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CAN THE COLOMBO-KANDY ROAD (A01) TRAFFIC AT PERADENIYA BEAR THE HIGH FUTURE INFLUX OF TRAFFIC TOWARDS KANDY? A CAPACITY CHECK

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INTRODUCTION

Colombo-Kandy road (A01), which connects two main cities, Colombo & Kandy is one of the oldest tarred roads in the country. There are some sections along A01, where the road width is narrower compared to the average width of the road. One such section is at the Peradeniya town, where one side of the road lies along the embankment of river Mahaweli, and the other side lies along a section constantly subject to active land-slides during rainy season. Since, the road approaching from Gampola (A05) joins A01 at Peradeniya junction, a heavy vehicular movement could be observed during daytime towards Kandy, thus bottlenecking the traffic towards Kandy town.

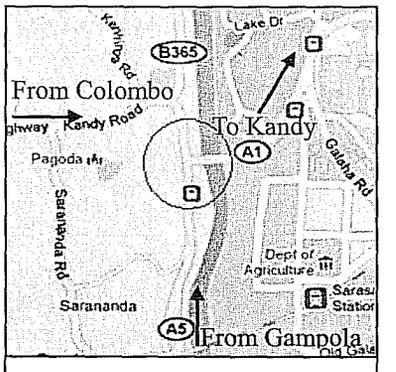

Figure 1- Site Layout

The aim of this study is to identify the present and future traffic behavior at Peradeniya and to design and implement a suitable road layout at this location for future traffic requirements based on classified turning movement traffic counts, and by using the US Highway Capacity Manual (1985).

METHODOLOGY

The following sequential guidelines have been carried out under the methodology.

- Study the traffic conditions with the geometric layout of roads during daytime around Peradeniya junction.
- Study the possible peak hours around Peradeniya town using previous Average Daily Traffic counts done by the Road Development Authority prior to carrying out Turning Movement Traffic Survey at Peradeniya junction.
- Conduct relevant traffic volume studies (classified turning movement traffic survey) to identify peak turning flows, and the turning movements by different vehicle categories at the junction.
- Analyse traffic volume studies to perform road capacity checks to ensure the adequacy of present road layout against future traffic capacity requirements.
- Present traffic was projected for 15 years and the adequacy of the road was checked for a reasonable level of service.

TRAFFIC VOLUME STUDIES

Classified Turning Movement Survey

All three roads merging at Peradeniya are presently two-way, two-lane and the junction consists

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of conflicting movements such as diverging, merging and crossing movements. A classified vehicle turning movement survey was carried out at Peradeniya junction to identify the peak hours, and to obtain the necessary data in order to check whether the present road layout is sufficient for each leg (i.e. Colombo leg, Kandy leg, and Gampola leg). If found that the present road layout is insufficient, new geometric design with additional lanes has to be designed. In classified vehicle counts the vehicles are categorized into separate groups as; passenger cars, motor cycles, buses, trucks, and lorries (small, medium and heavy), three-wheelers, etc. and count each category separately. These classified volume studies are useful for structural and geometric design of the carriageway and computing road capacity. The classified counts were recorded at 15min intervals, starting at 06:00 hrs to 18:00 hrs during a week day.

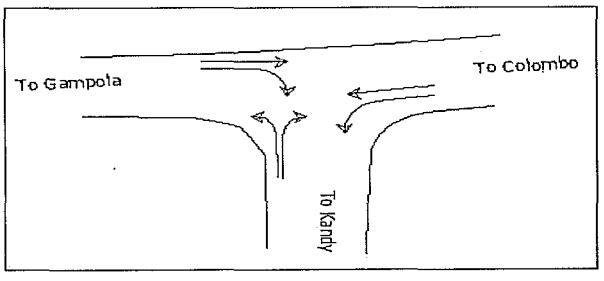

Figure 2- Turning Movement at Peradeniya junction

Identification of Peak Hours

Peak hour indicates the maximum traffic flux, and it is the critical period of traffic operation for a particular road section that is considered. Therefore to perform road capacity checks and to conduct other traffic analysis, peak hour traffic flow was considered. It can be easily observed from the classified turning movement survey data that there are three peak traffic periods, and the most critical out of the three peaks occurs in the morning. It was found that morning peak hour occurs between 7.45 am to 8.45am, and is the same for all road legs, even though in general peak hour for different legs can differ by few minutes at a junction.

Peaks	Kandy Leg		Colombo Leg		Gampola Leg	
	Peak Hours	Vehicles	Peak Hours	Vehicles	Peak Hours	Vehicles
Morning	7.45-8.45	1990	07.45-8.45	1275	7.45-8.45	1377
Midday	10.45-11.45	1592	11.00-12.00	1127	11.00-12.00	1194
Evening	16.30-17.30	1716	16.30-17.30	1233	16.45-17.45	1298

Table 1- Identified peak hours in each direction at Peradeniya junction

CAPACITY ANALYSIS AND DESIGN

The critical traffic volumes obtained from the traffic survey in each road were then converted to Passenger Car Units (PCU), irrespective of the category of vehicle to obtain the present total peak traffic volumes in PCU. To determine the design traffic volume after 15 years in the future, the total number of PCU at present was projected assuming a 4% annual growth rate based on Road Development Authority traffic projections on A01. The road capacity for the present traffic flow and for the projected traffic flow was checked against the maximum service flow rate, for each level of services by processing the relevant data as per US Highway Capacity Manual.

RESULTS AND DISCUSSION

Table 2 indicates the summary of road capacity checks carried out for existing and for designed road sections (for projected traffic volume), for each road leg separately.

Road Segment	Present details of the road at peak hour	Predicting details of the road at end of design period
Colombo Leg	Rolling terrain 3.7m lane width 1.2m shoulder clearance two-lane, two-way road Actual flow rate of 1190 pcph Operating at level of service E with $(v/c)_i = 0.93$	Rolling terrain 3.7m lane width 1.2m shoulder clearance six-lane, two-way road Obstruction on one side of roadway, undivided Predicting flow rate of 2250 pcph Will operate at level of service C with $(v/c)_i = 0.75$
Kandy Leg	Level terrain 3.3m lane width 1.2m shoulder clearance Four-lane, two-way road Obstruction on one side of roadway, divided Actual flow rate of 1890 pcph Operating at level of service E with $(v/c)_i = 0.90$	Level terrain 3.7m lane width 2.0 m shoulder clearance six-lane, two-way road Obstruction on one side of roadway, divided Predicting flow rate of 3450 pcph Will operate at level of service E with $(v/c)_i = 1.0$
Gampola Leg	Level terrain 3.95m lane width 1.2m shoulder clearance two-lane, two-way road Actual flow rate of 1150 pcph Operating at level of service D with $(v/c)_i = 0.61$	Level terrain 3.95m lane width 1.2m shoulder clearance two-lane, two-way road Predicting flow rate of 2170 pcph Will operate at level of service E with $(v/c)_i = 1.00$

Table 2- The summary of the existing and designed road parameters

The Figure 3 Indicates carriageway dimensions for existing and proposed road from Peradeniya junction towards Kandy.

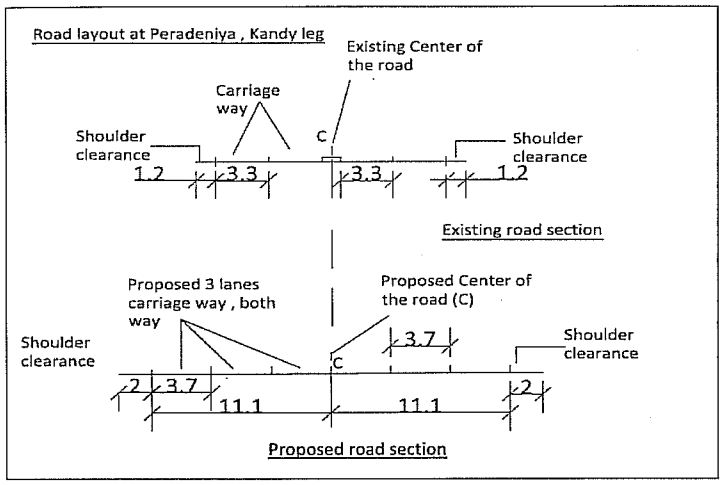

Figure 3- Carriage details of existing and proposed sections (Kandy leg)

CONCLUSIONS AND RECOMMENDATIONS

- At present with 2 lanes on either direction on Kandy leg, and with a single lane on either direction on Colombo leg, operate at Level of Service E during peak hours. This is an indication with present road widths both these legs will exceed its present capacity in the near future. This will create a problem of queuing of traffic most of the day time at this junction if no remedial measures are taken. Therefore, it is advantageous to improve the existing road by means of widening the carriage way, to cater to future traffic demand.
- Once the traffic is projected for the future, and if the number of single directional lanes are increased to 3, the results indicate that the Kandy leg will operates at Level of Service E with $(v/c)_i = 1.0$, during peak hours. Thus, to reduce the traffic conjunction in Kandy leg during peak hours, implementing an alternative road system is ideal. The possible way of diverting the traffic flow is through Gannoruwa road from Gannoruwa junction and Gatembe junction.
- The Gampola leg is satisfactory at present, but it also needs improvements for future traffic demands to provide better level of service for future traffic growth.
- It is important to carry out suitable measures to prevent possible land slides that can occur during road widening operations along Colombo leg. This is because; excavation towards the landslide mass during road widening process causes disturbances to landslide area, that will cause landslide threats during rainy seasons.

REFERENCES

"Highway Capacity Manual" (1985). Special Report 209, Transportation Research Board, National Research Council, Washington, D. C.