



Traffic Studies For Connectivity Of Mumbai Trans Harbourlink (MTHL) To Mumbai Pune Expressway

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Abstract

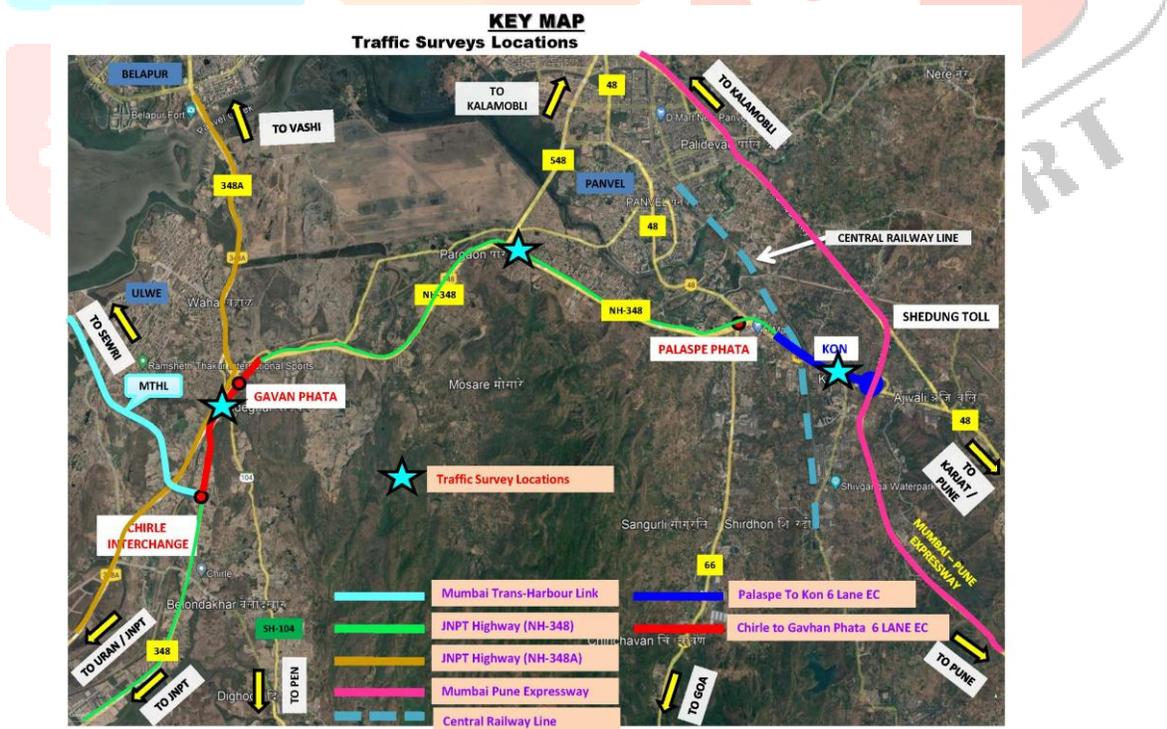
The Mumbai Trans Harbour Link (MTHL) is 22 km, Sea Bridge connecting the Mumbai with Navi Mumbai. The bridge start at Sewri, South Mumbai and cross Thane Creek north of Elephant Island and will terminate at Chirle village, near Nhava Sheva. The MTHL Bridge gives a faster connectivity with proposed Navi Mumbai International Airport, JNPT Port, Mumbai – Pune Expressway and Mumbai – Goa Highway. On Mumbai side, Connectivity with Coastal road is planned through Sewri Worli Elevated Connector project. The success of infra project largely depends on proper dispersal system on either side of MTHL. Therefore, it is very necessary to have a proper dispersal system from the proposed MTHL with the existing road network in the vicinity and connectivity with Mumbai-Pune Expressway.

Proposed development requires proper evaluation and projection of traffic data. Projection of traffic will give idea about improvement proposal components. So, It is necessary to analyze traffic data with precise data collection and evaluation methods.

This Paper presents traffic studies for new connectivity proposals which integrate with existing road networks.

1. Introduction

The Mumbai Metropolitan Region (MMR) spread over 6,328 Sq Km. consists of 9 Municipal Corporations and 9 Municipal Councils and more than 1000 villages in Thane, Raigad and Palghar Districts. MMRDA is responsible for the long-term planning and balanced development of the MMR, implementation of sustainable infrastructure and financing infrastructure development in the MMR. As a part of this endeavor, MMRDA is engaged in development of existing road network and new transportation routes to counterbalance the need of future traffic growth of region. MMRDA have planned and executing Mumbai Trans Harbour Link Project. This 22 Km Sea Link between Sewri on the island and Chirle on the mainland facilitates overall development and reduces the traffic congestion in the city. It is proposed to provide a smooth dispersal system from MTHL road to Mumbai-Pune Expressway. The MTHL road ends at Chirle Junction on NH-348 and there is heavy traffic on NH-348, especially of multi axle container trucks due to JNPT port, hence it is necessary to merge the MTHL traffic smoothly without causing traffic jam either on MTHL or on NH 348. As an endeavor of this, it is proposed to provide an elevated corridor from Chirle end of MTHL to Gavanphata and from Palaspe phata to Mumbai Pune Expressway. The proposed development is to be done from end point of MTHL at Chirle to Mumbai-Pune Expressway. The proposed alignment is conceptualized by dividing the same into two parts i.e. the alignment from Chirle interchange to Gavanphata as one part and that from Palaspe Phata to Mumbai-Pune Expressway as second part.



2. Need of study

- The main objective is to establish the technical, economical, and financial viability of the project and prepare detailed project report for the construction of proper dispersal system of required configuration.
- The viability of the project will be established considering the requirements with regard to rehabilitation, upgradation and improvement based on highway design, pavement design, provision of service roads wherever necessary, type of intersections, rehabilitation and widening of existing and/or construction of new bridges and structures, road safety features, quantities of various items of works, cost estimates and economic analysis.
- To calculate Traffic flow parameters according to location and time interval.
- To forecast future traffic growth by applying corrective parameters.
- To establish improvement proposal.

3. Scope of Study

Perimeter of MTHL road to Mumbai Pune expressway is considered for study area. To analyse traffic parameters selection of data collection method, Location and sections of traffic count, methods of counting and analysis are key components of study area.

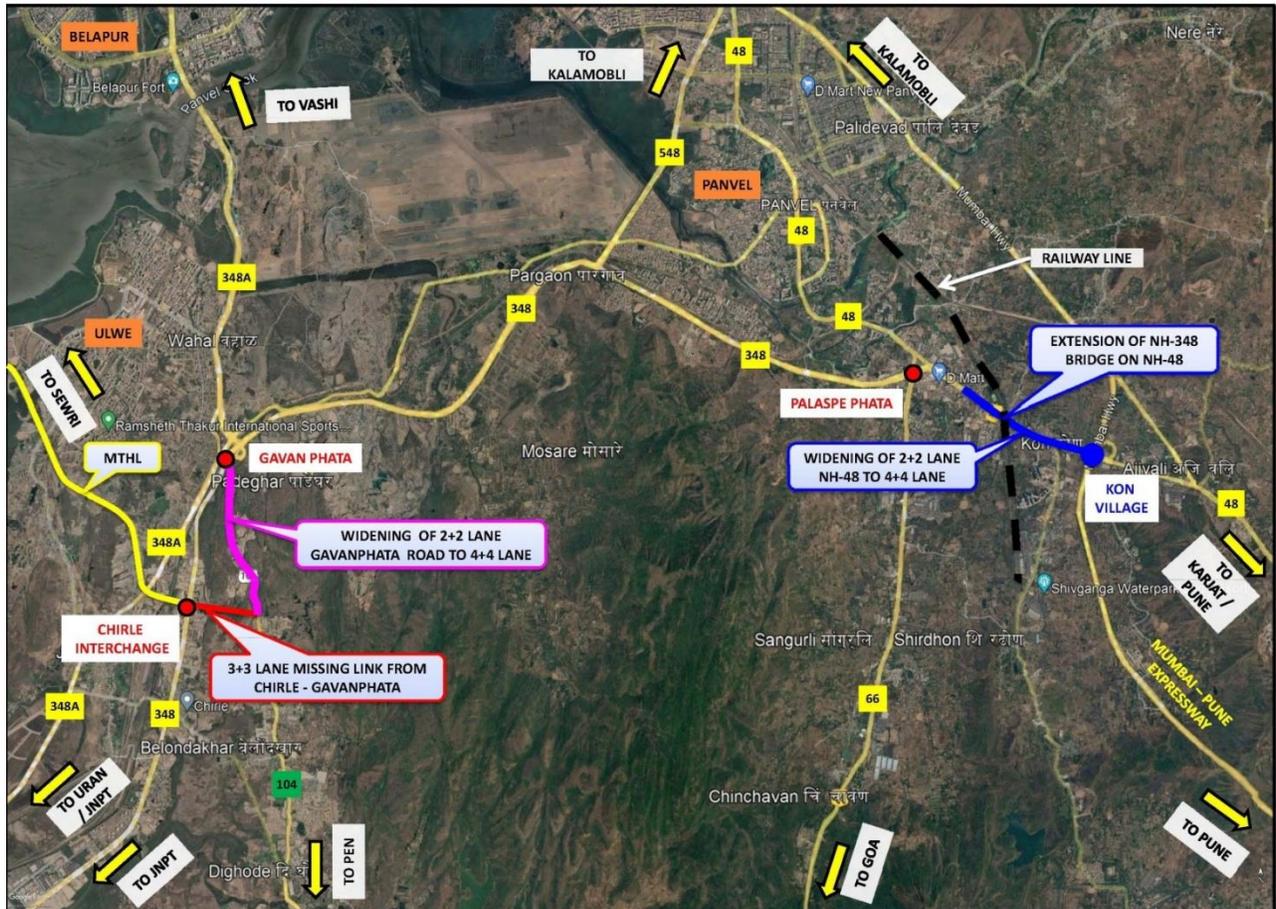
4. Methodology

- I. Study of existing road network
- II. Review of proposed infrastructure development plans.
- III. Identifying homogeneous section of traffic.
- IV. Data Collection
 - a. Type of survey
 - Mid-block traffic volume count
 - Intersection Traffic volume count
 - b. Methods of data collection
 - Manual count
 - Videographic count by camera
 - Count by sensors
- V. Analysis of traffic data
- VI. Projections and future trends
- VII. Results and conclusions

5. Data collection

Key map of area under traffic study are as below

KEY MAP – CONNECTIVITY OF MTHL TO MUMBAI – PUNE EXPRESSWAY



Traffic survey locations are decided according to homogeneous section of road. While deciding traffic locations traffic merge and diverge points are selected and according to location type of traffic survey is decided. i.e. Mid Traffic Volume Count and Intersection Traffic Volume Count.

This was carried out manually and counts were recorded at 30 minutes interval. The survey was carried out for 7 days (continuous and direction wise). The vehicle classifications as suggested in IRC Codes were followed. The same has been reflected in Traffic survey formats. All results have been presented in tabular and graphical forms. The data collected was computerized in MS-EXCEL software. Homogeneous section of traffic count are identified as 1) Chirle interchange to palaspe phata 2) Palaspe phata to Mumbai pune Expressway. Intersection volume count are planned at Gavhan phata, Palaspe flyover and Rasayani junction.

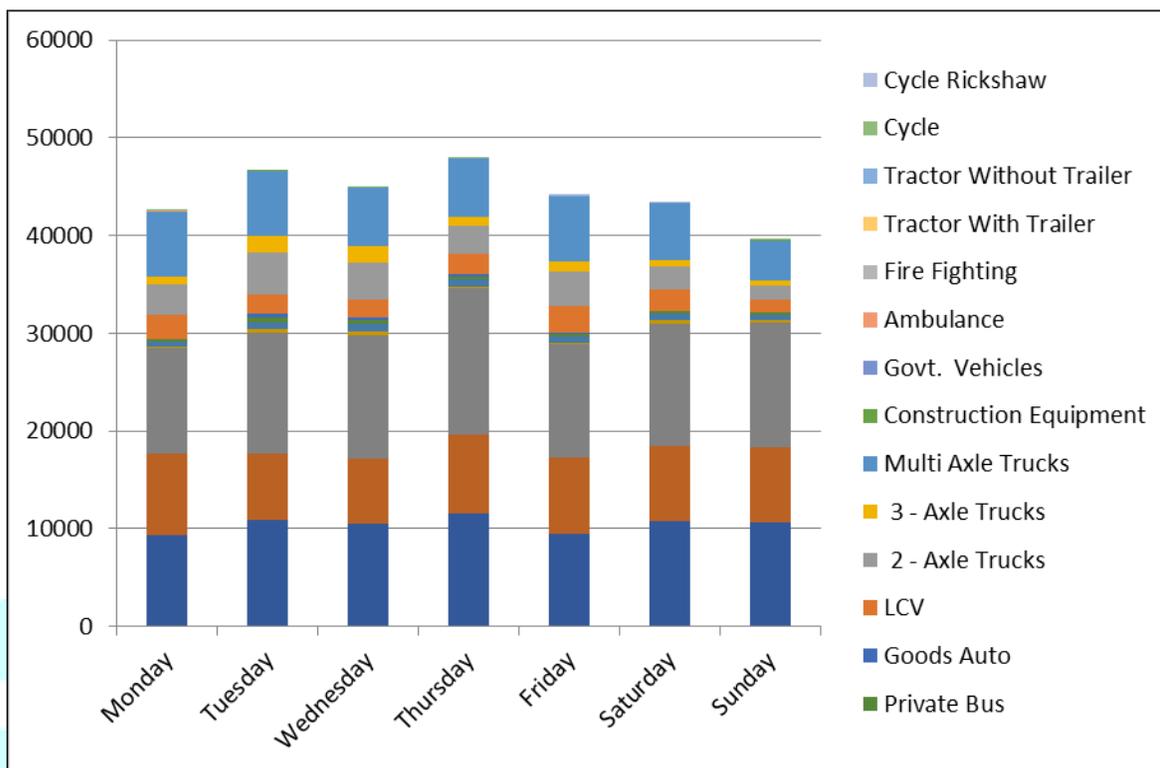
I. Data collected from traffic volume count are represented in table below

Table No 1 – Traffic count summary

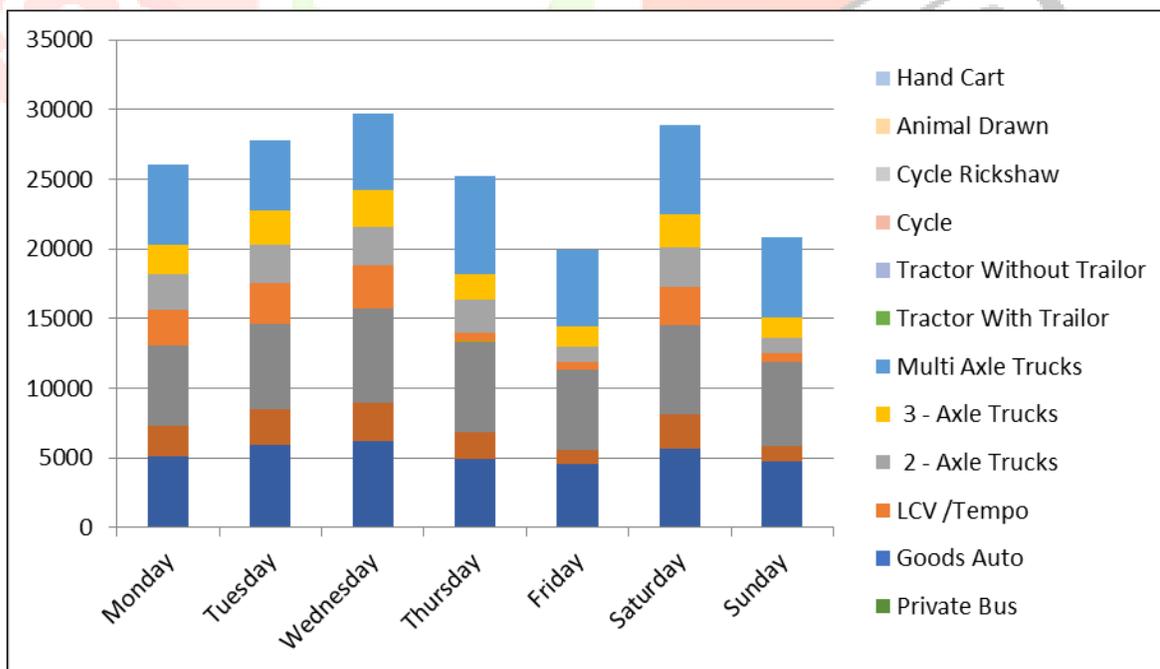
Type of Vehicles		ADT (Vehicles / day)				Chirle to Palaspephata (NH-348)
		PalaspePhata to Mumbai Pune Expressway (NH-48)			Before T point on Gavanphata side	
		Near Rasayani Junction	Near Palaspe Flyover			
Flyover Traffic	Slip Road Traffic		Total Traffic			
Two-Wheeler		10462	3087	10926	14013	5285
Three-Wheeler (Auto)		7591	559	5647	6206	2009
Car/ Jeep / Van / Taxi		12528	4205	7861	12066	6190
Mini Bus		236	58	216	274	8
Govt. Bus		658	10	1144	1154	0
Private Bus		311	29	339	368	3
Goods Auto		190	45	251	296	5
LCV		2037	1249	1478	2727	1871
2 - Axle Trucks		3049	1816	1174	2990	2212
3 - Axle Trucks		1049	1023	328	1351	2061
Multi Axle Trucks		5983	4364	704	5068	5833
Construction Equipment		22	21	41	62	0
Exempted Vehicles	Govt. Vehicle	2	0	4	4	0
	Ambulance	7	2	3	5	0
	Firefighting	0	0	1	1	0
Tractor With Trailer		1	0	0	0	0
Tractor Without Trailer		2	0	0	0	0
Cycle		11	0	36	36	0
Cycle Rickshaw		1	0	0	0	0
Animal Drawn		0	0	0	0	0
Hand Cart		0	0	0	0	0
Total Traffic (Vehicles/day)		44140	16468	30153	46621	25476

Graphical Representation of traffic data is as below.

a) Traffic volume count at NH-48 near Rasayani junction



b) Traffic volume count on NH-348 JNPT Highway



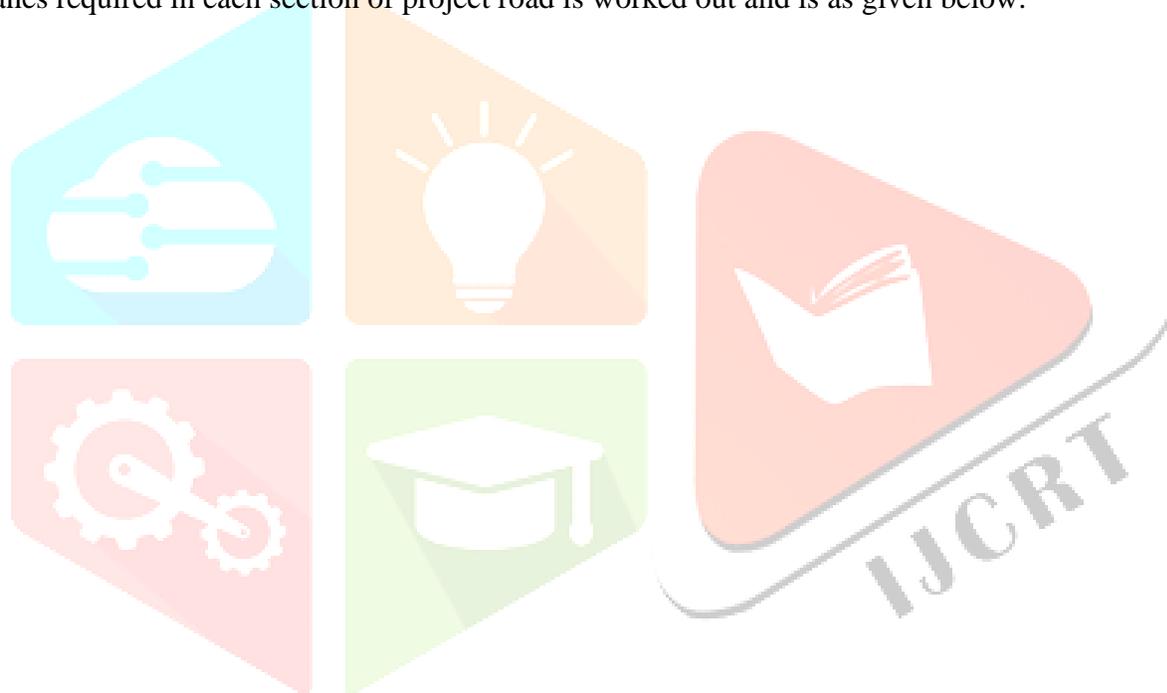
II. Percentage composition of traffic

Table No 2 – Composition of Traffic

Type of Vehicles	Composition of Traffic		
	Palaspe Phata to Mumbai Pune Expressway (NH-48)		Chirle to Palaspe phata(NH-348)
	Near Rasayani Junction	Near Palaspe Flyover	Before T point on Gavanphata side
Two-Wheeler	23.70%	30.06%	20.74%
Three-Wheeler (Auto)	17.20%	13.31%	7.89%
Car/ Jeep / Van / Taxi	28.38%	25.88%	24.30%
Mini Bus	0.53%	0.59%	0.03%
Govt. Bus	1.49%	2.48%	0.00%
Private Bus	0.70%	0.79%	0.01%
Goods Auto	0.43%	0.63%	0.02%
LCV	4.61%	5.85%	7.34%
2 - Axle Trucks	6.91%	6.41%	8.68%
3 - Axle Trucks	2.38%	2.90%	8.09%
Multi Axle Trucks	13.55%	10.87%	22.90%
Construction Equipment	0.05%	0.13%	0.00%
Exempted Vehicles	0.00%	0.01%	0.00%
	0.02%	0.01%	0.00%
	0.00%	0.00%	0.00%
Tractor With Trailer	0.00%	0.00%	0.00%
Tractor Without Trailer	0.00%	0.00%	0.00%
Cycle	0.02%	0.08%	0.00%
Cycle Rickshaw	0.00%	0.00%	0.00%
Animal Drawn	0.00%	0.00%	0.00%
Hand Cart	0.00%	0.00%	0.00%
Total Traffic (Vehicles/day)	100.00%	100.00%	100.00%

6. Result

For the optimum utilization of resources, phased out road up-gradation programme is essential so that improved facilities are created as per the traffic requirements. The project involves developing a direct connectivity of MTHL with Mumbai-Pune Expressway by providing elevated corridor. Hence, in order to decide the no. of lanes required to be provided to the elevated corridor, the traffic study was carried out. The traffic study report of MTHL was provided by MMRDA in order to the information of traffic data on MTHL. It is stated in the report that the Peak Hour Traffic on MTHL in year 2041 will be 3250 PCU. In absence of sufficient data about traffic to Mumbai-Pune Expressway from MTHL, it is assumed that 50% traffic of MTHL will continue to Mumbai-Pune Expressway. The requirement of no. of lanes is worked out based on the traffic study carried out on project road and the MTHL traffic likely to come on the project road. The traffic growth rate of 5% is considered as per IRC:SP-87-2019. The basic number of lanes required in each section of project road is worked out and is as given below.



Number of Lanes required													
Sr. No.	Location	Total Traffic (PCU/day)		Peak Hour Traffic (PCU/Hr)	No. of lanes required as of now with level of service 'B'		Projected Peak hour traffic in year 2041 (PCU/Hr)	No. of lanes required in year 2041 with level of service 'C'		Peak Hour Traffic of MTHL in year 2041 (50% considered for Mumbai Pune Expressway)	Total Projected Peak hour traffic in year 2041 considering MTHL traffic) (PCU/Hr)	No. of lanes required with level of service 'C' in year 2041 after adding MTHL traffic	
		To MPX	To JNPT			say			say				say
1	After Gavan Phata & Before T Point on NH-348	28846	26990	1731	1.9	2	4374	2.9	3	1625	5999	4.0	4
2	After T Point on NH-348	25978	22783	1559	1.7	2	3939	2.6	3	1625	5564	3.7	4
3	Palasphe Flyover	18171	20047	1203	1.3	2	3039	2.0	3	1625	4664	3.1	4
4	After Palasphe Flyover (@ 1500 trucks i.e. 4500 PCU goes to Rasayani) - Requirement of lane for flyover from Palasphe Flyover	13671	15547	933	1.0	2	2357	1.6	2	1625	3982	2.7	3
5	After Palasphe Flyover (@ 1500 trucks i.e.	24059	19534	1444	1.6	2	3648	2.4	3	0	3648	2.4	3

Number of Lanes required													
Sr. No.	Location	Total Traffic (PCU/day)		Peak Hour Traffic (PCU/Hr)	No. of lanes required as of now with level of service 'B'		Projected Peak hour traffic in year 2041 (PCU/Hr)	No. of lanes required in year 2041 with level of service 'C'		Peak Hour Traffic of MTHL in year 2041 (50% considered for Mumbai Pune Expressway)	Total Projected Peak hour traffic in year 2041 considering MTHL traffic) (PCU/Hr)	No. of lanes required with level of service 'C' in year 2041 after adding MTHL traffic	
		To MPX	To JNPT			say			say				say
	4500 PCU goes to Rasayani) - Requirement of lane for at grade level traffic												
7	On VOP across MPX	30844	19418	1851	2.1	3	4676	3.1	4	1625	6301	4.2	5
8	MPX Exit @ Kone	-	7025	422	0.5	1	1065	0.7	1	1625	2690	1.8	2
9	MPX Entry @ Kone	5855	-	351	0.4	1	888	0.6	1	1625	2513	1.7	2

7. Conclusion

Thus, from traffic analysis it can be seen that the number of lanes required for the elevated corridor from Palaspe Phata to Mumbai-Pune Expressway works out to 3 lanes in each direction of travel in the year 2041. Hence, it is proposed to provide 6 lane elevated corridor. Regarding number of lanes for elevated corridor @ Chirle to Gavanphata, it is proposed to continue same carriageway configuration of MTHL and thus, 6 lane elevated corridor is again proposed to provide.

8. References

- [1] IRC 106:1990 Guidelines for Capacity of Urban Roads in Plain areas
- [2] IRC 86:1983 – Geometric Design Standards for Urban Roads in Plains
- [3] Rajesh Gajjar a* and Divya Mohandas b, “Critical Assessment of Road Capacities on Urban Roads – A Mumbai Case-Study” 11th Transportation Planning and Implementation Methodologies for Developing Countries, TPMDC 2014, 10-12 December 2014, Mumbai, India.
- [4] Mohsin Manzoor Janwari*a, Geetam Tiwarib , Sudershan K. Poplic , M. S. Mird, 11th Transportation Planning and Implementation Methodologies for Developing Countries, TPMDC 2014, 10-12 December 2014, Mumbai, India, “Traffic Analysis of Srinagar City”

