

ELEVATED HIGHWAY: A Solution to Developmental Problems in Pathanamthitta

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Abstract - An elevated highway is a highway that is raised above grade for its entire length. It has restricted entry and exit. Technically the entire highway is a single bridge. The Omalloor – Kaipattoor road is a major road in Pathanamthitta district which is also a part of NH183A which spans all the way from Kollam to Vandiperiyar via Pathanamthitta and Adoor. Almost 17 sub roads that came from other towns and cities connect the main road at Omalloor itself. Traffic congestion occurs during peak hours in Omalloor – Kaipattoor route. During the flood that occurred in the year 2018-2019, almost all the major roads were flooded with water. The water logging has caused the roads to lose its strength and durability. The lands in Pathanamthitta have hilly areas and plain marshy land. Land available for future road widening or construction is very less in Omalloor area due to the marshy land of the area. So we have proposed an elevated highway at Omalloor Kaipattoor road for smooth traffic flow.

Keywords: *Elevated highway, Traffic volume survey, Questionnaire survey, Total station survey.*

I. INTRODUCTION

Pathanamthitta is a well-known district in Kerala for its culture and heritages. There are famous places like Sabrimala, Pandalam, Aranmula, Thiruvalla, etc. Pathanamthitta is among developing districts of Kerala. The district has a population density of 453 inhabitants per square kilometer.

Omalloor is one of the small towns in Pathanamthitta district. Omalloor is well known for its temples. Omalloor is one of those places where almost 17 sub roads from different towns and cities connect NH183A.

The increased traffic congestion in this area has been increased since last decade. An option for a bypass road cannot be taken in this case as the area gets flooded with water and also there is no land available for future development.



Fig.1 Omalloor – Kaipattoor road

II. OBJECTIVES

- To identify and analyze the present scenario of traffic congestion at Omalloor – Kaipattoor road.
- To conduct traffic volume survey and questionnaire survey.
- Collect necessary data for elevated highway design.
- Analyze the data obtained.

III. METHODOLOGY

Basic data regarding the project were collected from concerned authorities like land availability, soil investigation details, etc. A traffic volume study was conducted near Government Higher Secondary School (GHSS), Omalloor and Uzhuvathu Devi Temple, Omalloor. A detailed questionnaire survey was also conducted to evaluate the public interest about implementation of this project. The alignment of the existing road was found out by conducting a total station survey.

The accurate data regarding soil investigation couldn't be collected due to some financial causes. Thus the soil investigation details of Pathanamthitta KSRTC bus stand has been adapted, as the land near KSRTC bus stand is same as that of the land proposed for elevated highway construction at Omalloor.

IV. DATA COLLECTED

As a part of study, the following data were collected.

A. Soil investigation

It is the study conducted to know about the structure and property of land underneath. The proposed site at Omalloor and the Pathanamthitta KSRTC bus stand side have the same type of soil. The average of soil investigation reports at the Pathanamthitta KSRTC bus stand side shows

- 4.10m of filled lateritic soil and quarry waste (brown) (0.00m - 4.10m)
- 1.50m of lateritic gravel (red/yellow) (4.10m – 5.60m)
- 4.20m of lateritic clay with sand & gravel (yellow/red) (5.60m – 9.80m)
- 6.40m of silty lateritic clay with sand (white/yellow) (9.80m – 16.20m)
- 1.20m of silty weathered (white/grey) (16.20m - 17.40m)

- 6.80m of soft rock (white/grey) (17.40m – 24.20m)
 - 1.50m of hard rock (grey) (24.20m – 25.70m)
- Bore-hole terminated at 25.70m depth and not met ground water level.

B. Traffic volume survey

It is the type of survey conducted to know the amount of traffic flow in any area. Traffic volume survey was conducted on a working day (24/10/2019) and on a weekend day (27/10/2019) at two points i.e. near Government Higher Secondary School (GHSS), Omalloor and Uzhuvathu Devi Temple, Omalloor. Number of vehicles in each hour is estimated. Vehicles are categorized as bus, truck, car, two wheeler and light carriage vehicles. The numbers of vehicles are converted into PCU (Passenger Car Unit) and the average of the data is determined.

Passenger Car unit is calculated using the following data in TABLE 1.

TABLE 1. DIFFERENT VEHICLE PCU VALUE

Type of vehicle	Passenger Car Unit (PCU)
Bus	5
Truck	4
Car	1
Two wheeler	0.4
Light carriage vehicles	2

TABLE 2. AVERAGE TRAFFIC VOLUME DATA

HOUR	WORKING DAY (in PCU)		WEEKEND DAY (in PCU)	
	Near GHSS, Omalloor	Uzhuvathu Devi Temple, Omalloor	Near GHSS, Omalloor	Uzhuvathu Devi Temple, Omalloor
6am - 7am	320.2	424.2	351.6	342.2
7am - 8am	390.4	442.8	400.2	392.6
8am - 9am	479.8	482.4	421.6	424.8
9am - 10am	560.8	522.2	450.4	472.6
10am - 11am	432.8	418.8	507.6	508.6
11am - 12pm	395.6	398.2	403.4	419.6
12pm - 1pm	345.8	379.8	339.2	374.8
1pm - 2pm	317.6	394.2	330.6	330.4
2pm - 3pm	377.2	415.2	352.4	300.8
3pm - 4pm	434.8	461.6	421.4	350.2
4pm - 5pm	542.2	556.2	458.8	428.6
5pm - 6pm	519.2	506.8	504.8	503.8

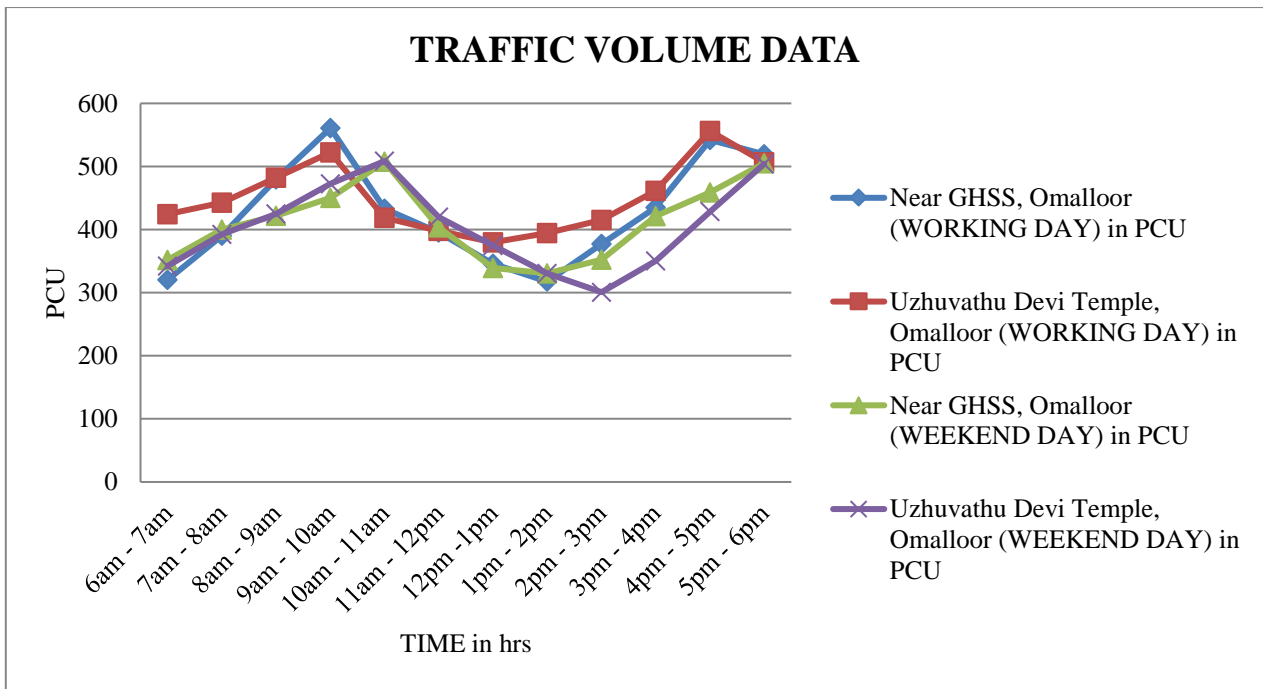


Fig.2 Traffic volume data

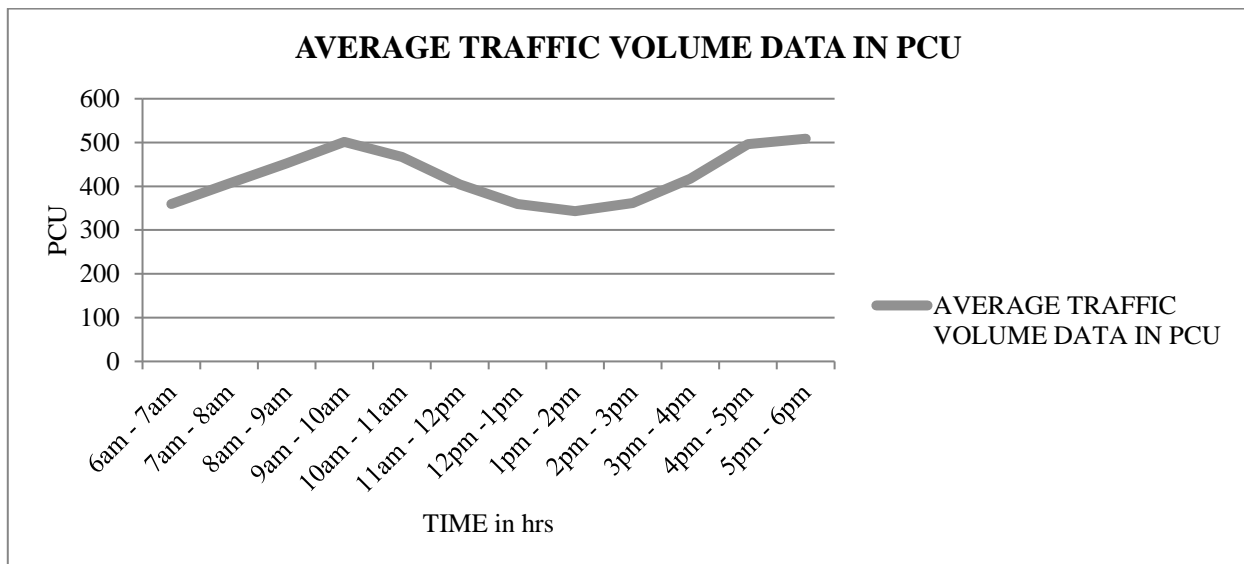


Fig.3 Average traffic volume data

C. Questionnaire survey

The questionnaire survey was conducted over the Omalloor - Kaipattoor road. The people included for the survey were pedestrians, nearby households and regular vehicle users. A questionnaire was prepared and distributed among the above mentioned people. And their feedbacks were collected. Almost 90% of people liked the proposed project of elevated highway. The average of the rating for the proposed project was calculated to be 8.68 out of 10.

Some of the reasons that the people liked this project are:

- Time required to travel the destinations will be reduced.
- Rate of accidents would be considerably reduced.
- Traffic congestions in this area will be reduced.

Some of the reasons that the people disliked this project are:

- Large area of land will be acquired back by the government for this project.
- Traffic conjunctions during construction phase.

D. Total station survey

Total station is surveying equipment which has a combination of Electromagnetic Distance Measuring Instrument and electronic theodolite.

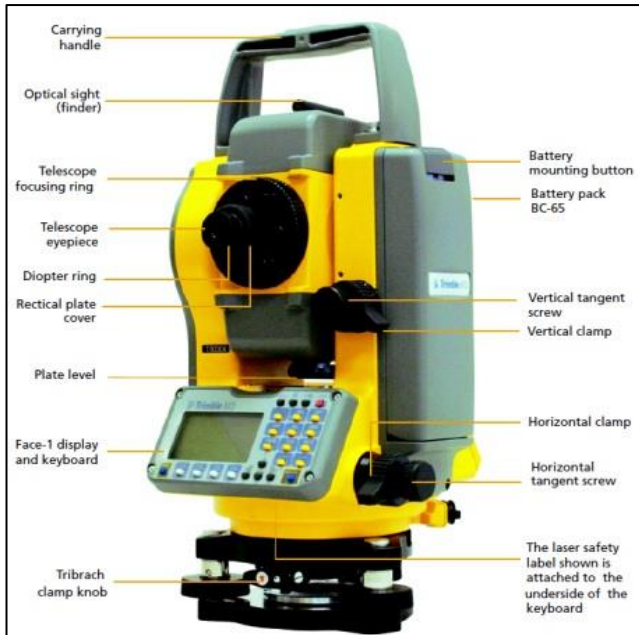


Fig.4 Total station survey equipment

Total station survey was done to determine the alignment of the existing road. Following steps were followed for total station survey:

- Tripod setup
- Mount instrument on tripod
- Instrument centering
- Instrument levelling
- Electronically verify levelling
- Set the instrument to north
- Set a default coordinate to the instrument station
- Take readings
- Shift to next known coordinate
- Back site to the previous instrument station

V. RESULT AND ANALYSIS

The elevated highway was designed and analyzed using software. All the specifications and dimensions were provided according to IRC specifications.

- Clarence from buildings – 5m
- Width of elevated road – 7.5m (2 lane)
- Width of service road – 4.5m (1 lane)
- Pillar height – 5m
- Pillar diameter – 1.5m
- Slab thickness – 0.3m
- Width of crash barrier = 450 mm (IRC 5:1998)
- Wearing coat = 100 mm
- Material: Concrete : M30
Steel : Fe500
- Loading : Class AA



Fig.5 Proposed elevated highway

VI. CONCLUSION

- The present situation of traffic conjunction is thoroughly studied.
- The surveys conducted are traffic volume survey, questionnaire survey and total station survey.
- The proposed project could help rectify the traffic conjunction problems at Omalloor – Kaipattoor road thus allowing smooth flow of traffic.
- The proposal can be adapted for the infrastructural as well as developmental improvement of the district.

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