EFFECTIVENESS OF TRAFFIC NOISE BARRIER AND RESIDENT'S ATTITUDE AND PERCEPTION IN REDUCING NOISE POLLUTION AT SELECTED RESIDENTIAL AREAS IN KLANG VALLEY.

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INTRODUCTION

In recent years, road traffic has rapidly increased, mainly in towns and even more in large conurbations. Thus representing, without any doubt, one of the most widespread source of noise nuisance. As a matter of fact, reduction in noise exposure may be effectively achieved by the erection of an acoustic barrier which prevents traffic noise reaching the community which resides near the busy freeways. Moreover, effective noise barriers can reduce noise levels by 10-15 decibels within finite regions. More specifically, insertion loss is the most realistic measure to evaluate the effectiveness of noise barriers Insertion loss is defined as the difference in sound level at a receiver location with and without the presence of a noise barrier, assuming no change in the sound level of the source.

OBJECTIVES

The basic objective of this research is to determine the effectiveness of roadside noise barriers in reducing noise pollution to the public.

The specific objectives are;

1. to identify the different designs of roadside noise barriers used in the Klang Valley
2. to determine and forecast daily noise level variations without barriers
3. to determine perception of effectiveness of noise barriers
4. to identify effectiveness of the different barriers in relation to design and placement

METHODOLOGY

The field measurement was performed along the Taman Puchong Utama at kilometre 26.5 along the LDP Highway. Basically, noise barriers are already installed along the Taman Puchong Utama, means only at one side of the highway. The existing barrier extends over a distance of around 0.33km with a height of 3. In fact, three noise monitoring points were selected to fulfill the survey objectives namely, one at property boundary, in between barrier and property boundary and near the noise barrier (Figure 1).

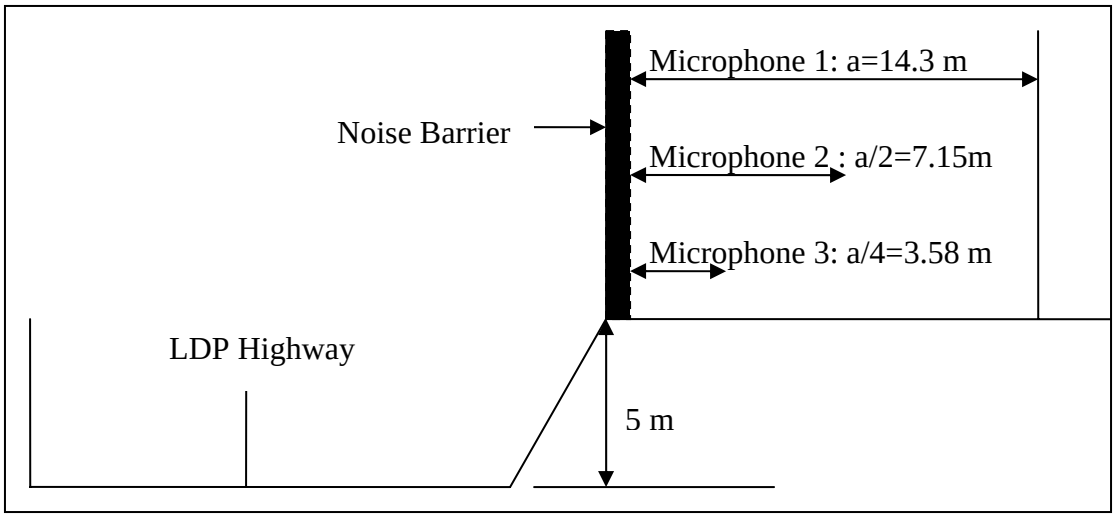


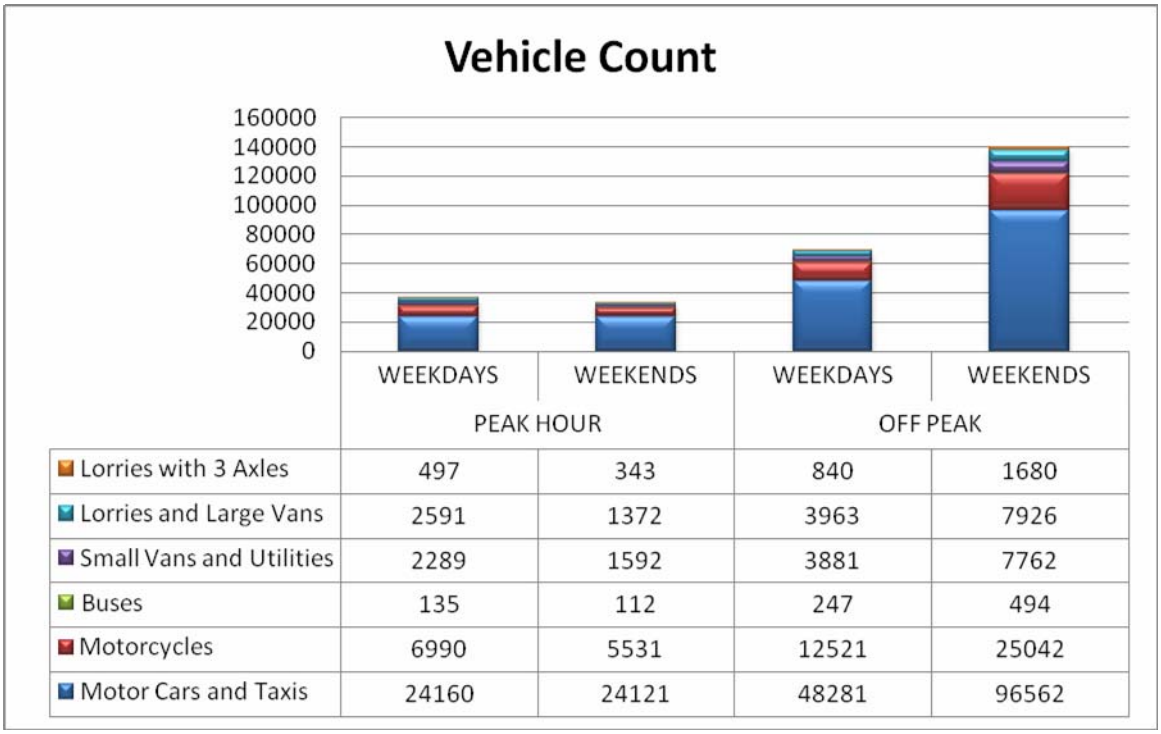
Figure 1 Cross-sectional view of the measurement location

All sound pressure level readings have been taken under the A-weighted network. Sound pressure level readings collected were analyzed and four most commonly adopted noise descriptors in environmental noise studies which are L_{eq}, L_{10}, L_{50} and L_{90} have been identified and calculated. Measurements were made for one week in the morning, afternoon and at the night of the same day. All field measurement were conducted early in the morning (7.30a.m – 9.30a.m.), in the afternoon (12.00noon - 2.00 p.m.), in the evening (5.00p.m – 7.00p.m.) in order to take the all rush hour readings. Other than that, readings were also collected at night for two hours (11.00p.m – 1.00a.m) as a baseline reference for quietest period. In addition, to verify the traffic volume, various contemporary modes of vehicles have been qualified and categorized into six major classes in order to simplify and generalize later works of studies and analyses (FHWA, 2008).

In order to determine the barrier's insertion loss, The Indirect Measured Method (FHWA, 2008) was used where the barrier has been installed prior to any direct BEFORE measurement and cannot be removed to permit such measurement. In this study, the BEFORE condition is simulated at an equivalent site without the barrier. In fact, BEFORE and AFTER measurement was performed simultaneously at the location under equivalent source, site, and atmospheric conditions. Additionally, in order to obtain a better and more complete as well as direct comprehension of the public's opinion on noise pollution generally and on effectiveness of the erected noise barrier specifically, a questionnaire survey also will be carried out among the Taman Puchong Utama residents.

RESULTS AND ANALYSIS

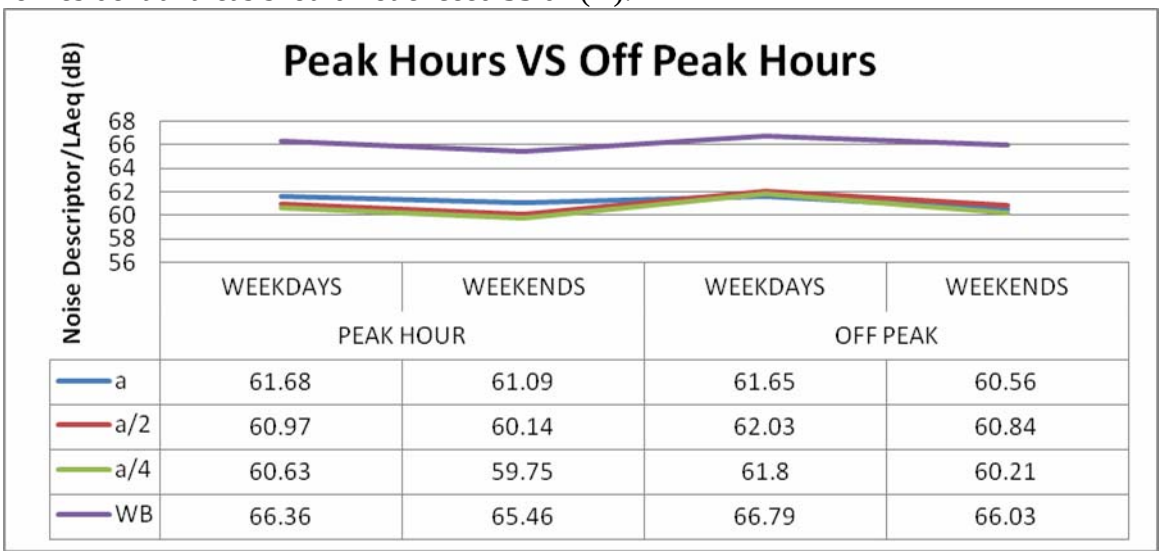
Figure 2 shows the total number of vehicle for both peak and off peak hour respectively for weekdays and weekends. It is significant to note that the motorcars and taxis dominate the roads and consequently contribute about 80 percentage of noise to the surrounding residential area. Besides that, the motorcars and taxis flow was at peak during the school holidays especially at weekends, which explains the high sound intensity during off peak days.



	PEAK HOUR		OFF PEAK	
	WEEKDAYS	WEEKENDS	WEEKDAYS	WEEKENDS
Lorries with 3 Axles	497	343	840	1680
Lorries and Large Vans	2591	1372	3963	7926
Small Vans and Utilities	2289	1592	3881	7762
Buses	135	112	247	494
Motorcycles	6990	5531	12521	25042
Motor Cars and Taxis	24160	24121	48281	96562

Figure 2 Vehicle count for peak and off-pick days

Moreover, as shown in Figure 3, it can be seen that there is not much difference between the noise levels between peaks or off peak hours. In fact, there is no significant difference between noise levels with and without barrier. This is because, at both area the sound level exceed the Department of Environment (DOE) guidelines, which states that the Leq for residential areas should not exceed 55 dB(A).



	PEAK HOUR		OFF PEAK	
	WEEKDAYS	WEEKENDS	WEEKDAYS	WEEKENDS
a	61.68	61.09	61.65	60.56
a/2	60.97	60.14	62.03	60.84
a/4	60.63	59.75	61.8	60.21
WB	66.36	65.46	66.79	66.03

Figure 3 Noise Level during Peak and Off-Peak Hours

	a/4	a/2	a
PEAK HOUR WEEKDAYS	0.78	0.74	0.64
PEAK HOUR WEEKENDS	0.79	0.74	0.6
OFF PEAK WEEKDAYS	0.67	0.64	0.7
OFF PEAK WEEKENDS	0.8	0.71	0.75

Figure 4 Insertion Loss VS Distance

Insertion loss is actually is the basis to evaluate the acoustical effectiveness of an outdoor noise barrier. The Figure 4 represents the difference of insertion loss for peak and off-peak hours with varying receiver distance. As predicted, for the peak hour scenario the insertion loss decreases with increasing distance. But, on the other hand, for the off-peak scenario the insertion loss decrease at first but increase when reached the property boundary. It can be explained that, because during the off-peak hour measurement, the background noise such as dog barking, alarm system and so on had also contributed to the measured sound level which at last contributed to this unpredicted insertion loss.

Figure 5 shows a constant noise level for both weekdays and weekends during rush and quietest hour. It should be noted that, for both weekdays and weekends the measurement point a/2 record the highest sound level between 61 dB to 63 dB. Such a noise level is considered very high for a Residential Area, according to the DOE guidelines. In fact, this result is much more shocking because the noise level is still exceed with the presence of noise barrier. So this reveals that the erected noise barrier is not effectively reducing the traffic noise.

However when comparison made between WITH and WITHOUT noise barrier (Figure 6), the results showed that, actually there is a significant decrease in the noise level with noise barrier but the reduction does not comply with guidelines.

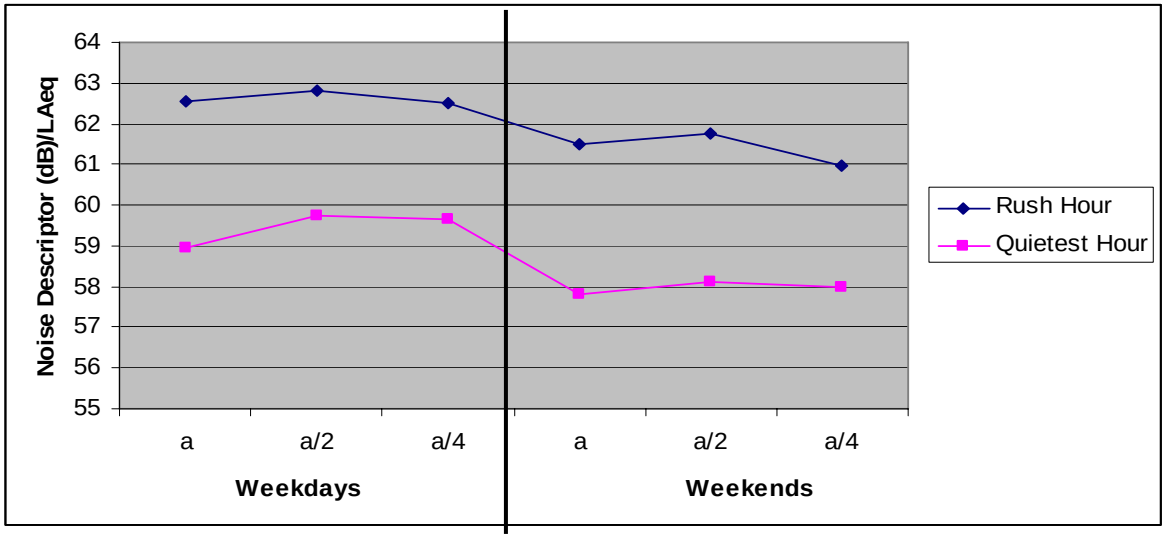


Figure 5 Average sound levels for rush hour and quietest hour during weekdays and weekend