



**Detailed Project Report  
for  
Nagpur Metro**

**Presentation  
By  
Delhi Metro Rail Corporation**



**Sep.02, 2013**

# NAGPUR AT A GLANCE

- **Nagpur** is the third largest city of Maharashtra and also the winter capital of the state.
- With a population of approximately 25 lakhs, Nagpur Metropolitan Area is the 13th largest urban conglomeration in India.
- The last decade population Growth rate in NMC area was 17.26%.
- Current Vehicle Statistics (2012) shows number of registered vehicles are 12.37 lakh out of which 10.32 lakhs are two wheelers.
- As per provisional reports of Census India, population of Nagpur NMC in 2011 is 2,405,421; of which male and female are 1,226,610 and 1,178,811 respectively. Although Nagpur city has population of 2,405,421; its urban UA / metropolitan population is 2,497,777 of which 1,275,750 are males and 1,222,027 are females. <http://www.census2011.co.in/census/city/353-nagpur.html>

# REGISTERED VEHICLES IN NAGPUR CITY

(As per Motor Transport Statistics of Maharashtra as on 31<sup>st</sup> March, 2012)

CATEGORY	VEHICLES	%
TOTAL OF TWO WHEELERS	1032607	83.47
AUTO RICKSHAWS	17149	1.38
CARS (Cars, Jeeps, Station Wagons & Taxi)	132709	10.73
OTHERS (Bus, Truck, LCV, Tractors etc.)	54634	4.42
<b>TOTAL OF ALL TYPES</b>	<b>1237099</b>	<b>100</b>

## RAIL AND AIR TRANSPORT IN NAGPUR CITY

- A total of 160 trains from various destinations halt at Nagpur.
- Almost 1.5 lakh passengers board/alight different stations in Nagpur Daily.
- Nagpur central alone is used by nearly 100,000 passengers.
- The Nagpur Airport handles around 4,000 passengers per day.

## **PROPOSED CARGO HUB AND AIRPORT AT NAGPUR (MIHAN)**

### **Multi-modal International Cargo Hub and Airport at Nagpur**

is the biggest economical development project currently underway in India in terms of investment.

**Nagpur SEZ** of 2086 hectares, largest multi-product SEZ in India, would be built along side the airport.

Out of 2086 hectares, 1472 hectares would be used by various processing units to be set-up and remaining 614 hectares for service sector unit.

**MIHAN** is spread over an area of 4354 Hectares.

## HIGHLIGHTS FROM L&T-RAMBOLL STUDY REPORT

1. POPULATION DENSITY OF NAGPUR MC IS 94/Ha. IN 2001
2. ONLY 10 ZONES HAD POPULATION DENSITY OVER 600/Ha.
3. RESIDENTIAL AREA ALLOCATED IN MIHAN = 404 Ha.
4. SEZ AREA IN MIHAN = 1472 Ha.
5. TOTAL AREA =4354 Ha.
6. ASSUMED TO BE OPERATIONAL IN 2015
7. EMPLOYMENT IN 2015 = 1.96 LAKH
8. EMPLOYMENT IN 2021 = 2.60 LAKH
9. EMPLOYMENT IN 2031 = 4.30 LAKH
10. 40% EMPLOYEES WILL COMMUTE FROM NAGPUR
11. EMPLOYMENT GROWTH 2015-2021 = 4.9% (CUMMULATIVE)
12. EMPLOYMENT GROWTH 2021-2031 = 5.2% (CUMMULATIVE)
13. POPULATION DENSITY ASSUMED = 600/ Ha.
14. MAXIMUM POPULATION IN MIHAN WHICH CANBE ACCOMODATED IS 2.40 LAKHS

According to L&T-RAMBOLL report, 2.4 lakh population (PD=600/ Ha.) is expected to live in MIHAN whereas there is hardly any population as on date. Keeping a modest view, most likely population and employment figures (**Assuming Population density as 150/ Ha. and Employment density as 40/ Ha. in 2016 and 5% growth rate**) in MIHAN are expected is as under:

	<b>2016</b>	<b>2021</b>	<b>2026</b>	<b>2031</b>	<b>2036</b>	<b>2041</b>
<b>POP</b>	<b>60600</b>	<b>77343</b>	<b>98711</b>	<b>125983</b>	<b>160790</b>	<b>205213</b>
<b>EMP</b>	<b>83440</b>	<b>106493</b>	<b>135915</b>	<b>173466</b>	<b>221391</b>	<b>282557</b>

If, however, project is further delayed, these figures will be shifted towards right.

## **EFFECT OF MIHAN ON PROPOSED METRO RIDERSHIP**

When completed, MIHAN will be a self sufficient city where people will live and work.

According to L&T-RAMBOLL report, 40% employees will commute here from Nagpur city but there is no mention of people who are likely to commute from MIHAN to Nagpur.

It is expected there will be overall 30% commuting of both resident population and due to employment which will make an impact on the daily ridership of Metro.

This has been included in the forecasting process.



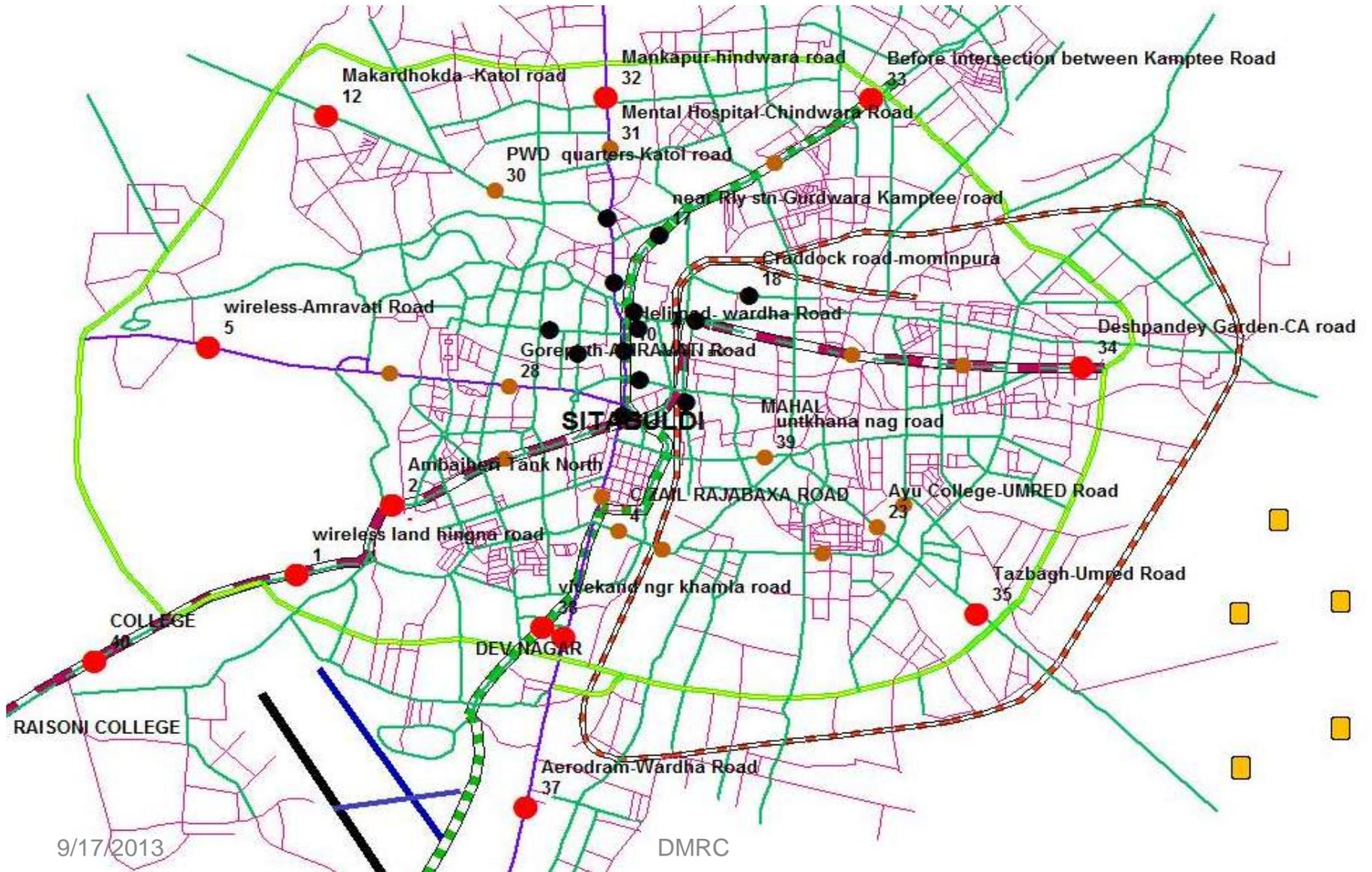
# EARLIER STUDY (MRTS Corridors Proposed by L&T-Ramboll )

Alignment	Detail Route
Alignment-1	Pardi Naka to Dahegoan ( 24.54 km with 25 Stations). The alignment option -1 starts at Pardi Naka and ends at Dahegaon. It passes through Central Avenue road, Central railway station, Ganeshpet Bus stand, Medical Chowk, Manewada Jn etc.
Alignment-2	Automotive Square to Dahegoan ( 23.94 km with 24 Stations) The alignment option -2 is starts at Automotive Square and ends at Dahegaon. It passes through Kamptee road, Itwari railway station, Central Avenue road, Medical Chowk, Manewada Jn etc
Alignment- 3	Transport Plaza to Dahegoan predominantly on NH-7 ( 27.20 km with 26 Stations) The alignment option 3 starts at Automotive Square and ends at Dahegaon. It passes through Indora, LIC Square, Kasthurichand Park, Central railway station, Zero mile, Sitabuldi, NEERI, Chatrapathi Square, Manewada Jn etc
Alignment-4	Transport Plaza to Dahegoan partially on NH-7 ( 24.20 km with 24 Stations) The alignment option 4 starts at Transport Plaza and ends at Dahegaon. This alignment option is combination of options 2 &3. It passes through Mahendra Nagar, Indora, Gaddigodam, Central railway station, CBS1 Depot, Medical Chowk, Manewada Jn etc

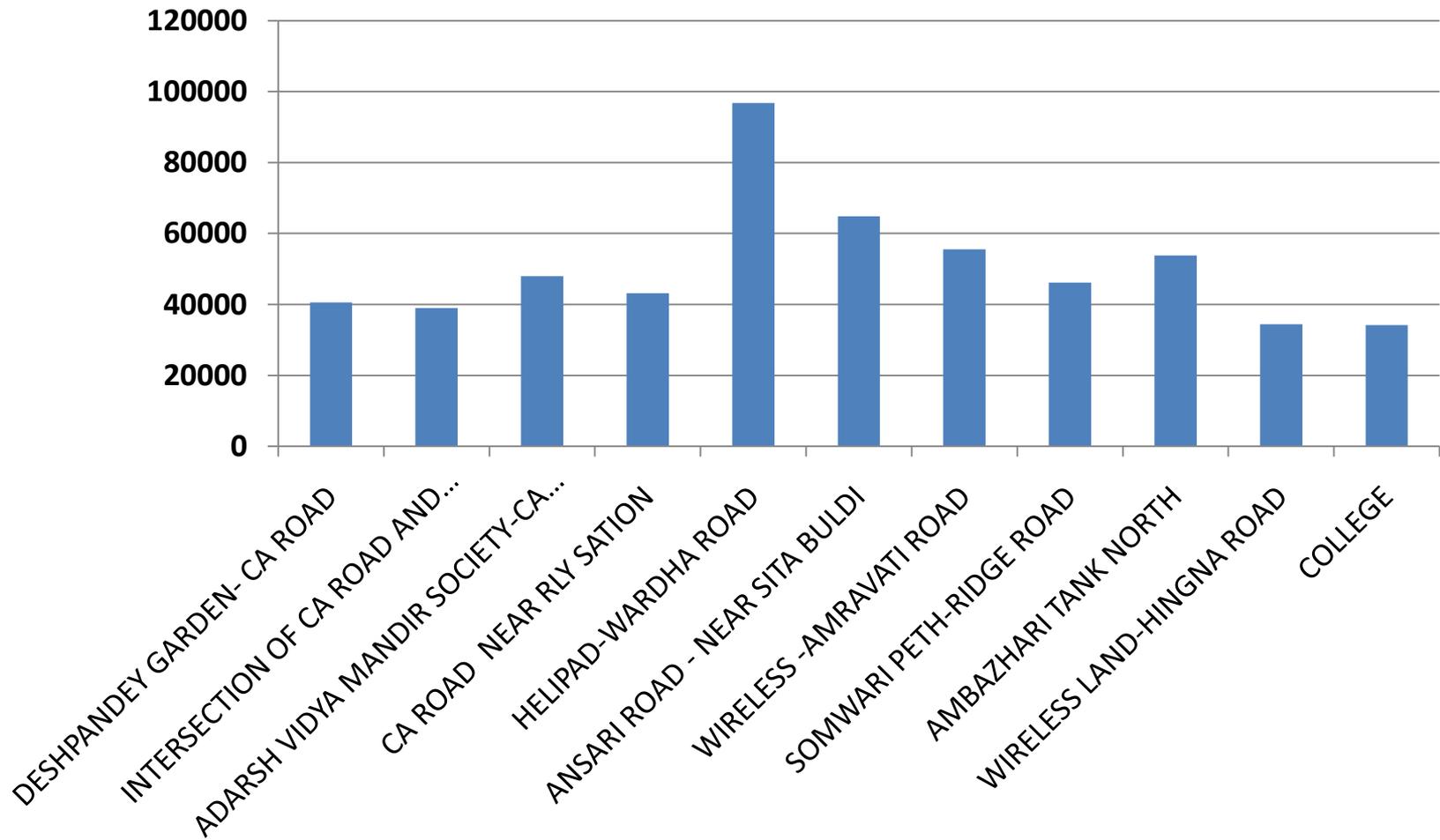
# **TRAFFIC SURVEYS UNDERTAKEN (PRIMARY DATA)**

- (1) Traffic Volume Count (TVC) at mid block sections, screen lines and outer cordon points.
- (1) Passenger Occupancy Surveys (PCS) at mid block sections, screen lines and outer cordon points.
- (2) Bus and Rail Mode passenger Terminal Survey.
- (3) Work Place Survey.

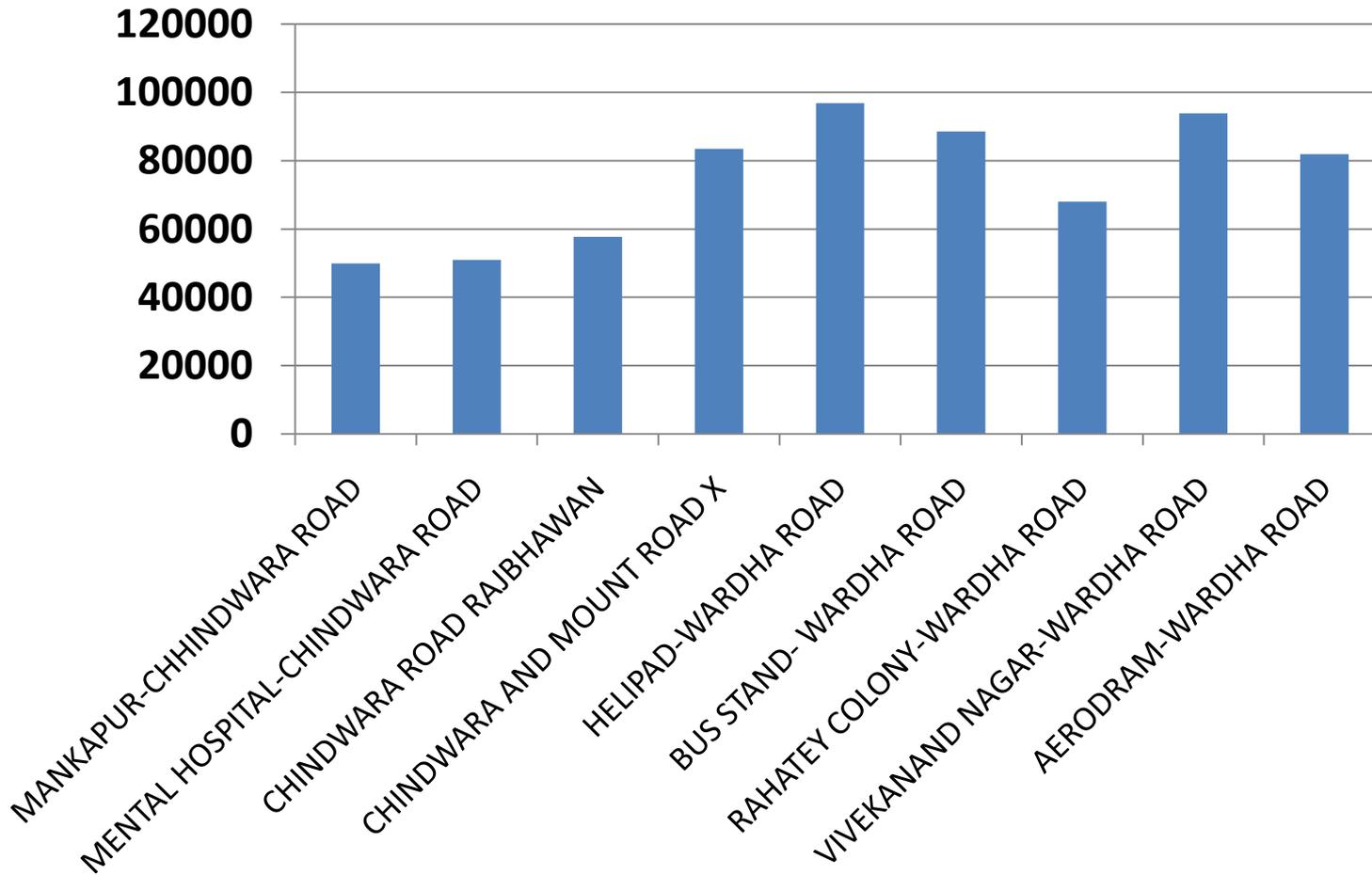
# TRAFFIC VOLUME COUNT (TVC) LOCATIONS



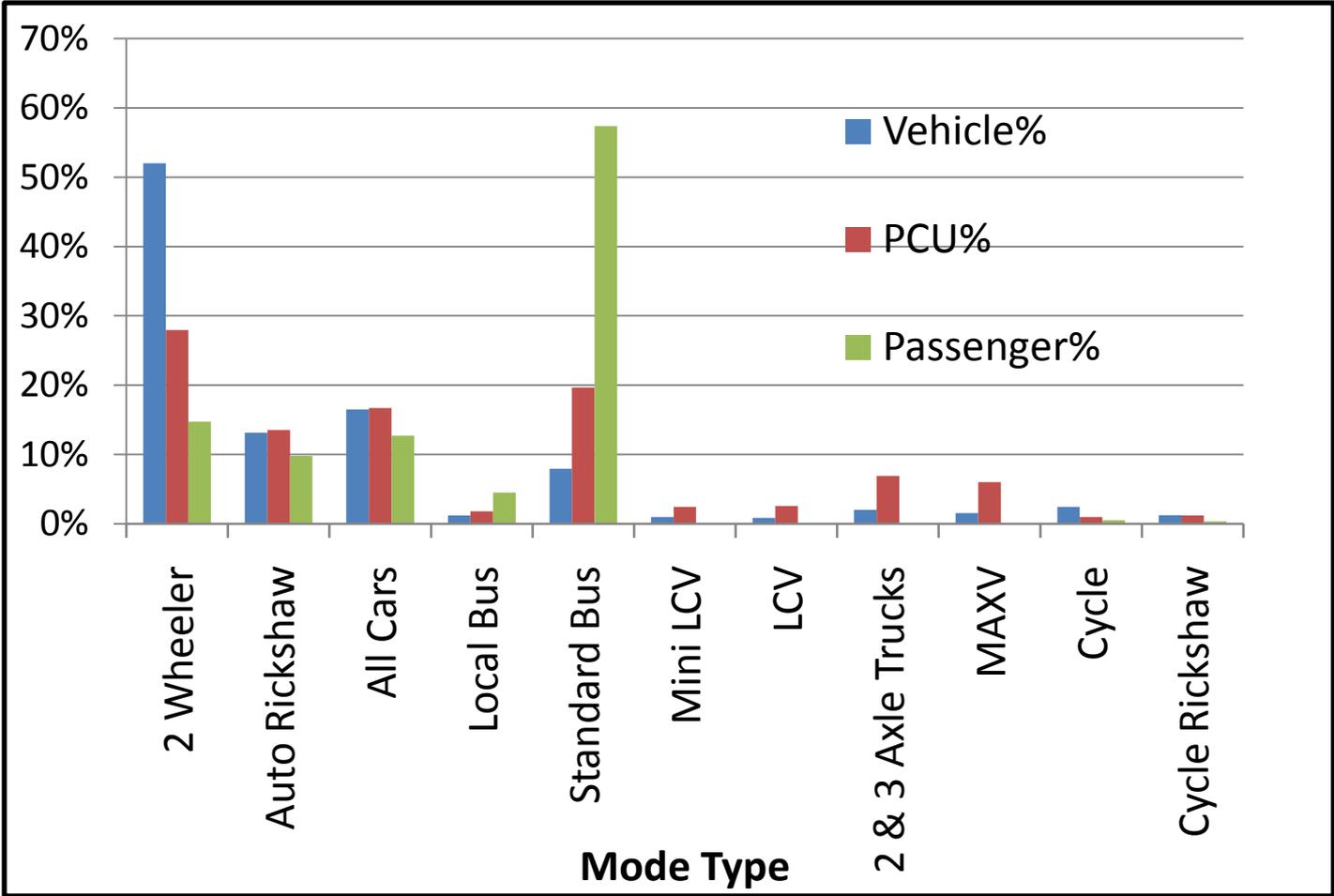
## DAILY PASSENGER TRAFFIC VARIATION ON EAST-WEST CORRIDOR BASED ON TRAFFIC VOLUME COUNTS



## DAILY PASSENGER TRAFFIC VARIATION ON NORTH-SOUTH CORRIDOR BASED ON TRAFFIC VOLUME COUNTS

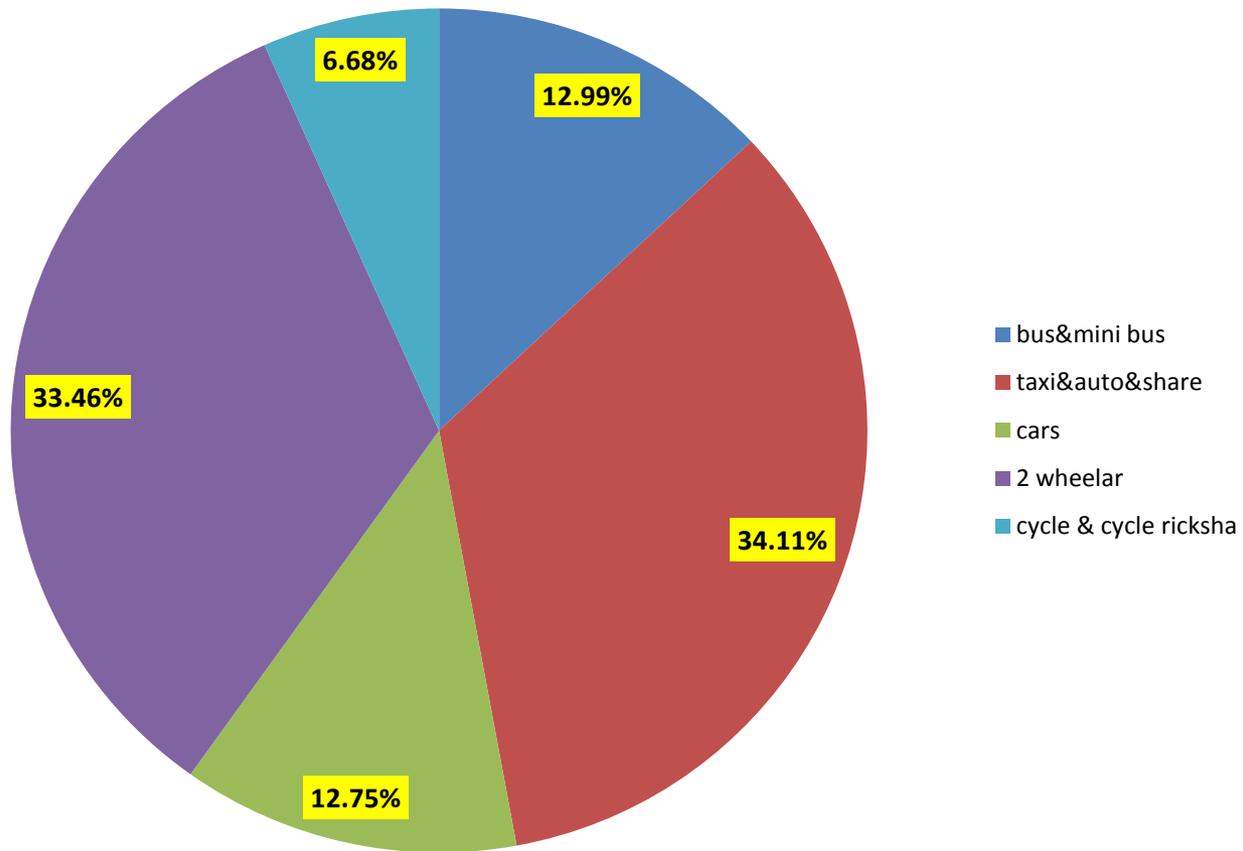


# Overall Mode Share observed on Roads including Inter City Vehicles



## Modal Split within Nagpur City

1. Geographically Nagpur is the center of commercial and economic activities of a vast area surrounding the city in which smaller towns such as Bhandara, Umred, Wardha, Hingna, Amravati, Raipur, Katol, Chhindwara and villages in between Nagpur exist. Therefore external trips to and from Nagpur are significant.
2. To transport these trips, very good regional bus services exist apart from the Railways. Also long distance inter-state bus services are available from different bus stands in Nagpur. In TVC survey, standard buses captured are mostly regional bus services.
3. If the external services are excluded from the TVC, internal picture of Nagpur City passenger mode share emerges. Average passenger trip modal splits between public, private and NMT are shown.
4. *Public mode includes local bus, auto, shared auto, taxis and shared taxis. Private mode includes Scooters, Motorcycles and cars. NMT includes cycles and cycle rickshaws.*





# **SECONDARY DATA USED FOR TRAFFIC FORECASTING**

- **Past and Present Population of Nagpur Urban Agglomeration,**
- **Ward wise population of Nagpur City,**
- **Road and Rail Network within Nagpur**
- **Future Land Use Map of Nagpur**

# SUMMARY OF TRAFFIC FORECAST

<b>BOARDING/RIDERSHIP (DAY)</b>	<b>2016</b>	<b>2021</b>	<b>2026</b>	<b>2031</b>	<b>2036</b>	<b>2041</b>
<b>ON LINE 1(AUTOMATIVE- MIHAN)</b>	144956	163371	183991	209180	240166	267617
<b>ON LINE 2(PRAJAPATI- LOKMANYA)</b>	178902	199028	225245	253738	289027	320568
<b>TOTAL OF BOTH</b>	323858	362399	409236	462918	529193	588185
<b>AVERAGE TRIP LENGTH IN KM</b>	6.271	6.284	6.257	6.283	6.256	6.307
<b>MAXIMUM PHPDT ON LINE 1</b>	7545	8526	9618	10987	12841	14332
<b>MAXIMUM PHPDT ON LINE 2</b>	8087	8992	10370	11755	13468	15060

## SUMMARY

<b>YEAR</b>	<b>2016</b>	<b>2021</b>	<b>2026</b>	<b>2031</b>	<b>2036</b>	<b>2041</b>
<b>POPULATION</b>	<b>2662338</b>	<b>2859852</b>	<b>3039907</b>	<b>3226854</b>	<b>3428976</b>	<b>3617956</b>
<b>ANNUAL GROWTH</b>	<b>1.50%</b>	<b>1.48%</b>	<b>1.26%</b>	<b>1.25%</b>	<b>1.25%</b>	<b>1.10%</b>
<b>ALL TRIPS</b>	<b>2714643</b>	<b>2951773</b>	<b>3189472</b>	<b>3442617</b>	<b>3719554</b>	<b>3995384</b>
<b>TRIP RATE</b>	<b>1.02</b>	<b>1.03</b>	<b>1.05</b>	<b>1.07</b>	<b>1.08</b>	<b>1.10</b>
<b>METRO TRIPS</b>	<b>323858</b>	<b>362399</b>	<b>409236</b>	<b>462918</b>	<b>529193</b>	<b>588185</b>
<b>% OF ALL TRIPS</b>	<b>11.93%</b>	<b>12.28%</b>	<b>12.83%</b>	<b>13.45%</b>	<b>14.23%</b>	<b>14.72%</b>

Looking at the last decade population Growth rate in NMC area was 17.26%. decreasing population growth rate is applied.

# FINALISATION OF ALIGNMENT

- Alignment is finalized after repeated inspection of the road network, intersections, passenger traffic flow, traffic congestion, connectivity to important landuse. Wide roads are normally selected for alignment to avoid relocation, land purchase and demolition of buildings. Sharp bends are avoided. Underground construction is considered only when necessary space for elevated line is not available or such construction is prohibited in the area.

# **DRAFT DPR**

- **Draft DPR was submitted to NIT on 18.02.2013.**
- **Subsequently NIT vide their letter dated 16.3.2013, requested for a Joint Inspection regarding the alignment and station location.**
- **Joint Inspection was held on 04&05<sup>th</sup> April, 2013.**
- **NIT vide letter dated 12.04.2013, requested for consideration of various issues while finalising the DPR.**
- **Same has been done and final DPR has been submitted to NIT on 26.07.2013**

<b>ROUTE LENGTH (END TO END OF STATION)</b>			
<b>CORRIDOR</b>	<b>Elevated (km)</b>	<b>Underground (km)</b>	<b>Total (km)</b>
Line 1 – North-South Corridor : Automative Square to MIHAN	18.533	3.300	21.833
Line 2 – East West Corridor : Prajapati Nagar to Lokmanya Nagar	18.266	000	18.266
<b>Total</b>	<b>36.799</b>	<b>3.300</b>	<b>40.099</b>
<b>DETAILS OF STATIONS</b>			
<b>Description</b>	<b>Elevated</b>	<b>Underground</b>	
Line 1 – North-South Corridor : Automative Square to MIHAN	16	1	
Line 2 – East West Corridor : Prajapati Nagar to Lokmanya Nagar	19	0	
<b>Total</b>	<b>35</b>	<b>1</b>	

# Alignment of routes proposed by DMRC

<b>Alignment</b>	<b>Detail Route</b>
<b>Alignment-1 North-South Corridor</b>	<b>Automotive Square, along Kamptee Road, Wardha Road, Variety Square to Abhyankar Road, along Nag River alignment will fall on Humpyard Road, Rahate Colony Road, Wardha Road, Khamla Road, Airport, MIHAN Area</b>
<b>Alignment-2 East – West Corridor</b>	<b>From Prajapati Nagar, along Central Avenue Road, Railway Feeder Road, Munje Chowk, Jhansi Rani Chowk, North Ambajhari Road, Hingna Road, Lokmanya Nagar</b>





# List of Stations (North-South Corridor)

S. No.	Station Name	Chainage (M)	Inter Station Distance (M)
	Dead End	-145.0	
1	Automotive Square	0.0	
2	Nari Road	975.8	975.8
3	Indora Chowk	2139.7	1163.9
4	Kadvi Chowk	3181.2	1041.5
5	Gaddi Godam Square	4399.0	1217.8
6	Kasturchand Park	5148.6	749.6
7	Zero Mile	6175.5	1026.9
8	Sitaburdi (Interchage)	6709.2	533.7
9	Congress Nagar	7897.2	1188.0
10	Rahate Colony	8682.6	785.4

# List of Stations (North-South Corridor)

S. No.	Station Name	Chainage (M)	Inter Station Distance (M)
11	NEERI station	9777.2	1094.6
12	Dev Nagar	11235.8	1458.6
13	Sehkar Nagar	12285.1	1049.3
14	Old Airport	14002.0	1716.9
15	New Airport	15819.8	1817.8
16	MIHAN city.	19368.9	3549.1
17	Depot station	21065.2	1696.3
	Dead End	21688.1	622.9

# List of Stations (East-West Corridor)

S. No.	Station Name	Chainage (M)	Inter Station Distance (M)
	Dead End	-392.00	
1	Prajapati Nagar	0.0	392.0
2	Vaishno Devi Chowk	1229.3	1229.3
3	Ambedkar Chowk	1947.9	718.6
4	Telephone Exchange	3137.4	1189.5
5	Chittar Oli Chowk	3950.2	812.8
6	Agarsen Chowk	4759.8	809.6
7	Dosar Vaisya Chowk	5590.4	830.6
8	Nagpur Railway station	6464.4	874.0
9	Sitaburdi (Interchange)	7707.7	1243.3
10	Jhansi Rani Square	8354.0	646.3

# List of Stations (East-West Corridor)

S. No.	Station Name	Chainage (M)	Inter Station Distance (M)
11	Istitute Of Engineers	9117.2	763.2
12	Shankar Nagar Square	10074.9	957.7
13	Lad Chowk	10873.1	798.2
14	Dharmpeth College	12020.7	1147.6
15	Subhash Nagar	12947.1	926.4
16	Rachna Ring Road Jn.	14201.1	1254.0
17	Vasdev Nagar	15173.9	972.8
18	Bansi Nagar	16131.6	957.7
19	Lokmanya Nagar	17424.1	1292.5
	Dead End	17874.100	

# TRAIN OPERATION PLAN 2016

Sections	Year	Head way (min)	No. of Rakes	Rake Consisting of	No. of Coaches	Max. PHPDT Demand	PHPDT (Capacity Available*)
Automotive Sqre to MIHAN Section	2016	6.5	11 Rakes of 3-car	3-car	33	7545	7640 (9730*)
Prajapati Nagar to Lokmanya Nagar Section	2016	6.5	12 Rakes of 3-car	3-car	36	8087	7640 (9730*)

\* @ 8 persons per square meter of standee area

# COST DETAILS

**\*COST IN INR (CRORES) AT JUNE-2012 PRICE LEVEL**

Name of Corridor	Distance (KMs)	Estimated Cost without Central taxes	Estimated Cost with Central taxes
North-South Corridor	21.833	3618.00	4053.00
East-West Corridor	18.266	2921.00	3274.00
<b>Total</b>	<b>40.099</b>	<b>6538.00</b>	<b>7327.00</b>

# COMPLETION COST

<b>Financial Year</b>	<b>Cost at June 2012 Price Level</b>	<b>Completion Cost</b>
<b>2013-14</b>	<b>918.00</b>	<b>943.00</b>
<b>2014-15</b>	<b>1605.00</b>	<b>1762.00</b>
<b>2015-16</b>	<b>1716.00</b>	<b>2056.00</b>
<b>2016-17</b>	<b>1716.00</b>	<b>2210.00</b>
<b>2017-18</b>	<b>686.00</b>	<b>950.00</b>
<b>2018-19</b>	<b>343.00</b>	<b>511.00</b>
<b>2019-20</b>	<b>343.00</b>	<b>549.00</b>
<b>Total</b>	<b>7327.00</b>	<b>8981.00</b>

# FARE STRUCTURE

(The Delhi Metro Fares duly escalated @15% for every two years)

Distance in Kms	DMRC Fare as Revised in 2009	Nagpur Metro Fare (Rs.) in 2018-19
0-2	8	15
2-4	10	19
4-6	12	23
6-9	15	28
9-12	16	30
12-15	18	34
15-18	19	36
18-21	21	39
9/17/2013 >21	22 DMRC	41



# FIRR AND EIRR

**FINANCIAL INTERNAL RATE  
OF RETURN  
(FIRR)**

**0.37%**

**ECONOMIC INTERNAL RATE  
OF RETURN  
(EIRR)**

**12.51%**

# FUNDING PATTERN UNDER SPV MODEL (WITH TAXES & DUTIES)

Particulars	With Taxes & Duties	
	Amount (Rs/Crore)	% of contribution
Equity by GOI	1796.00	20.00%
Equity by GOM	1796.00	20.00%
SD by GOM to central Taxes (50%)	489.50	5.45%
SD by GOI for Central Taxes (50%)	489.50	5.45%
SD by GOM for Land	464.00	5.17%
Nagpur Improvement Trust Contribution	449.00	5.00%
Nagpur Municipal Corporation Contribution	449.00	5.00%
JICA Loan @ 1.40% PA/Market Borrowing @ 12%	3048.00	33.93%
9/17/2013 <b>Total</b>	<b>8981.00</b>	<b>100.00%</b>

DMRC

# FUNDING PATTERN UNDER BOT MODEL (WITH TAXES & DUTIES)

Particulars	Amount (Rs/Crore)	% of contribution
VGF by GOI	1703.40	20.00%
VGF by GOM	5701.60	66.94%
Equity by Concessionaire	371.00	4.36%
Concessionaire's debt @12% PA	741.00	8.70%
<b>Total</b>	<b>8517.00</b>	<b>100.00%</b>
Land Free by GOM	464.00	
IDC	36.00	
<b>Total including IDC</b>	<b>9017.00</b>	

**In addition to the above, State Taxes of Rs.273.00 crore on completion cost basis has to be either reimbursed or exempted by state government**

# WAY FORWARD

On receipt of the Detailed Project Report, following action will be required for implementing the Corridor-1 & Corridor-2 .

Approval to the Detailed Project Report to be taken from Maharashtra State Government (Cabinet approval).

The DPR to be forwarded to the Ministry of Urban Development, Planning Commission and Finance Ministry with the request for approving the Metro project and for financial participation through equity contribution in the SPV.

Set up a Special Purpose Vehicle (SPV) for implementing the project and for its subsequent Operation & Maintenance.

# WAY FORWARD..... contd.

The State Government should formulate the funding plan for executing this project and get the same approved by the Government of India. The loan portion of the funding will have to be tied up by State Government in consultation with the Government of India.

The Government should freeze all developments along the corridors suggested. For any constructions within 50 m. of the proposed alignment a system of No Objection Certificate should be introduced so that in-fructuous expenditure at a later stage is avoided

**THANK YOU ALL**