Feasibility Study for Construction of Common Utility Tunnel on Anand Vidyanagar Road- A Pilot Study

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Abstract— This study approaches with the implementation of feasible construction of common tunnel utility. Many diversions are made while reconstructing the road which also causes traffic congestion. Urban utilities are overcrowding underground space. Therefore, future sustainable underground strategies will consist of the competency to reduce the utilization of traditional trenching. During the last century, there was an incrementing interest in utility tunnels for urban areas as a quandary-solving technique to evade congestion of the street subsurface. Utility tunnels or utilidors are joint-use underground facilities that may contain multiple utilities such as water, sewerage, gas, electrical power, telephone, and central heating in sundry combined or in some cases en masse. The key advantage of utility tunnel is the substantially lower environmental impact when compared with trenching alternatives. Their construction presents no incipient quandaries of an engineering nature. However, implementing these subsurface tunnels is retarded most by first-cost, compatibility, and liability quandaries. These underground facilities are highly complex and arduous to manage because of synergistic effects. Utility tunnels, as a major capital investment in urban development, should be considered in the broad context of the urban orchestrating strategy. This research work has fixated on utility tunnel feasibility and its practical application in urban areas. Many difficulties are faced while reconstructing the roads. As it is not economical in future to always dismantle the damaged road and reconstruct it. While dismantling the road and reconstructing it causes problem like destroying of telephone lines, drainage lines, and water supply lines. With this thought in mind, we are undertaking the project of designing a utility tunnel for the stretch Anand-Vidhyanagr road.

Keywords: Utility easy Access, less maintenance, pollution control

I. INTRODUCTION

The key advantage of utility tunnel is the substantially lower environmental impact when compared with trenching alternatives. Their construction presents no incipient quandaries of an engineering nature. However, implementing these subsurface tunnels is retarded most by first-cost, compatibility, and liability quandaries. These underground facilities are highly complex and arduous to manage because of synergistic effects. Utility tunnels, as a major capital investment in urban development, should be considered in the broad context of the urban orchestrating strategy. This research work has fixated on utility tunnel feasibility and its practical application in urban areas. Many difficulties are faced while reconstructing the roads. As it is not economical in future to always dismantle the damaged road and reconstruct it. While dismantling the road and reconstructing it causes problem like destroying of telephone lines, drainage lines, and water supply lines. With this thought in mind, we are undertaking the project of designing a utility tunnel for the stretch Anand-Vidhyanagr road.

II. LITERATURE REVIEW

This chapter consist various literature papers that we had referred while going through the project "Feasibility Study for Construction of Common Utility Tunnel on Anand-Vidhyanagar Road - A Pilot Study". Utility tunnel is most convenient and the best option to avoid digging of roads for the repair and maintenance work. It was first built in 1866 and has been in use since 19th century. Underground utility tunnels which have been discussed widely and adopted by different countries are becoming an alternative way to solve the problems of urban utility placement.

In this study Jain et al. (2017)endeavors to make utilization of traffic demeanor on the aggregate level to estimate congestion on urban arterial and sub arterial roads of a city exhibiting heterogeneous traffic conditions by breaking the route into independent segments and approximating the inception-destination predicated traffic flow deportment of the segments. This paper proposes a conception of estimating congestion on urban roads with reduced cost of field data collection by inhibiting observation sites at only a few select points (nodes) in the route in lieu of the entire length. A model for presage of travel time on a given segment was prepared utilizing multiple linear regression. Combined with the knowledge of free flow time for that segment, which from among other methods can additionally be approximated from the midnight field observation data, Congestion Index, which is an efficient, route length independent measure of congestion, can be calculated. This procedure was carried out in this study for a major road route in Delhi. Different combinations of situations were analysed to arrive at four efficient models, of which one with the best statistical values was chosen (adjusted R2 = 0.917). The model was validated with the avail of root mean squared error (RMSE) evaluation, which with a value of 7.2% was found remarkably reliable. The utilization of node data to estimate travel time may avail in estimation of travel time, but it falters in providing avail for suggesting alternative routes because the node data for alternative routes remain the same notwithstanding anything but roadway parameters such as length and diversions. In order to make this distinction clear, more roadway parameters should be studied for influence on traffic congestion.

III. OBJECTIVES

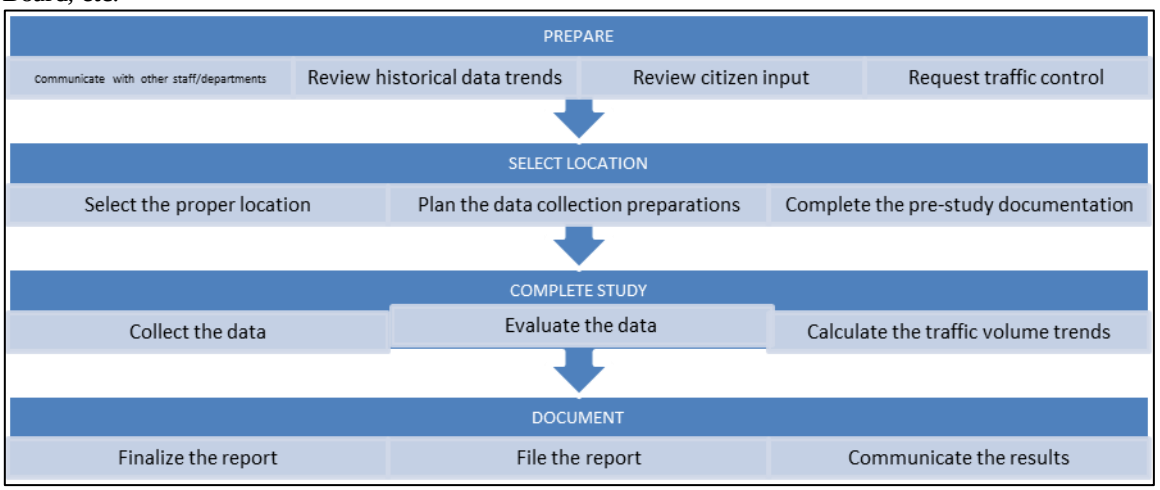
- Peak flood Controlling.
- Improving urban wastewater management, including water renewal plants.
- Efficient drainage maintenance.
- Reduce cost of reconstruction of road.

- Easy flow of traffic.
- Reduce health issue by reduction in traffic jam.
- Fuel consumption by reducing the time of journey VOC reduce where there is no any diversion.
- Immediate repairing of utilities.
  1) Volume Count
  2) Inventory of road
  3) Other data collection from BSNL, Pollution control Board, etc.

IV. EXPERIMENTAL WORK

A. Volume Count

There are two methods to conducting traffic volume counts: (1) manual and (2) automatic. Manual counts are typically used to gather data for determination of vehicle classification, movements of vehicle, direction of travel pedestrian movements, or vehicle occupancy.



B. Inventory of road

Measure distance of test run – 2.4 km
Road on which test run was made – AnandVidhyanagar Road
Between howmany points:-
1) Bhaikaka(Start) to Time Cinema
2) Time Cinema to Rutu-Ice creame
3) Rutu Ice creame to Big Bazar
4) Big Bazar to Woodland Showroom
5) Woodland Showroom to Townhall (End)

C. Other data

Other data collecting from the different department namely;
- Sewerage and Drainage Department
- Pollution Control Board
- Anand Municipal Corporation
- BSNL Telecommunication Dept.
- MGVCL Electricity

V. RESULTS AND ANALYSIS

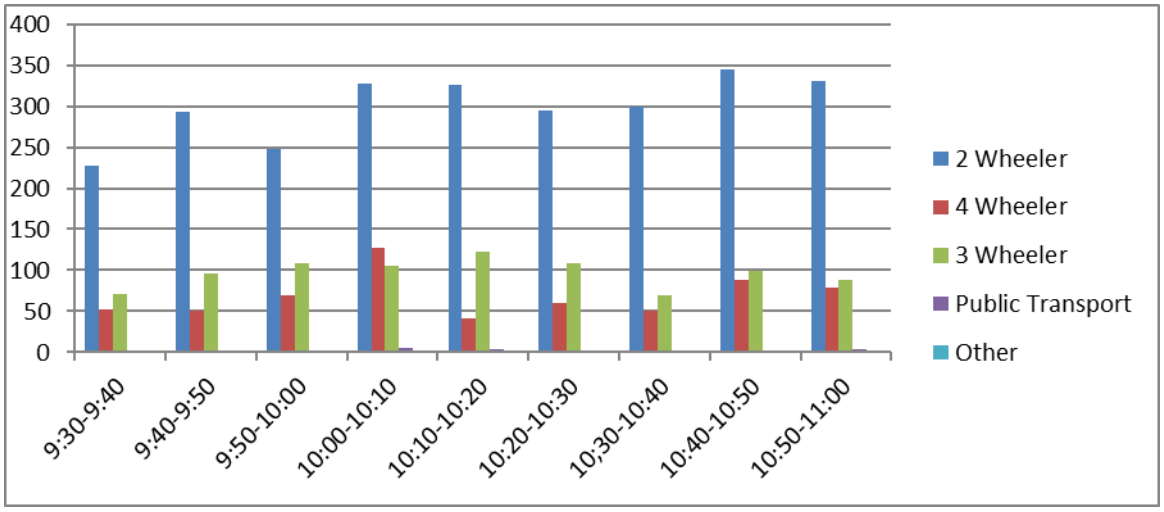
A. Results of Volume Count

1) Vallabhvidhyanagar to Anand (Morning)

The following table represents the different data collected for different vehicles from 9:30 am to 11:00 am.

Time	9:30-9:40	9:40-9:50	9:50-10:00	10:00-10:10	10:10-10:20	10:20-10:30	10;30-10:40	10:40-10:50	10:50-11:00
2 Wheeler	228	293	247	327	326	294	299	344	330
4 Wheeler	52	51	70	127	42	60	51	89	79
3 Wheeler	71	96	108	105	122	108	70	99	88
Public Transport	1	1	3	5	4	3	3	2	4
Other				3	1		1		

Table 1: Vallabhvidhyanagar to Anand (Morning)



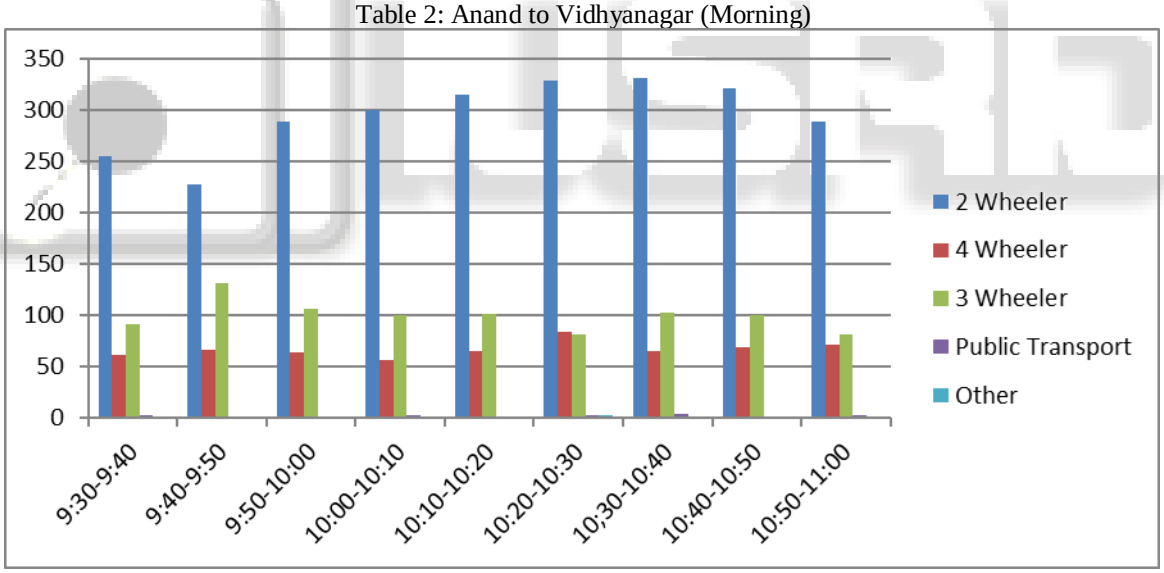
Graph 1: Vallabhvidhyanagar to Anand (Morning)

2) Anand to Vidhyanagar (Morning)

The following table represents the different data collected for different vehicles from 9:30 am to 11:00 am.

Time	9:30-9:40	9:40-9:50	9:50-10:00	10:00-10:10	10:10-10:20	10:20-10:30	10;30-10:40	10:40-10:50	10:50-11:00
2 Wheeler	255	228	289	300	315	329	331	322	289
4 Wheeler	61	67	64	56	65	84	65	69	72
3 Wheeler	91	132	106	100	102	81	103	100	82
Public Transport	3	1	1	3	2	3	4		3
Other				2	2	3	1	1	1

Table 2: Anand to Vidhyanagar (Morning)



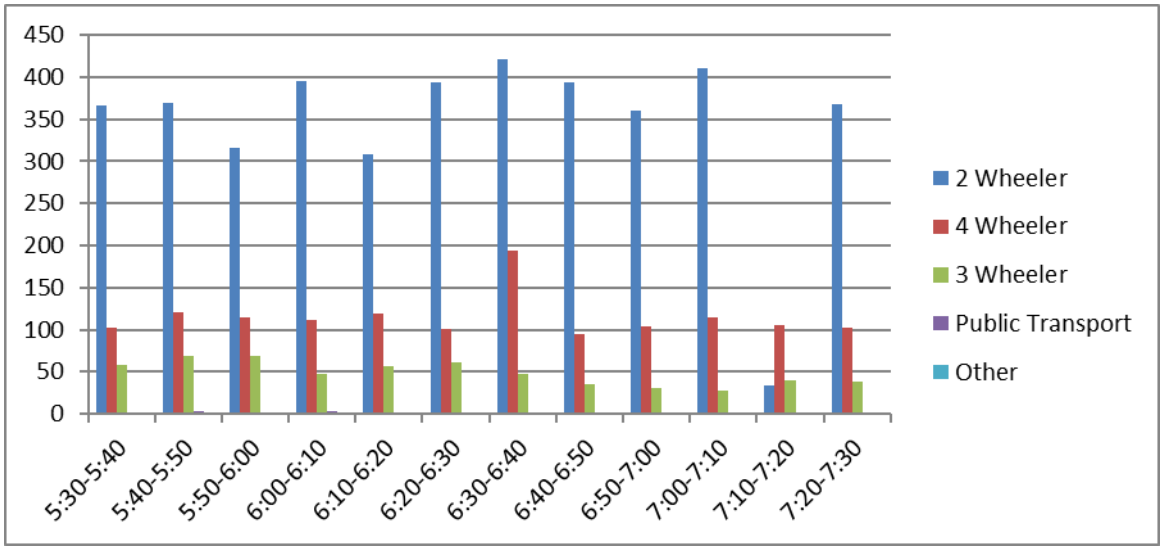
Graph 2: Anand to Vidhyanagar (Morning)

3) VallabhVidhyanagar to Anand (Evening)

The following table represents the different data collected for different vehicles from 5:30 pm to 7:30 pm.

Time	5:30-5:40	5:40-5:50	5:50-6:00	6:00-6:10	6:10-6:20	6:20-6:30	6:30-6:40	6:40-6:50	6:50-7:00	7:00-7:10	7:10-7:20	7:20-7:30
2 Wheeler	367	370	316	395	308	393	421	393	360	411	34	368
4 Wheeler	103	120	115	111	119	101	194	94	104	115	105	103
3 Wheeler	58	69	69	47	56	61	48	35	31	27	40	38
Public Transport	1	3		3	1	2	1	2	1	1	2	
Other						2	1		1	2		

Table 3: Vallabhvidhyanagar to Anand (Evening)



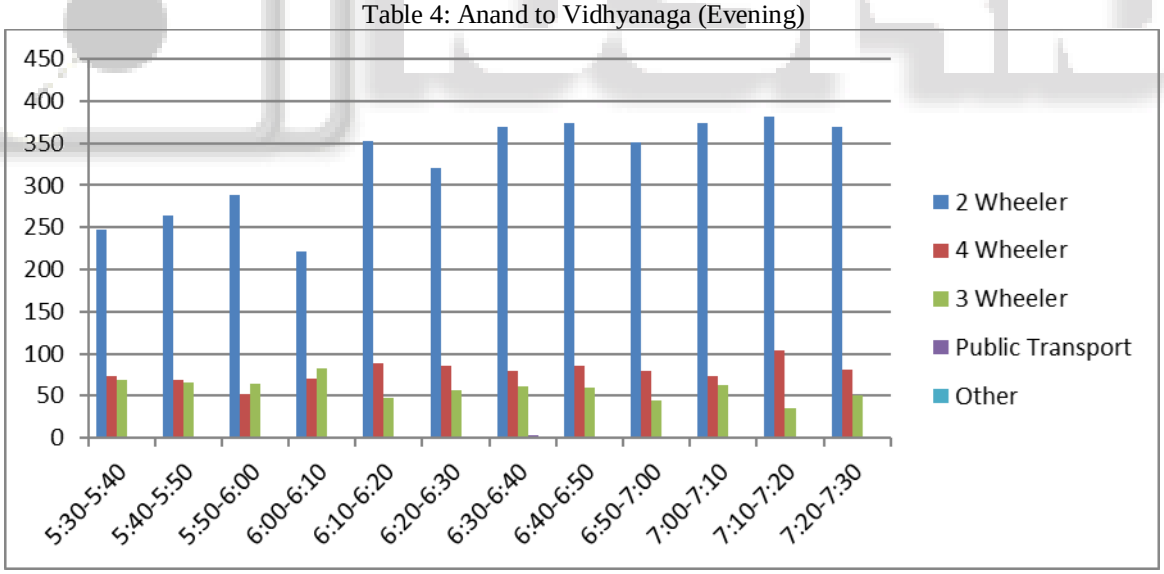
Graph 3: Vallabhvidhyanagar to Anand (Evening)

4) Vallabhvidhyanagar to Anand (Evening)

The following table represents the different data collected for different vehicles from 5:30 pm to 7:30 pm.

Time	5:30-5:40	5:40-5:50	5:50-6:00	6:00-6:10	6:10-6:20	6:20-6:30	6:30-6:40	6:40-6:50	6:50-7:00	7:00-7:10	7:10-7:20	7:20-7:30
2 Wheeler	247	264	288	221	353	320	370	374	351	374	381	370
4 Wheeler	73	69	52	71	89	85	79	85	80	73	104	81
3 Wheeler	69	65	64	82	48	57	61	60	45	63	35	51
Public Transport	1	2	2	1	1	1	3	1		1	1	2
Other		1				1		2				

Table 4: Anand to Vidhyanaga (Evening)



Graph 4: Anand to Vidhyanagar (Evening)

B. Inventory of AnandVidhyanagar Road

ANAND TO VIDHYANAGAR	MARGINE (SHOULDER)	90CM	1M		1M		1M	1M		1M
	LANE 2	3M 10CM	3M 80CM		3M 80CM		3M 80CM	3M 90CM		4M 10CM
	LANE 1	3M 10CM	3M 30CM		3M 30CM		3M 30CM	3M 30CM		3M 30CM
	MARGINE (SHOULDER)	0	45CM		45CM		45CM	45CM		45CM
	DIVIDER	0	1M70C	6M70CM	1M 70CM	2M	1M 70CM	1M 70CM	1M 90CM	1M 70CM
	(MARGINE)	0	45CM		45CM		45CM	45CM		45CM

VIDHYANAGAR TO ANAND	SHOULDER									
	LANE 1	3M 10CM	3M 30CM		3M 30CM		3M 30CM	3M 30CM		3M 30CM
	LANE2	3M 10CM	4M 20CM		3M 70 CM		4M	3M 80CM		4M
	MARGINE (SHOULDER)	1M 60 CM	1 M		1 M		1 M	1 M		1 M
	Place	BHAI KAKA	TIME CINEMA	APC CICLE	RUTU ICE CREAM	BIG BAZAR CIRCLE	BIG BAZAR	WOODLAND/ DIVINE 2	FOUNTAIN DIVIDER	TOWN HALL

VI. ESTIMATION AND COSTING

A. Estimation of Flexible Pavement

Construction Cost	Rs.3,59,94,935
Routine Maintenance	Rs. 96,14,413.56
Periodic Maintenance	Rs. 97,36,908.84
Rehabilitation Cost	Rs. 3,65,39,654.4
Fuel Consumption	Rs. 8,47,00,000
Delay cost	Rs. 4,62,00,000
Wearing and Tearing Cost	Rs. 6,16,00,000
Incremental Increase in road user cost	Rs. 4,62,00,000
Total	Rs. 33,05,85,912

B. Estimation of Utility Tunnel

Tunnel Cost	
Construction cost	Rs. 12,00,00,000
Maintenance Cost	Rs. 2,40,00,000
Pavement on Tunnel	
Base+ Sub Base	Rs. 54,81,578.4
Bitumen Surface	Rs. 3,05,13,552
Periodic cost	Rs. 97,36,908.84
Routine cost	Rs. 96,14,413.56
Total	Rs. 19,93,46,453.3