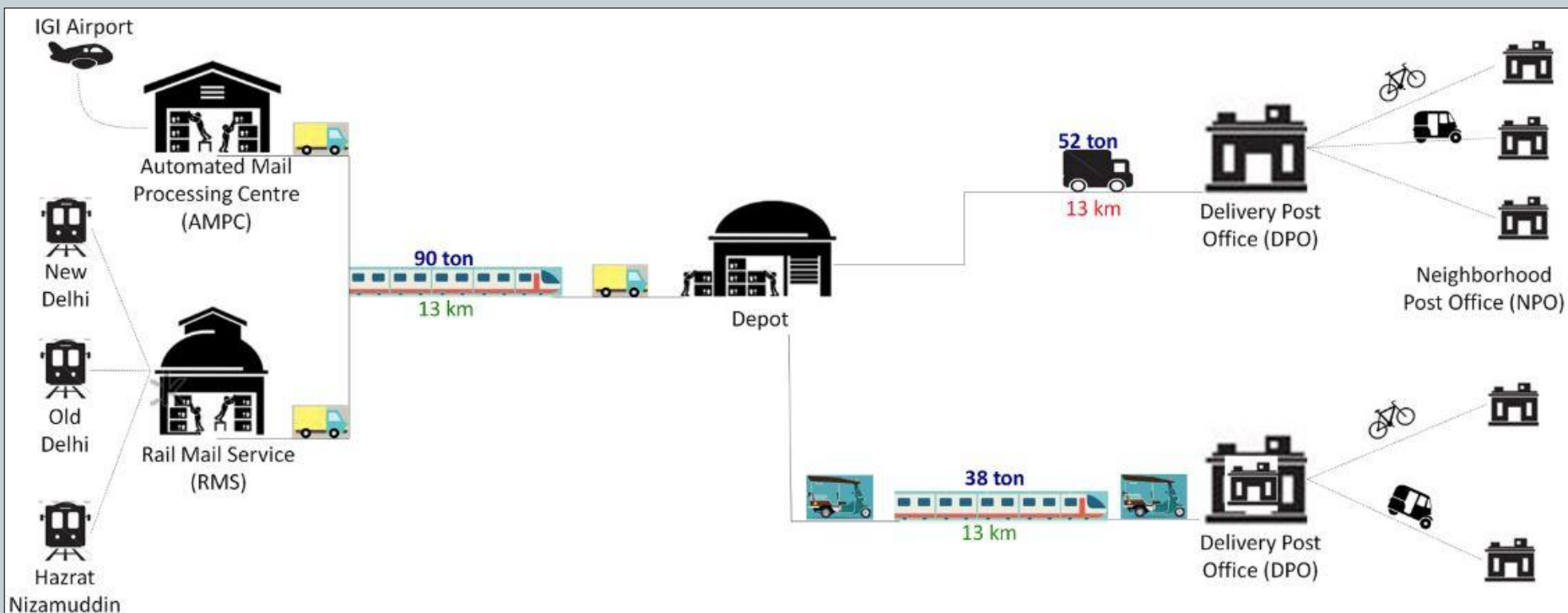
## SCENARIO II: IMPROVEMENT IN SECOND LEG OF MOVEMENT WITHIN THE SAME SUPPLY CHAIN



Intervention in the second step movement is done and for this **only those DPOs and courier agencies were selected which were falling into the one km catchment of the urban rail**, also catchment of one km buffer is considered and can be easily covered by using NMTs for 1km catchment.

# DEVELOPMENT OF ALTERNATE SCENARIOS

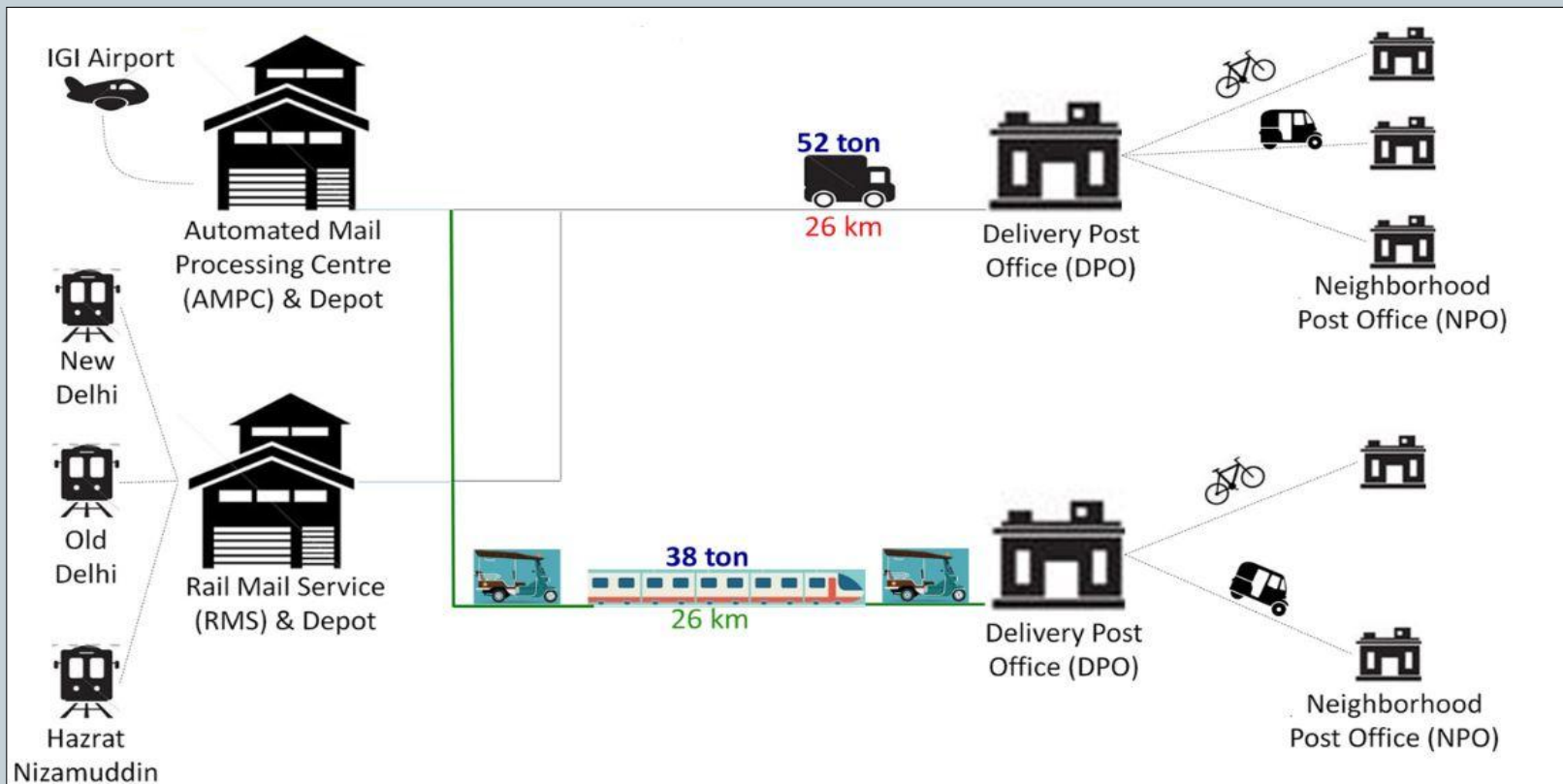
## SCENARIO III: IMPROVEMENT IN BOTH THE LEGS OF MOVEMENT WITHIN THE SAME SUPPLY CHAIN



**Intervention in both the movements has been done** it is the combination of Scenario I and II as integration of urban rail wherever it is feasible. In this Scenario, only movement that is performed between depot and DPOs, that too are outside the catchment zone of one km, will be road based moving 52 tonnes for average trip length of 13 km.

# DEVELOPMENT OF ALTERNATE SCENARIOS

## SCENARIO IV: CHANGE IN SUPPLY CHAIN (SHIFTING DEPOT AT AMPC AND RMS)



There is **complete change in supply chain** with respect to the existing one being practiced. In this scenario, **shifting of depots to the AMPC and RMS facilities** is being proposed to eliminate the intermediate road based transfer of the commodities that is in between AMPC/RMS and depots.



# CONCLUSION

- From all the five scenarios, last Scenario with the shifting of depots near to the Rail Mail Service (RMS) and Automated Mail Processing Center (AMPC) is most feasible, as it requires minimum handling, space and man power.
- Revenue earning business model for Delhi Metro and Ring Railway.
- Reduction in Supply Chain.

**Carbon Credits** can be earned by Delhi Metro and Ring Rail as it has **98% Carbon Emission Reduction**



**Reduction in total time taken in handling** the commodity has been observed with **14% decline** in horizon year 2026



As the total kilometer reduces in the supply chain, hence there is **91% saving in energy** by the year 2026



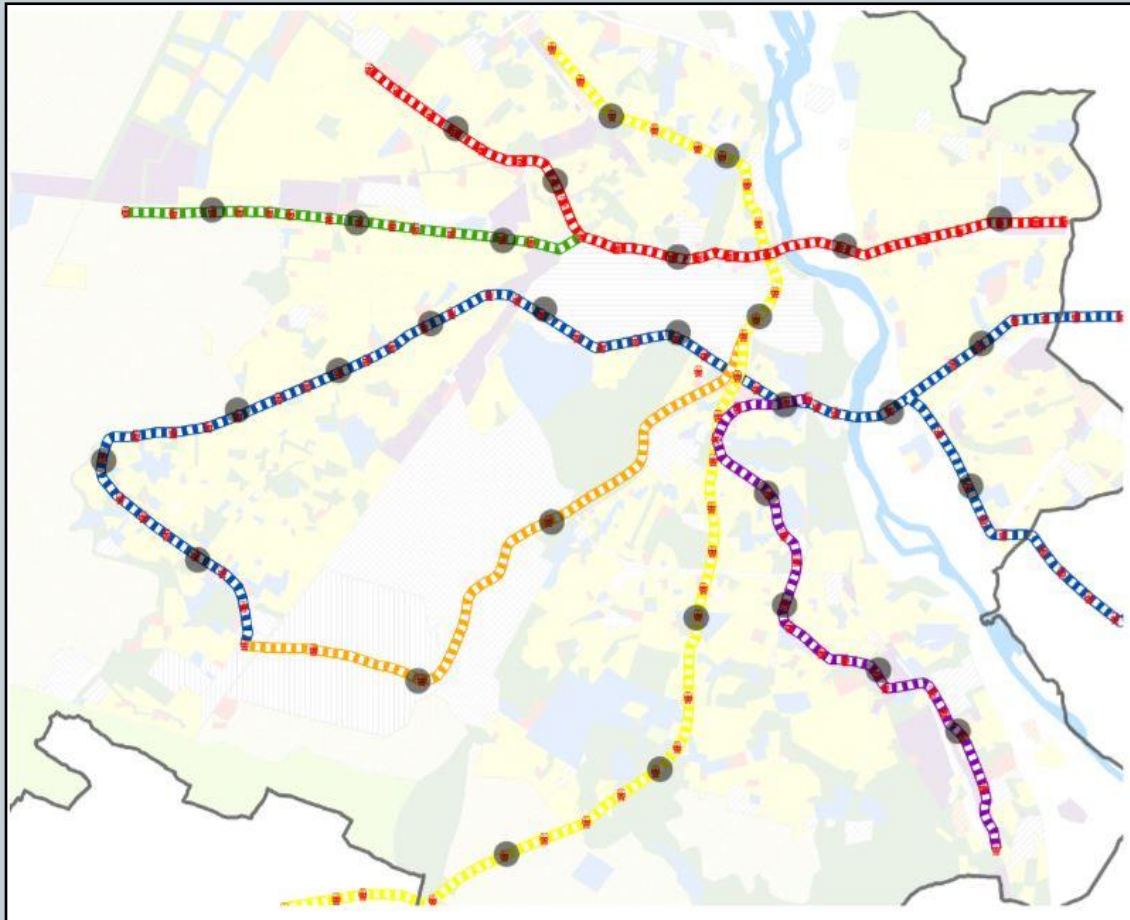
Scenarios	2016	2021	2026
BAU	2571	3125	3605
Scenario-1	-145	-1131	-2229
Scenario-2	556	759	904
Scenario-3	411	-372	-1325
Scenario-4	387	436	3527

Scenarios	2016	2021	2026
BAU	319	406	448
Scenario-1	280	274	254
Scenario-2	282	258	235
Scenario-3	258	234	210
Scenario-4	94	81	62

Scenarios	2016	2021	2026
BAU	2074	2614	3081
Scenario-1	1686	2249	2737
Scenario-2	1395	1687	1976
Scenario-3	1007	1323	1632
Scenario-4	2521	3064	287

# RECOMMENDATION

- Immediate Action Plan for India Post and Courier Agencies, in terms of shifting of mode for transfer of goods.
- Shifting of Depots at Automated Mail Processing Centre (AMPC) and Rail Mail Service (RMS) for the optimization of existing Supply Chain.
- 31 Metro Stations identified as Collection and Distribution Hub for last mile delivery to Delivery Post Office (DPOs).



<b>IGI Airport</b>	<b>Azadpur</b>
<b>Dhaura Kuan</b>	Shashtri Park
<b>Sultanpur</b>	Shahdara
<b>Hauz Khas</b>	Pulbangash
<b>Jor Bagh</b>	Kanhaiya Nagar
<b>Sarita Vihar</b>	Pitampura
<b>Kalkaji Mandir</b>	Punjabi Bagh
<b>Moolchand</b>	Pashchim Vihar
<b>Khan Market</b>	Udyog Nagar
<b>Mandi House</b>	RK Ashram
<b>Pragati Maidan</b>	Ramesh Nagar
<b>Mayur Vihar I</b>	Tilak Nagar
<b>Preet Vihar</b>	Uttam Nagar West
<b>Chawri Bazaar</b>	Dwarka Mor
<b>Vishwavidyalaya</b>	Dwarka Sector 11
<b>Patel Chowk</b>	

# RECOMMENDATION

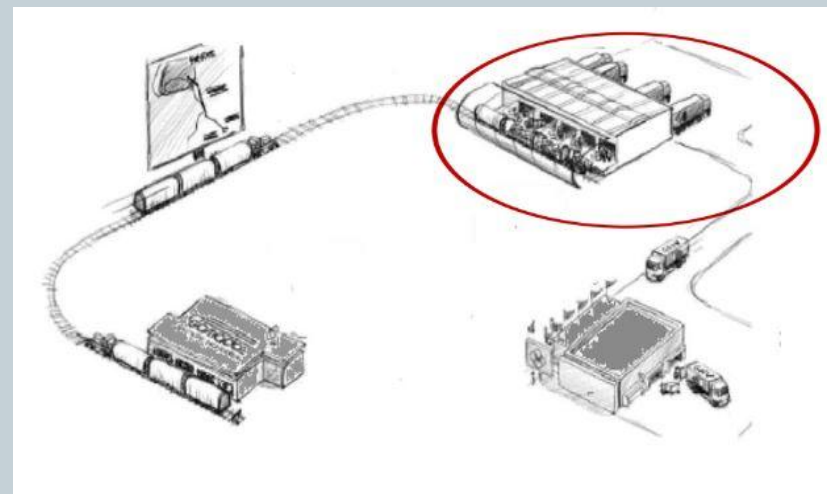
**Coding system for distribution** of posts and courier from AMPC and RMS for last mile delivery without any intermediate sorting.

Line	Line Code	Station Code	DPO Code
Red	R	RIT	1
Blue	B	JPE	3
Yellow	Y	GP	4
Violet	V	ME	6
Green	G	ILOK	2
Orange	O	ARC	4

To reduce time in manual loading and unloading, technology can be used.



Station designs in such a way that allows **immediate loading and unloading of goods** from rail to delivery vehicles.



Goods to be **palletized** in the following dimension for Delhi Metro.

Dimension	Maximum	Minimum
Length (mm)	900	300
Height (mm)	750	200
Width (mm)	450	150
Weight (kg)	50	2