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CASE STUDY OF NAGPUR METRO RAIL ON PRAJAPATISQUARE TO LOKMANYA SQUARE CORRIDOR.

RAVINA R POTEY

M.Tech, (Student)

Department Of civil Engineering
G H Raison, University,
M.P. India- 480337

Email:-Ravinapotey@gmail.com

VISHAL GAJGHATE

Assistant Professor (Faculty)

Department Of civil Engineering
G H Raison, University
M.P. India- 480337

ASHISH D KALE

M.Tech, (Student)

Department Of civil Engineering
G H Raison, University
M.P. India- 480337

ABSTRACT

In India, there are currently more than 26 metro rail projects at various levels of planning, construction and operation. Transport system whether it is public or private is the basic need of any city which not only decide the level of development but opens new avenues for the city. Nagpur is third largest city & second capital of Maharashtra state which itself more that sufficient to recognize its importance in socioeconomic and political corridor. To fight with the problem of traffic and to manage the future road traffic A number of new phases of metro rails are being planned and will be launched soon. Govt. Of India and Maharashtra govt. Initiated Nagpur metro rail project which is suppose to be started by 2018. The outcome of the research is significant in creating process flows in executing metro rail projects faster and effectively.

KEYWORDS: Metro rail, Public Transportation, Traffic Survey.

INTRODUCTION

Nagpur, the second capital of the state of Maharashtra is also the third largest city in the state and 13th largest urban agglomeration in India with area of 217 Sq. km. Its Metro Region has a population of around 35 lakhs and an area of around 3576 Sq. km. The city boasts of being the

geographical centre of the nation along with being the „Orange City“ as well as the „Tiger Capital of India“ as it is a Gateway to several tiger reserves in Central India. MIHAN Project is coming up in the city and will create many job opportunities. With the growing economic activity, it was necessary to plan for the infrastructure development so as to support the growth of the city. One of the major impacts of economic development will be increased traffic on the city roads. Currently the Public Transportation System contributes only 10% of the total trips. The motorized transport is dominated by two Wheeler's (28%) and so is the vehicle ownership in the city (84% of all owned vehicles are two- wheelers). Thus, there is a need for a safe, reliable, efficient, affordable, commuter friendly and environmentally sustainable rapid public transport system for the Nagpur Metro Region.

1. STUDY AREA

Nagpur Improvement Trust (NIT) requested DMRC to conducted Surveys for Nagpur, initially for 30 Km which was revised to 42 Km in July 2012. Thereafter, DMRC conducted Traffic Surveys, Topographical Surveys, Geotechnical Investigations and Environment Impact Assessment Survey and DMRC provided a Detailed Project Report for Metro Rail System in Nagpur. The study area consisted of Nagpur Municipal Corporation Area. The study area totalled to

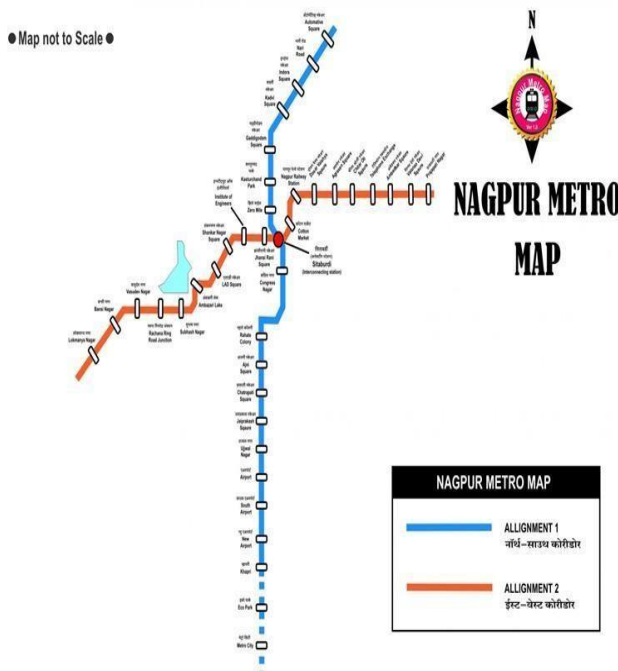
approximately 217 sq km. Based on the different types of surveys done by DMRC, metro alignments were finalized after repeated inspection of the road network, intersections, passenger traffic flow, traffic congestion, connectivity to important land uses. Alignment of routes proposed by DMRC were as follows

ALIGNMENTS PROPOSED

Alignment (Proposed by DMRC)	Detail Route
Alignment-1 North-South Corridor (21.833 Km, 17 stations)	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
Alignment-2 East – West Corridor (18.266 Km, 19 stations)	From Prajapati Nagar, along Central Avenue Road, Railway Feeder Road, Munje Chowk, Jhansi Raneer Chowk, North Ambajhari Road, Hingna Road, Lokmanya Nagar

FINAL ALIGNMENT

Alignment	Detail Route
Alignment-1 North-South Corridor (19.658 km, 17 Stations)	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, Parallel to Railway Line, Khapri Station and finally in MIHAN Area near concor depot
Alignment-2 East – West Corridor (18.557 km, 19 Stations)	From Prajapati Nagar, along Central Avenue Road, Railway Feeder Road, Munje Chowk, Jhansi Raneer Chowk, North Ambajhari Road, Hingna Road, Lokmanya Nagar



2. DATA COLLECTION

2.1 POPULATION GROWTH

Nagpur Metropolitan Area Development Plan 2012 - 2032 and Nagpur Metro Ph-I DPR, projected study

area population for various horizon years is estimated. The average annual growth rates of 1.4%, 1.2% & 1.1% have been considered for the years 2021, 2031 and 2041 respectively for the NMC area. Areas other than NMC are expected to grow at higher growth rates as per NMA Development Plans. The same annual growth rates of about 3% up to 2031 and about 2% for 2041 have been considered for projecting the population of other than NMC areas.

The overall study area population annual growth rates is 1.8% up to the year 2031 and 1.5% up to 2041. The projected study area population for various horizon years is given in Table

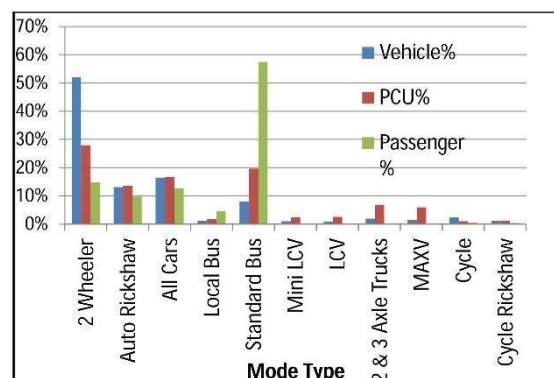
Sr. No.	Area	Population (Lakh)			
		2018	2021	2031	2041
1	Nagpur Municipal Corporation	26.5	27.6	31.1	34.8
2	Other than NMC Areas	7.8	8.6	12.3	15.5
Total		34.3	36.2	43.4	50.3

2.2 TRAFFIC VOLUME COUNT

To understand traffic characteristics in terms of vehicular, passenger and PCU, 40 traffic count stations were identified, some of which are mid block sections, some locations were fixed as screen line points and some were as outer cordon points, total traffic flow for all 40 locations and for both direction in terms of PCU is given. In grouped vehicular traffic, volume of fast, slow (NMT) and goods vehicles for all 40 locations is given. Nagpur being located at a central position, many inter-city and inter-state bus routes pass.

2.3 MODE SHARE

In, average mode share observed on roads in terms of Vehicle, Passenger PCU are shown. If external passenger is included, public mode share is high. However, if external trips are excluded different scenario will emerge.



3. TRAFFIC SURVEY

In any transport planning exercise, data collection is the cornerstone and is the very foundation on which rests the super structure. Historically and even in this study, this is treated with utmost seriousness, as it rightly should be. The data is used to analyze the existing transport and traffic situation in the study area and to develop urban transport demand model for the study area. The activity is undertaken to understand traffic and travel characteristic and highlight city specific problems.

The following survey were carried out

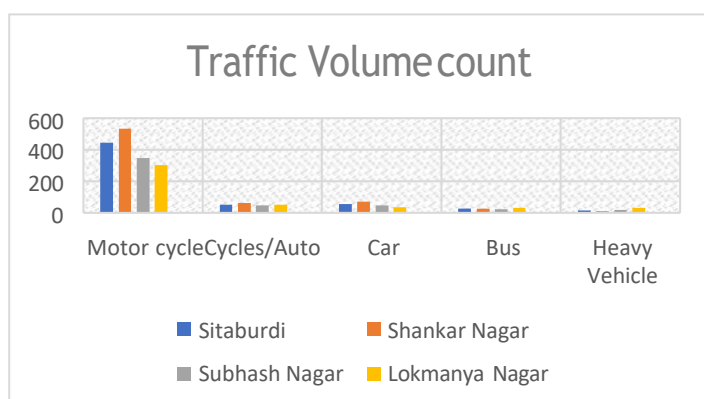
- 1) Traffic volume count survey
- 2) Parking survey

3.1 TRAFFIC VOLUME COUNT SURVEY:- the traffic survey is done with manual road survey. The traffic survey for data collection on the site .the data is collected of morning peak hour the data is extracted from 2 hr (10 am to 12pm)is distributed in 7 types of vehicle.

Traffic volume on four Intersections Sitaburdi to Lokmanya Nagar.

Location	Motor cycle	Cycles /Auto	Car	Bu s	Heav y Vehi cle	Total
Sitaburdi	442	51	56	26	12	587
Shankar Nagar	534	64	72	24	10	704
Subhash Nagar	345	48	45	22	16	476
Lokmanya a Nagar	303	52	35	29	32	451
Total	1624	215	208	101	70	2218

Traffic Volume Count Bar Chart



3.2 PARKING SURVEY

The number of vehicles that enter the parking lot for a particular time interval is counted. Parking survey done at lokmanya nagar and sitaburdi station. there are nos of vehicle is parked like motorcycles ,bicycle etc.

The final occupancy in the parking lot is also taken.

- 1) Parking Capacity
- 2) Parking Occupancy.
- 3) Parking Duration



4. STUDY OF STATION AND ROUTE

4.1 ROUTE:-

Two Corridors have been identified for implementation in phase I of Nagpur Metro Rail Project network as per details given as under:-

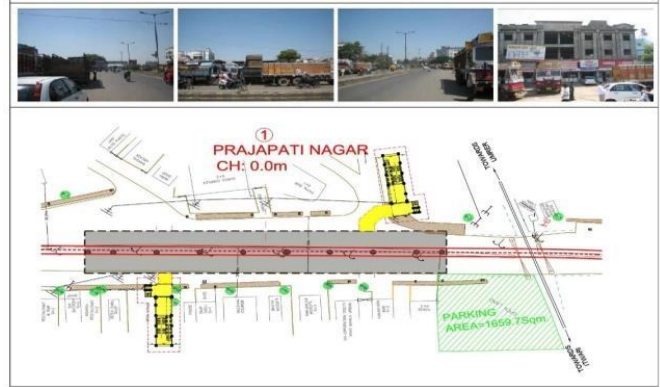
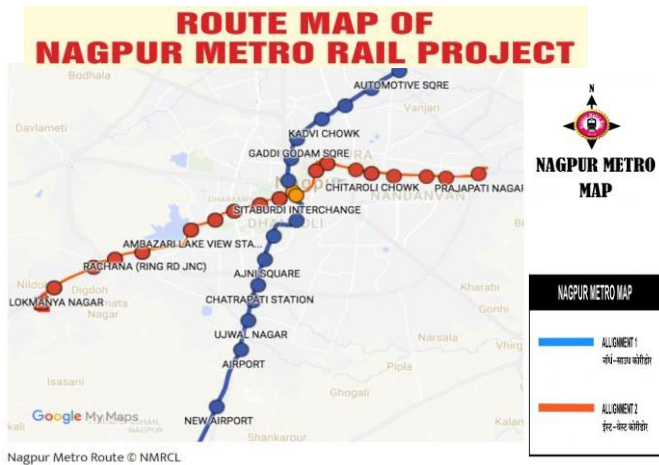
- Corridor I: North-South Corridor : Automative Square to KHAPRI
- Corridor II: East West Corridor : Prajapati Nagar to Lokmanya Nagar

I have Selected Corridor II: East West Corridor : Prajapati Nagar to Lokmanya Nagar For Study Area Of Nagpur Metro Rail. The Below stations are included in Corridor II

East West Corridor : Prajapati Nagar to Lokmanya Nagar

This corridor originates from Prajapati Nagar and runs westwards, through Vaishnodevi Chowk, Ambedkar Chowk, Telephone Exchange, Chittar Oli Chowk, Agarsen Chowk, Doser Vaisya Chowk, Nagpur Railway Station, Sitaburdi, Jhansi Rani Square, Institute of Engineers, Shankar Nagar Square, Lad chowk, Dharpeth College, Subhash Nagar, Rachna (Ring road Junction), Vasudev Nagar, Bansi Nagar to Lomanya Nagar. The entire corridor is elevated.

The total length of the corridor is 18.557 kilometer. There are 19 stations on this corridor. All stations are elevated stations and Sitaburdi station is an Interchange Station.



2. LOKMANYA NAGAR

Inter Station Distance : 1661 m

Rail Level : 13.36 m

Station type : Elevated

Entry/ Exits : On both sides of the road

Location : The station is located on NH-44.

Catchment Area The main source of passengers to this station is the residents & people visiting surrounding residential areas and Lata Mageshakar Hospital



4.2 RAIL LEVELS AND ALIGNMENT

In underground sections, the rail level is about 14.00 m below the ground level governed by a ground clearance of 2 m. and a station box of about 16 m depth. In the elevated section, rail level is generally about 13.00 m above ground in order to maintain a clearance of 5.50 m between the road and the station structure. In order to keep the land acquisition to minimum, alignment is planned generally in middle of the road and a twolevel station design has been proposed in both elevated and underground sections. Entry/exit structures to the proposed stations and traffic integration areas have been planned in the open space available.

4.3 STUDY OF STATION :-

1. PRAJAPATI NAGAR

Inter Station Distance 392.00m

Rail Level : 12.84 m

Station type : Elevated

Entry / Exits : On both sides of the road.

Location : The station is located on NH-6 across the railway line near Old Pardi Naka.

Catchment Area The station is proposed in the residential area of Ramanuj Nagar, HB Town, Chandar Nagar, Ram Nagar, Surya Nagar & the residents of the surrounding colonies.

4.4 PLANNING AND DESIGN CRITERIA FOR STATIONS

1. The stations can be divided into public and non- public areas (the areas where access is restricted). The public areas can be further subdivided into paid and unpaid areas.
2. The platform level has adequate assembly space for passengers for both normal operating conditions and a recognized abnormal scenario.
3. The platform level at elevated stations is determined by a critical clearance of 5.5-m under the concourse above the road intersection, allowing 3.5-m for the concourse height, about 1- m for concourse floor and 2.2-m for structure of tracks above the concourse. Further, the platforms are 1.09-m above the tracks. This would make the rail level in an elevated situation

at least 13.4 m above ground.

- The concourse contains automatic fare collection system in a manner that divides the concourse into distinct areas. The 'unpaid area' is where passengers gain access to the system, obtain travel information and purchase tickets. On passing through the ticket gates, the passenger enters the 'paid area', which includes access to the platforms.
- The arrangement of the concourse is assessed on a station-by-station basis and is determined by site constraints and passenger access requirements. However, it is planned in such a way that maximum surveillance can be achieved by the ticket hall supervisor over ticket machines, automatic fare collection (AFC) gates, stairs and escalators. Ticket machines and AFC gates are positioned to minimise cross flows of passengers and provide adequate circulation space

Prajapati Nagar to Lokmanya Nagar

This Corridor originates from Prajapati Nagar (meeting point of CA Road and Ring Road), then along Central Avenue Road moves towards Vaishno Devi Chowk, then Mayo Hospital and then takes left turn towards Nagpur Station Entry on Railway Feeder Road, then on Ghat Road alignment takes right turn and crosses over box culvert on existing railway line and falls on State Highway 255, Then after crossing Wardha Road alignment moves along North Ambajharae Road upto Ambajharae Lake and takes left State Highway 255, Then falls on Hingna Road and moves towards Lokmanya Nagar. There are 19 Stations proposed on this alignments.

6. SURVEY CONDUCTION

Survey Conduction

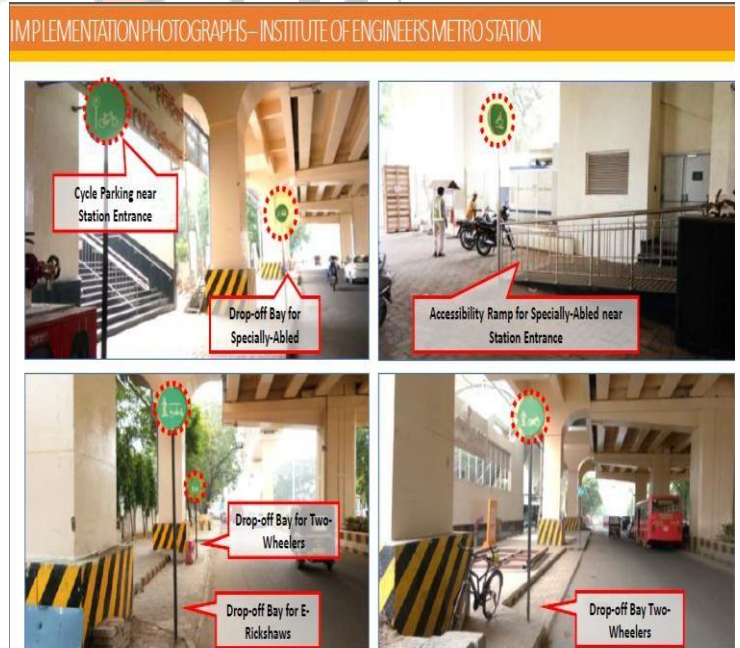
Survey research is the collection of data attained by asking individuals questions either in person, on paper, by phone or online. Conducting surveys is one form of primary research, which is the gathering data first-hand from its source. All of these choices can affect the answers given by participating individuals. The questionnaire was formatted in such a way that people should easily understand in traffic. I have created google form for questionnaire survey for public user of Nagpur metro rail. All question were rating was done in given below. I have received 554 response from public user of Nagpur.

Survey research:-

According to survey taken 60% vehicle user faced problem on nagpur road due to traffic congestion of poor traffic management. 40% users selection to relief from traffic congestion is metro rail transport if user are used metro rail for transportation then reducing air pollution and road accident and they reached their destination on time. 53 % vehicle user prefer their own vehicle for travel and they reach their destination .61% user voting is build the nagpur metro rail in nagpur city for city developing fastly and future expansion of city. Shows graphically representation of research work. overall rating for nagpur metro rail is 3 & 4 pointer out of 5

6.IMPLEMENTATION OF PARKING SYSTEM

Nagpur is one of the prominent cities located in Central India in the state of Maharashtra. The city limits encompass an area of 217 Sq. Km and the district is located on a Deccan Plateau. The recent trends in population indicate that the growth rate of the city's population may reduce in next three decades. Whereas, with the advent of the new developments such as MIHAN the growth rate might revive itself and the population might just double in the next fifteen years. The Employment figures of the city indicate that 35% of the population is employed and it's majorly occupied by Trade and Hospitality industries.



7. ESTIMATE COST AND FARE STRUCTURE

7.1 PROJECT COST

The Nagpur metro project north – south corridor (automotive sq to khapri) and east – west corridor (prajapati nagar to lokmanya nagar) the total route length is 38.215 km is proposed to be constructed with estimated cost are shown in below table.

(Rs./Crore)

Corridor No	Name of Corridor	Distance (KMs)	Estimated Cost without Central taxes at June-2012 Price Level	Estimated Cost with Central taxes at June-2012 Price Level	Completion Cost
I	North-South Corridor	19.658	3015.00	3,435.00	8680
II	East-West Corridor	18.557	2984.00	3,427.00	
Total		38.215	5999.00	6862.00	

The estimated cost at June-2012 price level also includes an amount of Rs.40 Crore as one time charges of security personal towards cost of weapons, barricades, and hand held and door detector machine etc. However, the recurring cost towards salary and allowances of security personal have not taken in to account in FIRR calculation.

7.2 FARE STRUCTURE

The Nagpur Metro Fares structures fixed by fare fixation committee in 2016 have been assumed, which have been duly escalated @15% for every two years to arrive at the initial fare structure for Nagpur Metro.

LOKMANAYA NAGAR METRO STATION FARE CHART 2020-2021

STATION	FARE	STATION	FARE
Bansi Nagar	RS 5 /-	Sitabuldi	RS 10/-
Vasudev Nagar	RS 5 /-	Rahate Colony	RS 20/-
Rachana ring road	RS 5 /-	Ajani Square	RS 20/-
Subhash Nagar Square	RS 5 /-	J P Nagar	RS 20/-
LAD Square	RS 10/-	Airport	RS 20/-
Shankar Nagar Square	RS 10/-	Airport South	RS 20/-
Institute Of Engineer	RS 10/-	New Airport	RS 20/-
Janshi Rani Square	RS 10/-	Khapari	RS 20/-

8. CONCLUSION

1. From case study report metro system are more reliable, comfortable and safer than road based system
2. Metro rail reduce congestion of roads.
3. Metro rails have minimized the travel time for the commuters.
4. Metro train has affected traffic in the nearby areas.
5. Metro rail is much economical for public user.
6. Metro rail has provided employment to be local people.
7. Overall local commuters are satisfied of rail line lokmanya nagar to Prajapati nagar
8. These aqua line is most usable for the college student, office staff like Mahindra, MIDC etc.
9. Estimation of passenger demand for transit services should consider complete journey of commuters including access time.
10. As per the survey the major issue is traffic congestion if people are use metro rail then reduce the traffic congestion, air pollution, road accidents.
11. Lastly local commuters are positive to travel by metro rail.

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