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## **Research Report**

# **Preliminary Assessment on the Usage of Advertisement Sign at Federal Route 2 (Kuala Lumpur – Shah Alam)**



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**M.I.R.O.S**

MALAYSIAN INSTITUTE OF ROAD SAFETY RESEARCH

ASEAN ROAD SAFETY CENTRE

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## Contents

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	<b>Page</b>
<b>List of Tables</b>	<b>v</b>
<b>List of Figure</b>	<b>vi</b>
<b>Acknowledgements</b>	<b>vii</b>
<b>Abstract</b>	<b>ix</b>
<b>1. Introduction</b>	<b>1</b>
1.1 Objectives of the Study	2
<b>2. Literature Review</b>	<b>3</b>
2.1 Attention Distraction	3
2.2 Visual Clutter	4
2.3 Driver’s Mental Workload	4
2.4 Positioning of Roadside Advertising Signs	5
2.5 Driver’s Reaction Time	5
2.6 Features on Roadside Advertising Signs	6
<b>3. Guidelines on Installation of Advertising Signs</b>	<b>7</b>
3.1 Permissible Location of Advertising Signs	7
3.2 Prohibited Locations for Advertising Signs	8
<b>4. Feasibility Study</b>	<b>9</b>
4.1 Location of the Study	9
4.2 Results	11
4.2.1 Distance between Gantry Advertisements	11

**Preliminary Assessment on the Usage of Advertisement Sign at Federal Road 2  
(Kuala Lumpur – Shah Alam)**

<b>5. Conclusion and Recommendation</b>	<b>15</b>
<b>References</b>	<b>16</b>

## List of Tables

		<b>Page</b>
Table 1	Location of gantry advertisements along Jalan Persekutuan (Shah Alam to Seputeh)	11
Table 2	Location of gantry advertisements along Jalan Persekutuan (Seputeh to Shah Alam)	12
Table 3	Minimum distance of gantry advertisement to junction along Jalan Persekutuan (Shah Alam to Seputeh)	13
Table 4	Minimum distance of gantry advertisement to junction along Jalan Persekutuan (Seputeh to Shah Alam)	14

Preliminary Assessment on the Usage of Advertisement Sign at Federal Road 2  
(Kuala Lumpur – Shah Alam)

## List of Figure

		<b>Page</b>
Figure 1	Gantry advertisements installed along Jalan Persekutuan	10

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## Abstract

This report highlights several factors affecting the safety of road users due to the presence of roadside advertising signs, especially gantry advertising signs. Section 1.0 touches on different types of outdoor advertising structures that usually found installed at high traffic areas such as highways, major roads and intersections.

Section 2.0 covers the factors that could affect road users' safety due the presence of roadside advertising. Attention distraction, visual clutter, mental workload, positioning of roadside advertising signs, driver reaction time and features on roadside advertising signs are some of the factors discussed in this section.

As mentioned in Section 3.0, the Public Works Department (PWD) and the Malaysian Highway Authority (MHA) have issued guidelines for the installation of advertising structures along federal roads and also on expressways. The guidelines prepared by PWD and MHA described the permitted and prohibited areas for installation of roadside advertising structures.

Section 4.0 covers the feasibility study that was conducted on Federal Highway, Kuala Lumpur. The study found that there are a number of gantry advertising signs installed behind the directional sign on the opposite direction of the traffic. This study is conducted to determine the number of gantry advertising, distance between gantry advertising, distance of gantry advertising to junction and other factors related to roadside advertising signs that may affect the performance of the drivers.

Section 5.0 is the conclusion and suggested recommendation based on the detailed review of the study done. It can be concluded that several factors that should be considered before the installation of roadside advertisement signs.



## 1. Introduction

Advertising signs are designed with attention-grabbing features. Large outdoor advertising structures such as unipole, twinpole, minipole, freestanding, gantry, parapet, container display and electronic billboards are usually installed at high traffic areas such as highways, major roads and intersections to attract road users' attention towards the product or services featured (Chou, 2008).

Research (Reference(s)) show that large outdoor advertising structures (usually referred to as roadside advertising signs) can affect drivers by:

- i. Directly distracting or confusing drivers while driving,
- ii. Indirectly distracting drivers from the driving task by moving or giving the appearance of motion,
- iii. Taking drivers' eyes off the road, which can lead to drivers' slower reaction time to road hazards,
- iv. Obstructing drivers' visibility, and
- v. Diverting drivers' attention from important roadside warning signs.

These effects can put drivers in danger and other road users at risk (Lehto, 1992).

Thus, in order to prevent large roadside advertising signs becoming a hazard to road users, the installation of advertising signs should comply with the guidelines laid down by the authorities. Several aspects must be considered in determining permitted areas and unauthorized areas for the installation of large outdoor advertising structure.

**Preliminary Assessment on the Usage of Advertisement Sign at Federal Road 2  
(Kuala Lumpur – Shah Alam)**

## **1.1 Objectives of the Study**

This study was carried out to identify the effect of roadside advertising sign installation, especially advertising on gantries, towards the safety of road users. The outcome of this study will provide recommendations on the installation of roadside advertising signs.

## 2. Literature Review

The impact of roadside advertising sign towards the safety of road users' should be considered in determining the criteria and also the location of the roadside advertisement sign to be installed. There are several factors in which the presence of advertising signs could affect road safety.

### 2.1 Driver's Attention Distraction

Distracted drivers are believed to be a contributory factor to road accidents (Klauer et al. 2006). Driver distraction is not just related to what is happening inside the vehicle. In a worldwide trend, the amount of visual information presented to drivers is increasing. Birdsall (2008) stated that roadside advertising signs are a major source of the information overflow. According to Crundall et al. (2005) attention to advertisements at the expense of processing vital driving information is distraction rather than attraction of attention, and may lead to impairment of driving performance. Distraction caused by roadside advertising signs can disrupt drivers' eye fixation on the road, thus lead to deterioration in driving performance, affect drivers' reaction time and quality, and diminish their ability to make the right decisions when faced with hazards while driving (Birdsall, 2008; Wallace, 2003). Furthermore, Edquist et al. (2010) found that individual factor can affect the distraction caused by advertising signs. The study shows that scanning patterns for novice and older driver were both more affected by advertising signs than scanning for comparison drivers. Thus, a great amount of information presented to drivers may jeopardize the safety of road users as it is anticipated to lead to slower comprehension of important road signs and warning.

## 2.2 Visual Clutter

Driving is a complex activity involving multiple tasks such as controlling velocity and acceleration, directing vehicle according to the lines on the road and the relative positions and movement of other vehicles, people, animals, and objects on and around the road, detecting and understanding information presented on the vehicle's instruments and from the signs and signals on the road, and keeping a look-out for the unexpected. Driving involves processing large amount of mostly visual information, operating in a constantly changing environment, and making decisions at speed. With the increasing amount of visual information available on the roadside, the road environment is increasingly prone to 'visual clutter' (Edquist, 2008). Increased visual clutter (defined as driving irrelevant stimuli) can lead to decreased ability to locate critical information (Jorgensen et al., 2013). The presence of driving-irrelevant material in the driving environment will hinder drivers' apprehension of driving relevant information. From studies done by Luoma (1986), it can be concluded that participants were less likely to correctly recall road signs in slides of road scenes that contained roadside advertising signs.

## 2.3 Driver's Mental Workload

Driving is not an automated task. Drivers' mental workload generally increases with an increased complexity of the driving context and drivers' lack of driving expertise. Mental workload is a vital concept for understanding driving performance. According to Edquist (2008), high mental workload affects and is affected by both, visual information gathering and processing of information.

Chattington et al. (2009) reported that the presence of roadside advertising signs increases driver's mental workload and eye fixations, and draws attention away from the driving task. It is important to note that driving task is a collection of many subtasks. Driver's level of mental workload will depend on the complexity of the situation; it is

more difficult to track and predict future behaviour for all relevant agents in a complex situation than in a simple one (Edquist, 2008).

Previous research done by Caird et al. suggests that older drivers have greater difficulty responding in complex road environments. An increased mental workload during more complex maneuvering could reduce their ability to switch their attention between critical tasks (e.g., watching coming traffic, pedestrians, reading traffic signs, dashboard displays) (Rizzo et al., 2004).

## 2.4 Positioning of Roadside Advertising Signs

The optimal positioning of roadside advertisements is a key issue in the marketing and advertising industry, given their ever growing interest in attracting drivers' attention while on the road (Chattington et al., 2009). Clark and Davies (2008) used a PC-based simulated driving task and found that, due to their attention-grabbing features, non-driving-related signs delay driver's response to simultaneously presented road signs. Studies have shown that road locations with roadside advertising signs have higher crash rates, particularly locations that require driver's full attention or higher workload, such as at intersections (Cairney and Gunatillake, 2000; Farbry et al., 2001; Wallace, 2003).

## 2.5 Driver's Reaction Time

Roadside advertising and information billboards are intended to draw the attention of drivers, and in doing so drivers may have lesser attention for the actual traffic situation. Studies into behavioral effects of roadside advertising billboards have established that advertising billboards have a negative effect on driver's reaction time. In the vicinity of advertising billboards, drivers react more slowly to relevant issues (SWOV Institute for Road Safety Research, 2012). Edquist (2008) reported that roadside advertisement signs can decrease driver's response time to approaching hazards, as well as peripheral hazards. Older drivers are also found to have delayed response time to hazards



## **Preliminary Assessment on the Usage of Advertisement Sign at Federal Road 2 (Kuala Lumpur – Shah Alam)**

compared to younger drivers. This may not only cause safety issues to drivers, but also to other road users.

### **2.6 Features on Roadside Advertising Signs**

Roadside advertising signs are designed with attention-grabbing features. The number and size of these signs, the written messages, the images and the use of color in the advertisements have eye-catching characteristics that can confuse or overawe drivers and override the messages conveyed by traffic signs and signals. According to Yannis (2012), labels and advertising signs resembling (in size and form) to traffic signs or other traffic indicators can confuse drivers. Drivers may also take their time to spot and digest the information written in small print on roadside advertising signs compared to those with larger prints. This in turn will affect driver's reaction time to approaching hazards.

### **3. Guidelines on Installation of Advertising Signs**

The Public Works Department (PWD)) and the Malaysian Highway Authority (MHA) issue guidelines for the installation of advertising structures along federal roads and expressways. In terms of the locations of these roadside advertising signs and billboards, the guideline has clearly indicated the permissible and prohibited locations for billboards installation on federal roads and highways.

#### **3.1 Permissible Location of Advertising Signs**

Locations that are permitted to have roadside advertising signs and billboards according to the guidelines by the Jabatan Kerja Raya and Lembaga Lebuhraya Malaysia are as follows:

- i. Rest & Service and Lay-by areas which are on Federal Road/ Highway reserves,
- ii. The area within the interchange loop provided that the applicant obtains approval from the Road Safety Audit,
- iii. Federal Government-owned bridges and parapets that cross the highway or road, as the suitability of the site and geometric,
- iv. Other locations on Federal Road Reserve/Highway in the city that comply with the guideline of at least 500 to 1,000 meter distance between any two billboard, depending on the speed limit at the locations and the suitability of the locations, and
- v. Other locations on inter-urban Federal Road that comply with the distance of at least one to two (2) kilometers, depending on the speed limit at the locations and the suitability of the locations

### 3.2 Prohibited Locations for Advertising Signs

The guidelines prohibit the installation of roadside advertising signs at the following locations:

- i. 300m before and 100m after a traffic sign,
- ii. 500m before any at-grade intersection, interchange and before the Rest & Service Areas as well as Lay-by Areas,
- iii. Corners that can interfere with driver visibility,
- iv. Addition of advertising signs at locations with existing signage and structures,
- v. Locations reserved for other infrastructure (substation/power lines/river etc.) without prior approval from relevant agencies,
- vi. Locations with high slopes and tunnels,
- vii. Locations that may be blocked and disrupt the safety of road users in the presence of advertising signs and structures,
- viii. Areas within 15km radius of the airport runway must refer to the Department of Civil Aviation Malaysia, and
- ix. Other locations that endanger road users.

## 4. Feasibility Study

The feasibility study was conducted to determine the number of gantry advertising along the Federal Highway, distance between each advertising on gantries, distance of roadside advertising to junction and other factors related to roadside advertising signs that may affect the performance of the drivers driving along the route.

### 4.1 Location of the Study

The Federal Highway was selected as the location of the study because of the availability of multiple gantry advertising signs along the route. The Federal Highway or *Lebuhraya Persekutuan* is a highway connecting the capital city of Kuala Lumpur, and Klang, Selangor. The highway starts from Seputeh, Kuala Lumpur to Shah Alam, Selangor. It is the busiest highway in Klang Valley during rush hour from/to Kuala Lumpur. The Federal Highway is coded as Federal Route 2.

Gantry advertising signs are installed behind directional signs on the opposite direction of the traffic. Figure 1 shows two (2) examples of gantry advertising signs along Federal Route 2.

Preliminary Assessment on the Usage of Advertisement Sign at Federal Road 2  
(Kuala Lumpur – Shah Alam)



Figure 1 Gantry advertisements installed along Jalan Persekutuan

## 4.2 Results

The Federal Highway is a multiple lane dual carriageway with high traffic volume and rapid development of roadside commercial areas. The location of roadside advertising signs must be taken into consideration to prevent the signs from becoming a hazard to road users. Roadside advertising signs must not be installed at locations where driver's full attention is required. The installation of roadside advertising signs should not cause distraction or confusion to drivers while driving, and jeopardise the safety of other road users.

This study took into consideration the location and positioning of the gantry advertising and calculated the distances between the advertisements and the distance between the advertisements and junctions/exits to determine whether the advertisements along this study location pose hazards to road users. Appendix A shows the location of gantry advertisements along the road heading towards Seputeh and Appendix B shows the location of gantry advertisements along the road heading towards Shah Alam.

### 4.2.1 Distance between Gantry Advertisements

Tables 1 and 2 presents the distances between gantry advertisements along the stretch of the Federal Highway obtained from data in Appendices A and B.

**Table 1** Locations of gantry advertisements along Jalan Persekutuan (Shah Alam to Seputeh)

Gantry billboard location	Latitude	Longitude	Distance between gantry billboards (meter)
A	3.076085	101.559173	-
B	3.082973	101.582085	2,700
C	3.083707	101.598108	1,900
D	3.083202	101.601057	350
E	3.084115	101.61563	1,600
F	3.099317	101.635835	3,000

**Preliminary Assessment on the Usage of Advertisement Sign at Federal Road 2  
(Kuala Lumpur – Shah Alam)**

G	3.10365	101.641467	800
H	3.107508	101.648922	950
I	3.114965	101.665445	2,100
J	3.114772	101.668725	350
K	3.114665	101.6736	550



**Table 2** Locations of gantry advertisements along Jalan Persekutuan (Seputeh to Shah Alam)

<b>Gantry billboard location</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Distance between gantry billboards (meter)</b>
A	3.10936	101.690722	-
B	3.114872	101.670027	2,500
C	3.114413	101.658365	1,100
D	3.113425	101.658365	220
E	3.112888	101.657438	120
F	3.111105	101.654415	400
G	3.105687	101.64473	1,200
H	3.101677	101.637763	900
I	3.094238	101.633955	1,000
J	3.083548	101.610565	3,000
K	3.08329	101.603623	750
L	3.085345	101.58719	1,800

According to the guidelines issued by the Public Works Department (PWD) and the Malaysian Highway Authority (MHA), advertising signs must be installed between 500m to 1000m apart, depending on the speed limit the suitability of the site.

**Preliminary Assessment on the Usage of Advertisement Sign at Federal Road 2  
(Kuala Lumpur – Shah Alam)**



**Table 3** Minimum distance of gantry advertisement to junction along Jalan Persekutuan (Shah Alam to Seputeh)

Gantry billboard location	Location of junction	Distance of gantry advertisement to junction
	Location of junction after gantry advertisement	
Point B		3.082825 101.581508 ↑ 63 m
	Location of gantry advertisement	3.082973 101.582085 ↓
		



**Preliminary Assessment on the Usage of Advertisement Sign at Federal Road 2  
(Kuala Lumpur – Shah Alam)**

**Table 4** Minimum of gantry advertisement to junction along Jalan Persekutuan (Seputeh to Shah Alam)

Gantry billboard location	Location of junction	Distance of gantry advertisement to junction
Point H	<p>Location of junction after gantry advertisement</p> 	<p>3.10365 101.641467</p> <p>↑ 450 m</p>
	<p>Location of gantry advertisement</p> 	<p>3.101677 101.637763</p>

## 5. Conclusion and Recommendation

Based on the findings and analysis of this feasibility study, the following criteria in terms of the advertising signs installation on Malaysian roads should be considered:

- i. Roadside advertising signs should be installed at safe and non-high risk locations along roads and motorways. Areas with high recorded accident rates (i.e., black spots), and those that are near curves and intersections should be prohibited locations for the installation of roadside advertisement signs.
- ii. The number or quantity of roadside advertising signs is kept minimal so that drivers' concentration and visibility on the road are not disrupted.
- iii. The roadside advertising signs installed must not require the driver's full attention as it may jeopardise the safety of the driver and also other road users.

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**Preliminary Assessment on the Usage of Advertisement Sign at Federal Road 2  
(Kuala Lumpur – Shah Alam)**

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