

Review of Roadside Advertising Research Report

Scottish Roads Research Board

21 October 2015

ATKINS

Plan Design Enable

Notice

This document and its contents have been prepared and are intended solely for Scottish Roads Research Board's information and use in relation to Research into Roadside Advertising.

Atkins Limited assumes no responsibility to any other party in respect of or arising out of or in connection with this document and/or its contents.

This document has 38 pages including the cover.

Document history

Job number: 5127592			Document ref: 01			
Revision	Purpose description	Originated	Checked	Reviewed	Authorised	Date
Rev 1.0	Client Draft	PM	<Initials>	<Initials>	<Initials>	26/05/15
Rev 1.1	Second Client Draft	PM	MR	GS	<Initials>	19/06/15
Rev 2.0	Final Report	PM	MH	GS	PM	20/10/15

Client signoff

Client	Scottish Roads Research Board
Project	Review of Roadside Advertising
Document title	Final Report
Job no.	5127592
Copy no.	
Document reference	01

Table of contents

Chapter	Pages
Introduction	5
1. Introduction	7
1.1. Background	7
1.2. Project Objectives	7
1.3. Appreciation of Issues	7
2. Safety and Amenity	11
2.1. Approach	11
2.2. Safety - Research Papers Identified	11
2.3. Discussion	12
2.4. Policies in Other Countries	14
3. Site Value	15
3.1. Introduction	15
3.2. Management Process	15
3.3. Business Model	15
3.4. Drivers of Value	16
3.5. Examples of Site Values	16
3.6. Digital Advertising Signs	17
3.7. Site Rental Value	18
3.8. Discussion	19
4. Legislation and Processes	21
4.1. Context	21
4.2. Planning Legislation	21
4.3. Roads Legislation	23
4.4. Summary	25
5. Conclusions and Recommendations	27
5.1. Introduction	27
5.2. Recommendations	28
5.3. Funding Further Research	29
Appendices	31
Appendix A. Abstracts of Research Papers	32
A.1. The role of roadside advertising signs in distracting drivers	32
A.2. Conflicts of interest: The implications of roadside advertising for driver attention	32
A.3. Effects of advertising billboards during simulated driving	32
A.4. Modulation of attention and urgent decisions by affect-laden roadside advertisement in risky driving scenarios	33
A.5. Attraction and distraction of attention with roadside advertisements	33
A.6. The emotional side of cognitive distraction: Implications for road safety	33
A.7. Guidelines for the display of advertising signs within the road reserve in Brazil	34
A.8. Do supplementary signs distract the driver?	34
A.9. Do familiarity and expectations change perception? Drivers' glances and response to changes	34
A.10. Visual search of driving situations: Danger and experience	35
A.11. Driver distraction by advertising: genuine risk or urban myth?	35
A.12. Mapping mental load in car driving	35
A.13. What attracts attention when driving?	35
A.14. Privately Funded Pedestrian Bridges	36

A.15.	External-To-Vehicle Driver Distraction	36
Appendix B.	Conclusion from External-to-External Driver Distraction Research	37
B.1.	Context	37

Tables

Table 2-1	Research Papers on Road Safety	11
Table 2-2	Policies Implemented in Other Countries	14
Table 3-1	Approximate Advertising Site Revenues	16
Table 3-2	Digital Site Costs and Revenues (48 sheet)	18

Figures

Figure 3-1	New Digital Advertising Site - Fenwick Road, Giffnock	19
------------	---	----

Introduction

Atkins was appointed to research the feasibility of local roads raising income through permitting roadside advertising at appropriate locations. Key points considered in this research are:

- Safety;
- Amenity;
- Revenue Potential; and
- The Legislative Framework.

The project has included desk research and limited consultation with industry (due to commercial sensitivities). A key point to note is that some of the recommendations are applicable to all roadside advertising and not just that which is erected on local authority land.

This page is deliberately blank

1. Introduction

1.1. Background

Atkins was appointed by the Scottish Roads Research Board in October 2013 to undertake research into the potential for local roads authorities to increase revenue by leasing out sites in their ownership for advertising purposes. Currently local authorities use their powers under the Planning Acts to control the location of advertising displays. In doing so they seek input from the relevant roads authority, either the Council or the Trunk Road Authority. At present local roads authorities typically approach to this is to seek to prevent advertising which impacts on road safety, e.g. because it obscures road signs or block visibility splays; whereas the trunk road authorities seek to prevent any advertising visible from the trunk road. What neither local roads authorities nor the trunk road authority does is to proactively market sites in their ownership or control so as to generated revenue for the authority.

Given current pressures on budgets and the revenue potentially available from leasing out sites for advertising hoardings located on road verges, roundabouts or vacant land adjacent to roads local roads authorities are being pressed to review their policies. The potential for public authorities to derive additional revenue from such advertising sites is significant, especially with the increasing pressure on public funding, however this must be tempered against any potential impact on road safety and / or increase in accidents.

1.2. Project Objectives

Initial research is required, in the form of a literature search / desk study to establish what research, if any, has been undertaken in the following areas:

- The road safety implications of permitting roadside advertising;
- The amenity impact of such advertising;
- The revenue potential of roadside advertisements; and
- The legal issues associated with a roads authority permitting advertising on its own land.

The last objective was not in the initial brief but was added after an interim presentation to the SRRB at which the board members identified this as a relevant topic.

1.3. Appreciation of Issues

As noted in the brief there are differing approaches to managing advertising on trunk and local roads. It is also important to recognise that roads have different functions and this could affect the type and location of advertising permitted (if any). Furthermore there are many different forms of advertising ranging from the “double size” 96 sheet bill boards, down to small illuminated panels on lighting columns. There may be scope to identify appropriate solutions for some locations, whilst still ensuring that road safety and visual amenity are maintained.

There is already much roadside advertising but it is generally not on local authorities’ land and specifically not on land under the control of the roads function of the authority. It seems that this arises from the presumption that roads authorities do not condone such advertising as it could have road safety impacts and thus pose a risk to road users, e.g. through distraction, obstruction, etc. There are however many advertising sites on private land and occasionally on land under the control of other local authority departments, e.g. housing, estates, commercial, etc. It is important to recognise that as well as being under different ownerships such sites tend to have different characteristics to the land under consideration in this study.

Current roadside advertising signs fall into several categories:

- On bridges or other over road structures;
- On bus shelters and other roadside furniture;
- On buildings;
- On land beside the road, either:
 - Adjacent to the carriageway; or

- Remote from the carriageway.

In the following sections we consider issues around current roadside advertising and how this may be relevant to this study.

1.3.1. On bridges or other over road structures

Most such signs are on railway bridges and Network Rail, as the owner of the UK's rail network, leases out such sites where they see the commercial opportunity. As far as we are aware there are no cases in the UK where advertising sites have been let on road over road bridges. However there is a programme in Australia¹ where foot bridges are funded through the advertising revenues arising from the opportunity created. At present we have not been able to get further details of this scheme.

Road over road (or footbridge over road) structures will by their nature tend to be at locations with higher traffic volumes and therefore are likely to be attractive to advertisers. Given that these structures are above busy roads, the installation and maintenance of such sites is an issue. This in turn is reflected in revenues and probably explains why many existing rail over road sites are not used for advertising: present day health and safety requirements (and road operation constraints) make the operation of such sites too expensive and difficult to make them commercial. Similar arguments are likely to be applicable for road bridges or footbridges over major roads.

It is also worth noting that planning permission for advertisements can only be granted for five years at a time² (although often the permission can be renewed). Therefore if the cost of installing a site is high, as will be the case on such inaccessible sites, then the business case must recover these costs (and indeed any removal / reinstatement costs) within five years. This may make them commercially unviable.

As Network Rail is a government owned company and (virtually) all UK major roads are public then any advertising revenue gathered by permitting advertising on them comes to the public purse by one route or another. However the application of these funds will depend on the governance regulations and policies of the receiving body.

1.3.2. On bus shelters and other roadside furniture

Bus shelters are normally provided by local authorities, regional transport partnerships (RTP) or commercial businesses. The arrangement varies between (and within) different local authority and RTP areas. Where commercial companies provide bus shelters they do so for a fee, however sometimes this fee is waived if the company can use the shelter to carry advertising. In some cases, where sites have high value (i.e. are busy in terms of users and / or passing traffic), there may be a payment by the operator to the awarding authority. Sometimes in lieu of such payment additional shelters are provided at what would be otherwise unviable sites.

Again any value realised from such sites (either in cash or in kind) is already being realised by the public sector.

1.3.3. On buildings

Buildings are not part of the road and any revenues associated with advertising displayed on them will fall to the building owner or tenant. Some of the highest value sites are on buildings as they create more imposing sites because of their height and / or size.

1.3.4. On land beside the road, either

Land adjacent to the carriageway

There are many advertising hoardings on land adjacent to roads; however these are nearly always in private ownership. It is worth considering the ways in which roads develop. It is normal, especially in urban areas, that the land underneath roads belongs to the adjacent land owners. Whilst most roads are public and maintained at public expense the public sector has no ownership in the conventional sense. Accordingly

¹ Privately Funded Pedestrian Bridges, Penn, Judd, 1991

² See Section 4.2 of this report for further details.

they are not in a position to grant leases for advertising sites, although they can, through the roads legislation,³ control activity on the road and verges (which form part of the public road).

Where the roads authority undertakes road improvements it is normally to use compulsory purchase powers to acquire the land needed for the improvements. This often results in the roads authority acquiring areas of land not directly required for the project and so such roads typically have land around them which is owned by the roads authority but does not necessarily form part of the public road. In addition they also own land within the road boundaries such as verges, traffic islands and the central islands of roundabouts.

Remote from the carriageway

Generally the roads authority will not own land remote from the carriageway, although there may be cases where land adjacent to one road can be seen from another road. Such remote sites require that there is a significant level difference (normally with the site higher than the carriageway) to enable any advertising site to clearly seen.

³ See Section 4.3 of this report for further details.

This page is deliberately blank

2. Safety and Amenity

2.1. Approach

We have undertaken literature research into safety and amenity using a number of resources including:

- ScienceDirect - a leading full-text scientific database offering over 9 million journal articles and book chapters from more than 2,500 peer-reviewed journals and more than 11,000 books;
- The British Library Document Supply Service delivers an efficient, higher quality document supply service and eventually will completely replace existing systems such as BLInside (see below); it provides a searchable platform across some 42 million articles;
- Explore the British Library allows you to search, view and order items from their main catalogue of nearly 57 million records:
- British Library Inside Web is a searchable database of the British Library's collection since 1993, and although soon to be superseded, is still accessible: and
- EThOS (from the British Library) offers free immediate download access to the full text of over 37,000 UK theses.

2.2. Safety - Research Papers Identified

A total of 14 papers were identified which related to roadside advertising and safety. They are summarised in Table 1. Some of these focus, almost entirely on road safety, but others look at broader aspects. For some consideration of a wider range of influences / distractions on drivers has been the main issue.

Table 2-1 Research Papers on Road Safety

Reference Number*	Title	Author(s)	Year	Country Published In
1.1+	The role of roadside advertising signs in distracting drivers	Bendak, Al-Saleh	2010	Saudi Arabia
1.2+	Conflicts of interest: The implications of roadside advertising for driver attention	Young et al	2009	UK
1.3+	Effects of advertising billboards during simulated driving	Edquist et al	2011	Australia
1.4+	Modulation of attention and urgent decisions by affect-laden roadside advertisement in risky driving scenarios	Megias et al	2011	Spain
1.5+	Attraction and distraction of attention with roadside advertisements	Crundall et al	2006	UK
1.6+	The emotional side of cognitive distraction: Implications for road safety	Chan, Singhal	2012	Canada
1.7+	Guidelines for the display of advertising signs within the road reserve in Brazil	Guerra , Braga	1998	Brazil
1.8+	Do supplementary signs distract the driver?	Metz, Kruger	2013	Germany
1.9+	Do familiarity and expectations change perception? Drivers' glances and response to changes	Martens, Fox	2007	Netherlands
1.10+	Visual search of driving situations: Danger and experience	Chapman, Underwood	1998	UK
1.11+	Driver distraction by advertising: genuine risk or urban myth?	Wallace	2003	UK

Reference Number*	Title	Author(s)	Year	Country Published In
1.12 ^o	Mapping mental load in car driving	Wildervanck et al	1978	Netherlands
1.13 ^o	What attracts attention when driving?	Hughes, Cole	1986	Australia
1.14 ^o	Privately Funded Pedestrian Bridges	Penn, Judd	1991	Australia
1.15 ⁺	External-To-Vehicle Driver Distraction	Wallace	2003	UK (Scotland)

Notes: * Reference Numbers have been assigned for the purpose of this study only.

+ These papers have been reviewed in full and copies are available if required.

^o We have only viewed abstracts of these papers.

In Appendix A we reproduce the abstracts of these papers.

In the remainder of this section we provide a discussion on those papers which are of relevance. We have not included the following papers:

- 1.10 - due to its age
- 1.12, 1.13 or 1.14 - due to their age and the absence of the full papers.

2.3. Discussion

2.3.1. Driver Distraction: Papers 1.11 and 1.15

These papers date from 2003 and are probably the most useful papers we identified. Paper 1.15 is research commissioned and published by the Scottish Executive, Social Research, Transport Research Planning Group; whilst paper 1.11 is a short summary of that research published in the journal "Municipal Engineer" (published by the Institution of Civil Engineers).

The research is a literature review which draws on a range of previous studies some of which we had identified before locating this paper. The conclusions of paper 1.15 are attached at Appendix B and the paper can be accessed at: <http://www.scotland.gov.uk/Publications/2003/08/17782/23546>.

The findings of the research were:

"Despite the fact that in its totality the evidence for driver distraction by billboards is compelling, individual studies have been criticised on methodological grounds. It is likely that greater emphasis on experimental 'controls' (and less emphasis on purely correlational studies) would go a long way towards answering these criticisms. Moreover, in terms of laboratory studies, far more realistic electronic representations of the driving experience are possible now than in the 1970s (when most of the laboratory studies took place). Psychological (and statistical) theory has also moved forward, enabling more sophisticated research questions and more complex analysis of data to be performed. Therefore, with both forms of distraction more research using contemporary methods is required".

Other finding in the paper, include:

"It is suggested that the effect of visual 'clutter' at junctions has been sufficiently well established that specific guidelines relating to this issue could be created to regulate the position and number of advertisements in this context. However, more research is needed to establish what kind of advertisement/sign is most likely to contribute to accidents, and what level of effect specific advertisements are likely to have"

Given this is Scottish Government research we consider it sets the benchmark for taking this project forward. Also because the study provides a robust review of work undertaken prior to 2003 in the remainder of this paper we focus primarily on studies since 2003.

2.3.2. Paper 1.7

This is the earliest published paper and is by Guerra and Barga in 1998. It was reviewed as it looks at real life examples of advertising signs placed within the highway boundary specifically to generate income for road maintenance. It considers a wide range of sites and identifies good and bad practice, considering both safety and amenity. However it is over 15 years old; and is from Brazil which is still an emerging rather than a developed economy (this was even more the case in 1998). Accordingly whilst it gives a good overview of the issues its findings are not considered relevant.

2.3.3. Simulated Driving Situations: Papers 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.8, 1.9

Study 1.15 found, as noted above, that there was both a need and an opportunity (using improved technology) to undertake new simulated driving studies. These eight papers are all simulator based experiments undertaken between 2006 and 2013 (we have discounted paper 1.10 as it dates from 1998 and is cited in 1.15 although was not one of the papers analysed in detail for the study). The aim of such studies is generally to establish if certain factors distract drivers and if this distraction impairs their driving skills. However there are some points worth noting from the papers:

General point	The impact of the presence of roadside advertisement seems to particularly impact on lateral control, and thus affects lane discipline / lane changing behaviours most.
Paper 1.1	Avoid placing advertising signs where maximum attention is required, e.g. near dangerous bends or areas with high accident rates.
Paper 1.2	Advertising signs are less of a distraction on routes drivers are familiar with; and the use of “visual load maps” may help identify where a road has “capacity” for advertising signs.
Paper 1.3	The primary aim of the study had been to examine the impact of changeable billboards but because of technical issues this was not feasible. However it was found that advertisements have a greater impact on both novice and older drivers compared to the control group.
Paper 1.4	<p>Images with more negative emotional content create a greater degree of driver distraction and therefore road safety messages with strong images may be inappropriate in such settings.</p> <p>Note: This study examined how the content of advertisements affects the degree of distraction on drivers seeing the advertisement. Although the simulated driving was typical of on street situations, the positioning and content of the advertisements was not; with advertisements appearing centrally above the road and the content being pictures from the “International Affective Picture System” (a standard set of images which have varying levels of “emotional content” and which are specifically designed to be used in research situations).</p>
Paper 1.5	Street Level Advertisements (SLA) seem to distract drivers more than Raised Level Advertisements (RLA), but not necessarily because drivers are actually paying more attention to these advertisements, rather they are concerned that there may be hazards (e.g. pedestrians) associated with the SLA. Whilst this may appear to be a useful effect the advertisement may then hold the driver’s attention and make it less likely that they will see the hazard.
Paper 1.6	<p>Advertisements containing words with a positive emotional content are less distracting than those with a negative content. Words with positive emotion may cause drivers to speed up for a short distance after the seeing the advertisement (~200m).</p> <p>Note: This study is very similar to paper 1.4 but uses words rather than images and produces consistent findings.</p>
Paper 1.8	The provision of supplementary information on signs for motorway rest areas in Germany did not make the signs more distracting for those drivers who were not seeking to use the rest areas. The supplementary information was shown below the main sign (on a separate sign plate) on stack type signs; or below the rest area name on map type signs.

Note: The study confirmed that drivers process signs “top down” and found. The supplementary information was shown below the main sign (on a separate sign plate) on stack type signs; or below the rest area name on map type signs.

Paper 1.9 The more familiar drivers are with a route the less attention they pay to traffic signs and as a result they may not note changes in signing.

Note: This study did not look at advertising signs but road traffic signs.

2.4. Policies in Other Countries

In undertaking the above research we also located two highly relevant documents as detailed in Table 2 they are presented separately as they are not research but represent relevant policy as implemented elsewhere.

Table 2-2 Policies Implemented in Other Countries

Reference Number*	Title	Issued by	Year
2.1	Transport Corridor Outdoor Advertising and Signage Guidelines Assessing Development Applications	New South Wales Department of Planning	2007
2.2	Advertising Road Signs and Road Safety: Design and Location Guidelines	Land Transport Safety Authority Transit New Zealand	1993 (Reprinted 1998 and 2001)

As can be seen from their titles these documents are both published to set out clear guidance for outdoor advertising signs visible from roads. In the case of 2.2 it has been in operation for over 20 years and 2.1 has been in place for some 6 years; so neither can be considered as recent. In the case of 2.1 it deals with all aspect of planning in relation to advertising signs with section on both amenity and safety. Examples of acceptable and unacceptable advertisements are provided in both documents:

- Those in 2.1 are more focussed on amenity; whilst
- Those in 2.2 are more relevant to the safety issue.

Both documents set out guidance on what is and is not acceptable and provide a solid basis for the granting or otherwise of permission to place roadside advertising signs.

3. Site Value

3.1. Introduction

Key to local authorities increasing their revenues is the way in which the advertising industry would respond to the introduction of potential new advertising sites. We have accordingly held informal discussions with some key players in the industry, including advertising companies and property agents.

3.2. Management Process

It is useful to understand how the advertising site market works as it has its own unique features. Advertising sites are rarely owned by the site operators. Because sites are often transient (e.g. sites due to be developed) or are on land which forms part of a larger estate (e.g. on the edge of bigger development) they are owned by others and the operator leases the site upon which to erect the advertising hoarding.

As noted in Section 1 (and see Section 4) the planning permission regime for advertising sites only grants permission for five years at a time. As a result site leases tend to be for five years, with renewal of the lease linked to renewal of the planning permission.

There is a series of transactions in developing and operating such a site. What happens in practice will be driven by commercial factors:

- If the site owner is proactive, especially if thinks a site is working well for the contractor, he may well serve a notice to quit so as to obtain a higher rental, however if the tenant considers the new rental to be unsustainable the tenant will walk away without lodging a planning application;
- On the other hand a less proactive owner may not take any action, in which case:
 - If a site is performing well the advertising contractor will sit back and wait to see what happens. He is likely to seek to renew the planning permission but the planning process will result in the owner being reminded of the renewal opportunity;
 - On the hand if a site is not generating good revenue the contractor may well advise that he is quitting the site at the end of the lease.

If neither party serves a notice to quit the lease continues under statute on the same terms for another year under what is known as "Tacit Relocation".

3.3. Business Model

Advertising companies like other businesses need to make the investment case to justify tying up funds in the development of a site. The justification takes account of the cost of the site in terms of items such as: site rental; business rates; development costs and operating costs. It also of course has to look at revenue which takes into account not only what can be charged for advertising on the site, but the type of advertising (e.g. conventional or digital) and the likelihood of a site being unused for any period. Clearly these factors vary from site to site and whilst some sites will have low costs the associated income may also be low, whereas a site with high value may also have higher costs. As most advertising companies are UK wide sites are competing across the country for investment and market share and therefore just having the best site locally does not guarantee it will receive investment.

The process of determining the attractiveness of a site typically incorporates a split between sites which are of interest to "national accounts" and "local accounts", i.e. is a site best targeted at UK wide advertising campaigns or is it better suited to advertising local businesses in the vicinity. Typically the sites which are seen to be the most attractive are allocated to national sales campaigns where the company is commissioned by companies which have full UK market penetration (e.g. supermarkets, grocery products, confectionary, drinks, cars, etc.) to provide a certain number of sites meeting clients' marketing criteria. The remaining sites are then marketed to local businesses where revenues will be lower and the likelihood of periods without sales is higher. Due to their nature these local sites also require more effort to market them and thus have a higher overhead cost.

3.4. Drivers of Value

There is an adage in the property world “location, location, location” and that is very true for advertising sites; in the context of advertising sites location translates to visibility and the number of people who see the advertisement. Although slightly simplistic this is normally translated into traffic volume ignoring factors such as buses or vehicle occupancy. Furthermore the pedestrian market is seen to be separate and targeted through bus shelter and pavement advertising systems.

3.5. Examples of Site Values

We have managed to obtain some useful examples of site rental values through Lambert Smith Hampton, a firm of commercial property agents with which Atkins has a relationship. These are set out in Table 3-1 below. It can be seen that rentals are quite variable and this reflects the value operators put on sites and the level of revenue they can obtain from advertisers. There are a number of points arising from this simple analysis:

- The highest value site is in central Glasgow on Argyle Street a road with a very high level of pedestrian (and bus) activity but subject to restricted vehicle access arrangements.
- The sites adjacent to the M8 (Harthill and Newhouse) both have annual revenues of about £25,000, but one site is two signs with three rotating faces and the other a large backlit site.
- The next highest value site (Fenwick Road, Giffnock) is on a busy local road so the traffic flow levels are not that high, but again it has three rotating faces and adjacent to traffic signals and so benefiting from stationary traffic providing a captive audience for much of the day.
- The value of other sites is relatively low, being in the range £2,000 to £5,000 per sign per annum.

Table 3-1 Approximate Advertising Site Revenues

Location	Size		Comments	Estimated Annual Rental ⁽²⁾
	Sheets ⁽¹⁾	No		
Pointhouse Road (Clydeside Expressway) Glasgow	48	6	High traffic flows.	£12,000
Argyle Street, Glasgow	96	1	Backlit portrait format, near Central Station bridge.	£46,000
Cathedral Street, Glasgow	48	1		£2,000
Fenwick Road, Giffnock, Glasgow	96	1	3 rotating faces Busy local shopping centre and on commuter route.	£21,000
South Queensferry, near Forth Road Bridge Service Area	NA	NA	Area of land leased to BP for advertising adjacent to filling station.	£2,500
Dalry Road, Edinburgh	48	1		£4,500
M8 Harthill	96	2	Each sign has 3 rotating faces. Remote from M8 but can be clearly seen by passing drivers.	£25,000
M8 Newhouse	96	1	Backlit sign on building gable	£25,000

Notes: 1. The “sheet” is the industry standard method of describing hoarding sizes.
A sheet was originally defined as being 20” x 30” which in metric terms is 508 mm x 762mm.

2. Revenues are approximate and could be up to 5 years old. Accordingly they could have been renegotiated (upwards or downwards) since then. The figures given are the totals for all the hoardings on each site.

3.6. Digital Advertising Signs

We were asked to give specific attention to the potential of digital advertising sites to generate revenue. Accordingly we have spoken to some operators to ascertain their approach and the issues they perceive. Most of the remainder of this section is based on the information they shared with us.

It is worth noting that in the last 2 to 3 years there has been a major change in the technology behind digital signs. The latest ones are effectively large, very high quality televisions / computer displays and they can show anything you can show on such a device. They clearly have additional features such as being weatherproof and the display brightness can be adjusted by time of day to optimise their performance in the ambient lighting conditions.

Whilst they are capable of displaying moving images this is generally not how they are operated, rather they show a series of static colour images. This offers several major advantages to the operators:

- They can display a series of advertisements;
- The very act of changing the advertisement displayed attracts the attention of those on the street (both in vehicles and others) and thereby makes them more noticeable; and
- The very high quality image displayed which can provide much better reproduction than a conventional printed poster also attracts viewers.

All these features enable the operator to charge a premium for the site and therefore there is the potential to pay a higher rental to the site owner.

3.6.1. Industry View

The advertising industry recognises that digital signs offer great opportunities to develop innovative advertising sites, however there is a high capital cost and this requires large audiences to justify the associated charges levied on advertisers. Whilst there have been some electronic signs for some years it is only the last 2 years or so that really effective digital signs have entered the market. These offer the ability to rapidly change the display (typically every 10secs) and can produce sharp images without the use of flashing lights, etc. (often cited as a reason not to permit such sign where they can be seen by drivers and cause distraction). At present nearly all digital sites in Scotland lie in the Central Belt and this is seen to be likely continue to be the case for some time, due to the economics of such sites, which require operators to demonstrate they can generate adequate income before they can commit to the big investment they necessitate.

3.6.2. Location Adjacent to the M8 in the West of Scotland

We were given limited access to a proposal made with regard to a busy location adjacent to the M8 in the west of Scotland. It identifies a number of potential sites / options for advertising hoardings which all seem to be in the central islands of roundabouts. Such locations are likely to be the most challenging in terms of road safety (see Section 2 of this report) and therefore hard to justify and realise the potential revenue.

3.6.3. Costs and Revenues

We were able to get an insight into the cost / revenue model for digital sites from one of our respondents which is shown in Table 3-2. This is based on a 48 sheet sign displaying 4 images on a 40 second cycle (i.e. ~10 seconds / advert). It can be seen that the capital cost is high but so are the rewards, even assuming 50% take up of space the sign the operator could break even in year one even allowing for rental, marketing, maintenance and other overheads. Therefore for the remaining life of the site the only costs are rent, maintenance and sales, leaving a comparatively high potential profit margin. The profit (or loss) in any year is of course dependant on market conditions and cannot be guaranteed.

Whilst the data in Table 3-2 suggests a likely gross profit of over £50,000 there are other costs to be taken into account, including head office costs, cost of sales, maintenance, site restoration (at end of lease) etc. Accordingly this in fact could be close to the starting point for a site to be considered viable. As the latest technology is still very new there are a number of imponderables the main one being the service life (and maintenance cost) of the technology. Many operators will be relying on maintenance agreements with equipment suppliers to give the certainty in the early years, but typically this will only be for 3 to 5 years. What happens after that will depend on how equipment performs, and equipment suppliers may be feeling

their way as much as the operators. Accordingly it is difficult to predict how things will progress and what long term maintenance costs will be.

Table 3-2 Digital Site Costs and Revenues (48 sheet)

Costs		Revenues	
Item	Cost	Item	Revenue
Site development	£150,000	Revenue (per advert per 2 week period)	£4,000
		Advertising cycles per year	26
		Number of adverts per cycle	4
		Assumed vacancy rate	50%
Investment Cost	£150,000	Annual Revenue	£208,000

3.7. Site Rental Value

In Table 3-1 we set out typical site rentals for conventional sites. Such a model can of course also be applied to digital sites and indeed depending on the terms of any lease an advertising contractor could opt to install a digital sign on any site. However the reality is that most operators will discuss their plans with the site owner for various reasons:

- The owner will become aware of the change, not just from the sign going up but when they are served notice of the associated planning application;
- Given the lead time required to obtain such permission the operator may wish the lease to be conditional on obtaining permission so as to maximise the life of the digital site;
- As digital displays can probably operate for well over 5 years (whether they last 10 years is a moot point) the operator will almost certainly try to renew the lease and the planning permission to maximise their return.

Most operators accordingly start their negotiations by clearly stating that they wish to use a digital display (subject to planning permission) and this opens up the opportunity for the site owner to get increased revenue. Because of the nature of the signs two revenue models have developed:

- The conventional one, whereby the rental offered is the operator's valuation of sites worth with the operator taking all risks and effectively guaranteeing the income to the site owner (unless the operator defaults);
- A risk sharing approach whereby the operator pays a lesser (or potentially no) basic site rental, but receives a proportion of the revenues earned by the operator. Such a deal can take a variety of different approaches e.g. zero basic rent plus a proportion of all income, a base rent and then a proportion of income over an agreed threshold, etc.

The level of income accruing to the owner is strongly correlated to the level of risk the owner is willing to accept, i.e. the greater proportion of the rental income that is linked to the income earned by the operator the higher the owner's income. Equally the level of contingent payments offered by the operator is a reflection of the difficulty (or ease) they expect to experience in selling space on the site. Accordingly site owners have to balance the degree of certainty associated with their income with the level of that income.

Another issue which will come into play is on renewal of the lease / planning permission and the need or otherwise to replace the site infrastructure. For conventional sites this is not a major issue but for digital sites it could be. If at renewal the equipment is operating well and particularly if the operator can continue to purchase maintenance under a fixed price contract, then there is an opportunity for the owner to extract added value in the second period of rental (it seems to be generally agreed that after 10 years the infrastructure will need to be replaced).

3.8. Discussion

General

In Section 2 we identified that land in roads authority ownership would tend to be close to roadside and thus could be challenging to use effectively and safely. The sites on the M8 are remote from the road and work effectively because of that. The sign in Giffnock is close by the road but also adjacent to a set of traffic signals with queuing present for considerable parts of the day and this may well be a factor may it attractive to advertisers. Interestingly during the course of this study the site has been converted to a digital display (from a 3 face rotating display). A series of advertisements is show in Figure 3-1. We have not been able to ascertain how this may have affected the site rental.

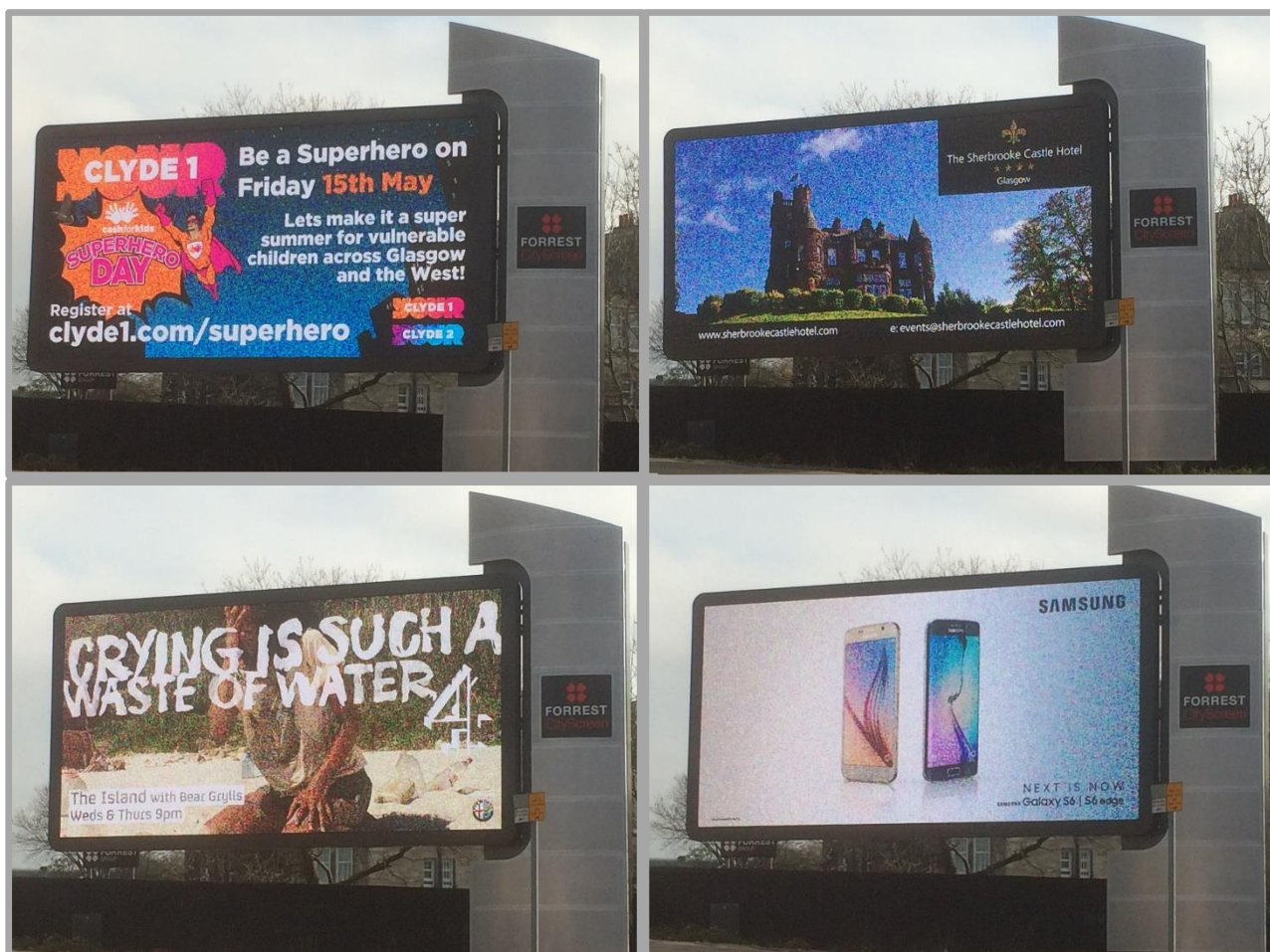


Figure 3-1 New Digital Advertising Site - Fenwick Road, Giffnock

In contrast the site on Pointhouse Road although close to the Clydeside Expressway is not seen to be valuable possibly because it is too close to the Expressway which has a 50 mph speed limit and it cannot therefore be seen effectively by passing traffic.

Braehead / Hillington Second Interchange

Such sites are problematic because they are busy locations where drivers have to make important decisions and watch other traffic and traffic signals. This they are not favoured for the introduction of distractions such as advertising signs, even though they may be very busy and lucrative.

The proposal we had sight of suggested high rentals over a 10 year period. We would caution that these could be high end forecasts and that if a contract were concluded there would be clauses that could reduce it considerably, e.g. as planning permission only last 5 years there would likely be a break clause, the revenues could be reduced if maintenance costs were above some threshold and there could be a reduction if the vacancy rate exceed a certain level.

This page is deliberately blank

4. Legislation and Processes

4.1. Context

The legal issues associated with roadside advertising are twofold:

- The planning legislation under which advertising hoardings are granted permission by the Planning Authority; and
- The roads legislation under which the Roads Authority exercise control over activities on or near roads.

4.2. Planning Legislation

Special provision is made for advertising sites within the planning legislation. Section 182 of the Town and Country Planning (Scotland) Act 1997 (as amended) empowers the Scottish Ministers to “*make provision for the restricting or regulating the display of advertisements so far as appears to the Scottish Ministers to be expedient in the interests of amenity or public safety*” (see below).

Town and Country Planning (Scotland) Act 1997

182 Regulations controlling display of advertisements.

- (1) Regulations shall make provision for restricting or regulating the display of advertisements so far as appears to the Secretary of State to be expedient in the interests of amenity or public safety.
- (2) Without prejudice to the generality of subsection (1), any such regulations may provide—
 - (a) for regulating the dimensions, appearance and position of advertisements which may be displayed, the sites on which advertisements may be displayed and the manner in which they are to be affixed to the land;
 - (b) for requiring the consent of the planning authority to be obtained for the display of advertisements, or of advertisements of any class specified in the regulations;
 - (c) for applying, in relation to any such consent and to applications for such consent, any of the provisions mentioned in subsection (3), subject to such adaptations and modifications as may be specified in the regulations;
 - (d) for the constitution, for the purposes of the regulations, of such advisory committees as may be prescribed by the regulations, and for determining the manner in which the expenses of any such committee are to be defrayed.
- (3) The provisions referred to in subsection (2) (c) are—
 - (a) the provisions of Part III relating to planning permission and to applications for planning permission, except sections 32, 34, 35, 36(2) and (3), 38, 58 to 62, 69 and 70 and Schedules 6 and 7, and section 65 of the M1Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997,
 - (b) sections 88 to 92, 94 and 95 (except so far as they relate to purchase notices served in consequence of such orders as are mentioned in section 88(1)(b) or (c)), and
 - (c) section 263.

4.2.1. Regulations Controlling Advertising

Such regulations have indeed been made and the current regulations are The Town and Country Planning (Control of Advertisements) (Scotland) Regulations 1984 (as amended). It can be seen that the Regulations predate the act having been made under previous legislation, but continued to have force under the 1997 act. The latest amendments, made in 2013 and 2104 (2) are technical and do not make substantive changes to the Regulations.

A key feature of the Regulations is to limit the period for which Planning Permission, in respect of advertisements, to 5 years, i.e. unlike normal planning permission which is in perpetuity it is temporary. The fact that the permission is temporary allows the circumstances relating to any advertisement to be reviewed

from time to time and to ensure that its continuation is acceptable to the wider public and appropriate to the surroundings taking account of changes which may have occurred, e.g. nearby development, etc.

Section 16 of the Regulations (see below) place a “*duty to consult*” on the Planning Authority prior to determining an application. This duty (inter alia) specifically identifies that where the planning authority considers that the display of advertisements may affect the safety of road users they must consult with the relevant authority. However it is interesting to note that:

- The Regulations refer to “Highway Authority” which is an English term based on the Highways Act 1980, whereas in Scotland we have Roads Authorities based on the Roads (Scotland) Act 1984 (see 4.3 below); and
- The duty to consult is only explicit where the road is a trunk road or where the road is the responsibility of a different local authority to the planning authority.

The Town and Country Planning (Control of Advertisements) (Scotland) Regulations 1984

16.— (1) Before determining an application for consent to display advertisements the planning authority shall consult—

- (a) with any other planning authority whose district, or any part thereof, appears likely to be affected by the display of advertisements to which the application relates;**
- (b) where it appears to the planning authority that the display of advertisements to which the application relates may affect the safety of persons using—**
 - (i) any trunk road, with the Secretary of State;**
 - (ii) any road (other than a trunk road) for which the planning authority are not also the local highway authority, with the local highway authority concerned;**
 - (iii) any railway, waterway, (including any coastal waters), dock, harbour or airfield with the authority, statutory undertaker, body or person responsible for the operation thereof and, in the case of any coastal waters, with the Commissioner of Northern Lighthouses.**

(2) A planning authority shall give to any authority, person or body with whom they are required to consult not less than 14 days’ notice that an application is to be taken into consideration and shall on determining the application take into account any representations made by such authority, person or body.

NB: Since the establishment of the Scottish Parliament and devolved government the role of the “Secretary of State” has passed to the “Scottish Ministers”.

4.2.2. Consultation Processes

This first point is an issue of draftsmanship and given that to our knowledge the regulations have not been challenged or found wanting on this point it is of little consequence. The second point is only relevant now in relation to trunk roads or roads on the boundaries between local authorities, whereas in the past (e.g. when we had regional councils that were roads authorities and district councils that were planning authorities) it was more widely applicable.

However as drafted the regulations perceive that where a local authority is both the planning authority and the highway authority they are a single entity and it is up to that entity to arrive at its position in relation to the granting of planning permission, i.e. there is no recognition of the internal separation of function in the regulations and they do not mandate that the “planning department” consults with the “roads department”.

Whilst we recognise that internal consultation is widely undertaken it leaves such consultation down to good practice, without any regulatory backing.

4.2.3. Scope of Comments

The Act and the Regulations place no restriction on the scope of comments other than that of the “safety of persons using ... the road”. Accordingly the roads authority can comment on any issue of safety they deem relevant, e.g. driver distraction, obstruction, sign clutter, etc. as long as they can demonstrate that it is an issue of road safety. Users of course are not merely vehicles (and their occupants) but include cyclists, pedestrians, equestrians and others.

A valid issue is the form of the advertisement and in this regard planning permission will normally reflect the form set out in the application. As a result an advertising hoarding may be illuminated but if the hoarding is to be electronic then that would need to be clearly defined in the application. Accordingly simply because a site is allocated for an advertising hoarding, does not automatically mean that the hoarding can be converted to use as an electronic sign, since such a change would require a new planning application, which would be subject to consultation. The previous use of the site for advertising in itself will not mean that the site can be simply upgraded as the issues of road safety (and amenity, etc.) would need to be considered in the light of the new format of the advertising.

4.2.4. Revocation of Consent

There are limited powers (Section 22 of the Regulations) to revoke or modify consent for the display of advertisements. However these can only be exercised before “the carrying out of any building or similar operations.....has been completed”. Where such power is exercised then compensation is payable for the works which are rendered abortive, including preparation of plans (after the grant of consent). In theory if a site does not involve building work then the revocation can be at any time and potentially without cost to the authority. It should be noted that no compensation for loss of value is payable.

4.3. Roads Legislation

We identified two main pieces of legislation as potentially being relevant in this area:

- Road Traffic Regulation Act 1984; and
- Roads (Scotland) Act 1984.

We have reviewed these and in fact there are no specific provisions relating to advertising signs under the Road Traffic Regulation Act 1984, whereas the Roads (Scotland) Act 1984 does provide powers in this regard. These are provided under Section 83 of the Act (see overleaf) and enable a “roads authority” to “impose restrictions”, “...at or near a corner, bend or junction...”, for “...the prevention of danger arising from obstruction of the view of road users...”.

Whilst this does not directly mandate the authority to impose restrictions, given that they have a general duty of care they can discharge that duty by applying the act. The section deals with all forms of obstruction, listed as:

- wall (not being a wall forming part of the structure of any other permanent building);
- fence;
- advertising hoarding;
- hedge;
- tree; or
- shrub.

Advertising hoardings are clearly in the scope of the act. However the powers here only relate to obstruction of view at or near a corner, bend or junction. Furthermore a roads authority may be reluctant to use these powers as they can be required to meet the costs of complying with the Obstruction Notice and additionally pay compensation for any loss arising from that compliance (cf. revocation of consent under planning regulations where only direct costs can recovered). As advertising hoardings are a generator of income for the operator there is clearly a significant risk of consequential costs falling on the roads authority if the powers are used to remove or alter advertising hoardings.

Roads (Scotland) Act 1984

83 Prevention of obstruction of view at corners, bends and junctions.

(1) Where the roads authority are of the opinion that it is necessary, for the prevention of danger arising from obstruction of the view of road users, to impose restrictions with respect to land at or near a corner, bend or junction in a road they may serve a notice (in this section referred to as an “obstruction notice”)—

(a) upon the owner or occupier of the land directing him, within such period (being not less than 28 days) as may be specified in the notice, to alter the height or character of any wall (not being a wall forming part of the structure of any other permanent building), fence, advertising hoarding, hedge, tree or shrub thereon so as to cause it to conform with any requirements specified in the notice;

(b) upon the owner, occupier and any lessee of the land restraining him, either absolutely or subject to such conditions as may be specified in the notice, from permitting any building, wall, fence or advertising hoarding to be erected or hedge, tree or shrub to be planted, on the land:

Provided that an obstruction notice shall not inhibit reconstruction, or repair, which does not create any new obstruction of the view of road users.

(2) In subsection (1) above “advertising hoarding” means a hoarding or similar structure used, or adapted for use, for the display of advertisements.

(3) Restrictions imposed by an obstruction notice shall come into force upon its service and shall remain in force until it is withdrawn by the roads authority; and such restrictions shall, while in force, be binding upon any successor in title to the owner or occupier of the land to which they relate unless that successor proves that when he became the owner or occupier of the land he had, after making due inquiries, no reasonable cause to suspect that any such restrictions were in force.

(4) A person may, within 28 days of the receipt of an obstruction notice, object in writing (specifying the grounds of objection) to the roads authority; and the question whether the notice shall be withdrawn as respects any requirement or restriction objected to shall then be determined in the manner provided by section 84 of this Act.

(5) A person upon whom an obstruction notice is served shall have power, notwithstanding anything in any conveyance or in any lease or other agreement, to do all such things as may be necessary for complying with the requirements of the notice.

(6) Without prejudice to section 141 of this Act, where an obstruction notice has been served upon a person the roads authority may, with the consent of that person, do on his behalf anything necessary for complying with the requirements of the notice.

(7) Subject to subsections (4) and (6) above, and without prejudice to any other proceedings which may be instituted against him, a person who fails to comply with the requirements of, or acts in contravention of, an obstruction notice served on him commits an offence.

(8) A person upon whom an obstruction notice is served shall be entitled to recover from the roads authority any expenses reasonably incurred by him in carrying out any directions contained in the notice; and a person sustaining loss in direct consequence of any requirement of such a notice or a person who proves that his property is injuriously affected by restrictions imposed by such a notice shall, if he makes a claim within six months after its service, be entitled to recover from the roads authority compensation for the injury sustained.

(9) Nothing in this section shall authorise the service by a local roads authority of an obstruction notice with respect to—

(a) any wall—

(i) forming part of an ancient monument or other object of archaeological interest, except with the consent in writing of the Secretary of State; or

(ii) forming part of, or necessary for the maintenance of, a railway, canal, inland waterway, dock or harbour;

(b) a protected tree; or

(c) a listed building.

(10) In subsection (9) above—

“protected tree” means a tree which is subject to a tree preservation order under section 160(1) of the Town and Country Planning (Scotland) Act 1997; and

“listed building” has the meaning assigned to it by section 52(7) of that Act.

4.4. Summary

Considering the above powers under the planning and roads acts it is clear that the most effective strategy is to prevent the erection of advertising hoardings when planning permission is applied for, rather than try to act retrospectively using roads authority powers. Key points are:

- Planning powers are more wide ranging than roads powers;
- As the refusal of planning permission only stops development no compensation is payable;
- By coordinating the activities of the planning and roads functions a local authority can operate in a highly effective manner; and
- Such a coordinated approach is implied in the planning legislation.

This page is deliberately blank

5. Conclusions and Recommendations

5.1. Introduction

We have examined a number of different aspects in relation to the location of advertising signs close to roads and specifically on land owned by the roads authority. The following section of the report will summarise the findings of the research undertaken, before proceeding to make some important recommendations.

5.1.1. Safety and Amenity

Safety is an issue and advertising signs can be a distraction for drivers and other road users. However:

- There is little current research;
- No research on the specific impact of digital advertising signs was identified;
- Research is often not relevant to the UK (or even Europe);
- Much of the research carried out has been undertaken on simulators due to problems of implementing such research in real life situations;
- Although most studies found that signs can take drivers' attention away from the road (as measured by eye movement, recall of situations, etc.) it is also demonstrated that in some situations drivers have adequate mental processing capacity to absorb appropriate advertising messages;
- Appropriate regulations should take account of form, and location (both longitudinally on the road and where it falls in drivers' fields of view);
- Sign clutter is an issue and if further signs are to be introduced this should be done in a managed manner and should ideally take account of both safety and environmental issues.

We note that standards have been successfully developed and implemented in Australia and New Zealand and these can be cited as a precedent for developing such guidelines for the UK (or Scottish) situation.

5.1.2. Site Values

The market for advertising hoardings has a unique set of characteristics which make it hard to predict a value for a specific site. As a result some sites have much higher values than others due to specific features and issues. The values attributable to digital advertising signs can be significantly higher than those associated with conventional signs. Whereas conventional sites may only have a value of £2,000 to £3,000 per sign per annum a good site with a digital sign may command multiples of this.

The value of sites is affected by scarcity and if the supply is increased then there may be a reduction in site values which would be detrimental to the revenues generated. There are opportunities to create risk sharing deals between site owners and site operators which can increase the owner's return, but it has to be recognised that in a risk sharing situation there may be downsides from time to time.

In assessing site values it is important to recognise the costs associated with enabling, developing and operating the site (and restoring at the end of its use). Also to realise the revenue from a site the owner has costs which need to be met and these will reduce the net revenue. These include:

- Marketing the site;
- Negotiating a deal;
- Managing the lease; and
- Renegotiating the deal every five years to keep revenues aligned to the market.

To maximise site values local authorities need to present a coherent approach to the industry and ensure that they have dealt with internal issues (e.g. estates / planning / roads) before coming to market as operators have noted that they have expended considerable sums only to find that projects brought forward by one arm of an authority is later derailed by another. This does not encourage participation or value maximisation.

5.1.3. Legislation

There is no obvious reason why a local authority should not lease land to an advertising company provided it recognises the potential conflict with its roles as both planning authority and road authority. Under the planning legislation the authority is obliged to consider the safety of all road users and under the roads legislation the authority can in extremis intervene to remove signage (and other obstructions) to visibility at or near corners, bends, and junctions. However as this can result in the roads authority having to meet costs and pay compensation it should only be seen as an option of last resort.

5.2. Recommendations

Based on this research we have developed a series of recommendations for the management of roadside advertising. Whilst our research has been focused on the management of sites owned by local authorities, and specifically the roads function within those authorities, it is clear that it is neither desirable nor practicable for the way advertising signs are managed to be based on ownership, rather there should be a consistent approach which can be seen to be fair and equitable by all parties.

Accordingly our recommendations set out work which we have identified as being both practical and useful and which would help Scottish local authorities to develop such an even handed approach to the management and control of roadside advertising,

5.2.1. Management Strategy

The overall management of roadside advertising should be through the use of Planning Legislation. This has a long established position as being the way in which all types of development are controlled and there are well developed regulations already in place. There is, based on anecdotal evidence a need for the road, planning and other functions within the local authorities to adopt a more holistic approach to the management process, especially where the authority may have a commercial interest.

The remainder of these recommendations will, it is hoped, enable such an approach to be developed and if these recommendations are followed it may be appropriate to give consideration to modifying the regulations under which planning consent for advertising signs is granted so as to codify the findings.

5.2.2. Safety

To develop current practices and improve our understanding of how advertisements impact on drivers' behaviour we would recommend that further research is commissioned on the optimal locations of advertisements from the point of view of safety. This should consider:

- Their positioning relative to junctions, bends and other features;
- Where in drivers' field of view such signs should be placed, i.e. at eye level, above eye level, nearside, offside, etc;
- The most appropriate size of sign, which will relate to the size of words and images and the speed of the road traffic; and
- Other issues such as (for electronic signs) the use of moving images, frequency of image change and image brightness.

We note that with the recent rapid developments in technology new research opportunities are opening up all the time, including:

- The use of wearable technology, e.g. Google Glass, with which it may be feasible to undertake real tests in the field;
- The development of better simulators may allow more realistic simulations to be created in the laboratory.

5.2.3. Amenity

Considerations should be given to developing Scottish standards for permitted advertising on local authority roads e.g. through the Society of Chief Officers of Transportation (SCOTS) and the equivalent planning officer.

A number of points should be taken into account in progressing this work:

- The following paragraph from paper 1.15 (Scottish Government's research in 2003) is telling:

“It is suggested that the effect of visual ‘clutter’ at junctions has been sufficiently well established that specific guidelines relating to this issue could be created to regulate the position and number of advertisements in this context. However, more research is needed to establish what kind of advertisement/sign is most likely to contribute to accidents, and what level of effect specific advertisements are likely to have”
- The development of standards can be done in parallel with the above safety research work with the standards developed taking into account the findings of the research and issues of townscape, landscape and general amenity so as to provide a consistent core framework for the display of roadside advertising.
- Such standards would provide a “core framework” as there are always local issues to be considered and therefore it is likely authorities will wish to adapt them to specific circumstances within their area.
- In taking such a strategy forward it is likely to be beneficial to engage with the authorities in Australia and New Zealand to understand their experiences and ascertain if they have been able to measure the effect of their policies.
- As the Australian and New Zealand documents reflect road design and other practices in these countries they should only be seen as exemplars and therefore an appropriate document would require to be developed for use in the Scottish context, based on our practices.

5.2.4. Revenues

To maximise revenue for sites within their ownership local authorities need to adopt a clear and impartial approach which will encourage the industry to engage with them in the knowledge that they can, with reasonable certainty, know how sites are marketed and how decisions about them will be made:

- Managing the land they own which may be suitable for roadside advertising;
- Granting of Planning consent; and
- Ensuring that issues of road safety are properly considered in the grant process.

The application of consistent standards would be helpful therefore reinforces the benefit of creating of a core Scottish Standard. This offers a number of potential benefits:

- We strongly recommend that this be developed as a Scotland wide standard to maximise consistency of approach;
- This will ensure that standards are consistent across Scotland and present a coherent strategy to road users, not changing arbitrarily at local authority boundaries; and
- It could potentially be much more cost effective to develop such standards collaboratively e.g. through SCOTS and / or chief planning officers, than for each authority to undertake the work separately;
- Indeed it may not be feasible for local authorities to resource such development on a standalone basis;
- The advertising industry will be able to develop a coherent approach to applying for planning permission which should be more cost effective for all parties.

5.3. Funding Further Research

It may be feasible to get the advertising industry to be a funding partner if they see the opportunity to get better advertising locations, although there would need to be a proper governance regime to ensure that the research on potential locations is seen to be unbiased.

This page is deliberately blank

Appendices

Appendix A. Abstracts of Research Papers

A.1. The role of roadside advertising signs in distracting drivers

Paper 1.1

Driving is getting more complex by the time due to distraction factors inside and outside the motor vehicle. One of the major external distraction causes is roadside advertising signs. This study aims at assessing the effects of these signs on driving performance on a simulator and drivers' opinion on the distraction caused by such signs using a questionnaire. Twelve volunteers participated in the driving simulator part of this study on two identical paths with one difference. One had roadside advertising signs and one had none. Driving simulator results revealed that two driving performance indicators, drifting from lane and recklessly crossing dangerous intersections, were significantly worse in the path with advertising signs as compared with performance on the other path. The other three performance indicators (number of tailgating times, overspeeding and turning or changing lanes without signaling) were also worse in the presence of advertising signs but the difference was not statistically significant. 160 drivers responded to the questionnaire. Half of the respondents indicated being distracted at least once by roadside advertising signs. Moreover, 22% of them indicated being put in a dangerous situation due to distraction caused by such signs. Relevance to industry: In light of the results, practical suggestions are made as to the positioning of these advertising signs and the need for more research in this area.

A.2. Conflicts of interest: The implications of roadside advertising for driver attention

Paper 1.2

There is growing concern that roadside advertising presents a real risk to driving safety, with conservative estimates putting external distractors responsible for up to 10% of all road traffic accidents. In this report, we present a simulator study quantifying the effects of billboards on driver attention, mental workload and performance in Urban, Motorway and Rural environments. The results demonstrate that roadside advertising has clear adverse effects on lateral control and driver attention, in terms of mental workload. Whilst the methodological limitations of the study are acknowledged, the overriding conclusion is that prudence should be exercised when authorising or placing roadside advertising. The findings are discussed with respect to governmental policy and guidelines.

A.3. Effects of advertising billboards during simulated driving

Paper 1.3

There is currently a great deal of interest in the problem of driver distraction. Most research focuses on distractions from inside the vehicle, but drivers can also be distracted by objects outside the vehicle. Major roads are increasingly becoming sites for advertising billboards, and there is little research on the potential effects of this advertising on driving performance. The driving simulator experiment presented here examines the effects of billboards on drivers, including older and inexperienced drivers who may be more vulnerable to distractions. The presence of billboards changed drivers' patterns of visual attention, increased the amount of time needed for drivers to respond to road signs, and increased the number of errors in this driving task.

A.4. Modulation of attention and urgent decisions by affect-laden roadside advertisement in risky driving scenarios

Paper 1.4

In road safety literature the effects of emotional content and salience of advertising billboards have been scarcely investigated. The main aim of this work was to uncover how affect-laden roadside advertisements can affect attention – eye-movements – and subsequent risky decisions – braking – on the Honda Riding Trainer motorcycle simulator. Results indicated that the number of fixations and total fixation time elicited by the negative and positive emotional advertisements were larger than the neutral ones. At the same time, negative pictures got later gaze disengagement than positive and neutral ones. This attentional capture results in less eye fixation times on the road relevant region, where the important driving events happen. Finally, the negative emotional valence advertisements sped up braking on subsequent risky situations. Overall results demonstrated how advertisements with emotional content modulate attention allocation and driving decisions in risky situations and might be helpful for designing roadside advertisements regulations and risk prevention programs.

A.5. Attraction and distraction of attention with roadside advertisements

Paper 1.5

The optimum positioning of roadside advertisements is recognized by the industry as an important factor in attracting the attention of passing drivers. Less acknowledged is the possibility that the location of an advertisement may distract attention from vital driving-related information. This study compared street-level advertisements (SLAs; predominantly bus shelters) with raised-level advertisements (RLAs) of the same size that were suspended 3m above the ground, on their ability to attract attention under different task conditions. Participants were split into two groups and watched video clips of driving, rating them for hazardousness while their eye movements were recorded. One of the groups was additionally primed to attend to advertisements. SLAs received the most fixations when participants were solely looking for hazards, and the fewest fixations when primed to look for advertisements. Though SLAs also had longer fixations than the RLAs, they were more poorly recognized in a subsequent memory test. We conclude that SLAs attract and hold attention at inappropriate times compared to raised-level advertisements.

A.6. The emotional side of cognitive distraction: Implications for road safety

Paper 1.6

Driver distraction is estimated to be one of the leading causes of motor vehicle accidents. However, little is known about the role of emotional distraction on driving, despite evidence that attention is highly biased toward emotion. In the present study, we used a dual-task paradigm to examine the potential for driver distraction from emotional information presented on roadside billboards. This purpose was achieved using a driving simulator and three different types of emotional information: neutral words, negative emotional words, and positive emotional words. Participants also responded to target words while driving and completed a surprise free recall task of all the words at the end of the study. The findings suggest that driving performance is differentially affected by the valence (negative versus positive) of the emotional content. Drivers had lower mean speeds when there were emotional words compared to neutral words, and this slowing effect lasted longer when there were positive words. This may be due to distraction effects on driving behavior, which are greater for positive arousing stimuli. Moreover, when required to process non-emotional target stimuli, drivers had faster mean speeds in conditions where the targets were interspersed with emotional words compared to neutral words, and again, these effects lasted longer when there were positive words. On the other hand, negative information led to better memory recall. These unique effects may be due to separate processes in the human attention system, particularly related to arousal mechanisms and their interaction with emotion. We conclude that distraction that is emotion-based can modulate attention and decision-making abilities and have adverse impacts on driving behavior for several reasons.

A.7. Guidelines for the display of advertising signs within the road reserve in Brazil

Paper 1.7

This paper discusses the use of regulated advertising signs within the road reserve to obtain funds for the improvement of highway infrastructure and safety conditions. Laws presently either do not exist or fail to provide appropriate guidance. A review is included of published material, describing the approach used in different countries and providing technical, economic and political support for the guidelines proposed in this paper. These guidelines could provide public agencies with the necessary basic orientation for their implementation, and the conclusions emphasize the action which should follow such implementation.

A.8. Do supplementary signs distract the driver?

Paper 1.8

In 2005, the regulation of signage on German highways was changed and now allows supplementary signs. These signs are installed below direction signs and inform about the services offered on motorway service areas. Being advertisement, the supplementary signs bear the risk to distract drivers looking for directional information. To study the influence of supplementary signs, four experiments (N = 30) were conducted. Experiment 1 used the phenomenon of change blindness as an indicator for the allocation of attention. It could be shown that drivers searching for a specific direction direct nearly no attention to the supplementary signs. In experiment 2 and 3, the influence of the supplementary signs on perceptual threshold for directional information and on self-chosen perception times was measured. Neither the perceptual threshold nor perception times freely chosen by the participants were negatively affected by the supplementary signs. The last experiment analyzed the influence of supplementary signs on driver reaction in a critical driving situation in a driving simulator study. Here, supplementary signs had no negative impact on collision rate and reaction time. Based on the results, it is concluded that drivers use effective attentional strategies while searching for directional information. In the experiments no negative effects of the supplementary signs could be found.

A.9. Do familiarity and expectations change perception? Drivers' glances and response to changes

Paper 1.9

The present study shows that repeated exposure to a road environment changes eye movement behaviour. In addition, repeated exposure may result in inadequate responses to unexpected changes in the road environment. Participants drove a low-cost simulator while their eye movements were recorded. With repeated exposure participants' glances at traffic signs along the route were shorter while having a better recollection of the traffic signs along the route. At the last drive, the priority situation at an intersection was changed (a priority road was changed into a yield situation). Even though drivers glanced at the sign that indicated the new priority situation, they did not sufficiently process the information to show an adequate response. Only two out of 12 drivers showed any response, being a response only after crossing the priority road markings. The current finding that unexpected but relevant information may be missed by drivers is relevant for other monitoring tasks.

A.10. Visual search of driving situations: Danger and experience

Paper 1.10

Previous research on visual search in driving suffers from a number of problems: small sample sizes, a concentration on mundane situations, and a failure to link results to more general psychological theory. The study reported in this paper addresses these issues by recording the eye movements of a large sample of drivers while they watched films of dangerous driving situations and comparing the findings with those from more general studies on scene perception. Stimuli were classified according to the types of road shown and the degree of danger present in the scenes. Two groups of subjects took part, fifty-one young novice drivers who had just gained a full driving licence and twenty-six older more experienced drivers. Dangerous situations were characterised by a narrowing of visual search, shown by an increase in fixation durations, a decrease in saccade angular distances, and a reduction in the variance of fixation locations. These effects are similar to the concept of 'attention focusing' in traumatic situations as it is described in the literature on eyewitness memory. When road types are compared, the least visually complex rural roads attracted the longest fixation durations and the shortest angular saccade distances, while the most visually complex urban roads attracted the greatest spread of search but the shortest fixation durations. Differences between the groups of subjects were also present. Novices had longer fixation durations than experienced drivers, particularly in dangerous situations. Experienced drivers also fixated lower down and had less vertical variance in fixation locations than novices.

A.11. Driver distraction by advertising: genuine risk or urban myth?

Paper 1.11

Drivers operate in an increasingly complex visual environment, and yet there has been little recent research on the effects this might have on driving ability and accident rates. This paper is based on research carried out for the Scottish Executive's Central Research Unit on the subject of external-to-vehicle driver distraction. A literature review/meta-analysis was carried out with a view to answering the following questions: is there a serious risk to safe driving caused by features in the external environment, and if there is, what can be done about it? Review of the existing literature suggests that, although the subject is under-researched, there is evidence that in some cases over complex visual fields can distract drivers and that it is unlikely that existing guidelines and legislation adequately regulate this. Theoretical explanations for the phenomenon are offered and areas for future research highlighted.

A.12. Mapping mental load in car driving

Paper 1.12

A system is being developed which permits the identification of traffic locations which impose a heavy mental load on the car driver. The method employs a car equipped with a video-recorder, of which the camera is mounted behind the windscreen, continuously recording the independent variable of traffic load. Dependent variables are physiological indices and performance on a secondary task. This working report is a review of the factors taken into consideration in the preparatory phase of the experiments.

A.13. What attracts attention when driving?

Paper 1.13

Twenty-five observers were asked to report what attracted their attention while driving along a 21.9 km route through a suburban district. A second group of equal size made similar reports in the laboratory while watching a movie film of the same route. The results obtained from the laboratory trial closely paralleled those obtained in the field and it is concluded that laboratory studies using a movie simulation provide a satisfactory means of studying the distribution of attention using a concurrent verbal report technique. It is noted that the absence of a driving task has no substantial effect on attentive behaviour suggesting that the visual information presented by the movie film is sufficient to generate attentive processes characteristic of driving. It is found that advertising attracts a good proportion of attention but in those sections of the route where there was little advertising attention was directed to an even greater extent to other objects not related to driving. It seems that some 30 to 50% of attention is given to such objects, perhaps reflecting the spare capacity of the observers, and it does not follow that restriction of advertising would result in more attention being given to driving-related objects. About 15 to 20% of attention is given to traffic control devices which is not sufficient to ensure that all or even most traffic control devices are noticed. Consideration is given to what action could be taken to increase the chance

of traffic control devices attracting attention.

A.14. Privately Funded Pedestrian Bridges

Paper 1.14

The separation of pedestrians and vehicular traffic is an increasing safety issue. With limited funding available to provide pedestrian bridges, the development of policies which have now resulted in bridges provided at no cost to the road authority are described. The procedures require the management of the projects in a manner which gains co-operation of local residents, councils and the road authority in a way that private proponents feel comfortable investing in bridge construction. The invitation of proposals and the criteria used to assess proposals are described. The development of guidelines that allow the private sector freedom in both the engineering design and financing mechanisms are illustrated by examples from actual projects. The development of the School Pedestrian Bridge program combines the specialised safety needs of school children with the resources of the private sector to improve traffic flow and pupil safety. (A) For the covering entry of this conference, see IRRD abstract no. 843369.

A.15. External-To-Vehicle Driver Distraction

Paper 1.15

See Appendix B

Appendix B. Conclusion from External-to-External Driver Distraction Research

B.1. Context

This research was undertaken in 2003 by the Scottish Executive, Social Research, Transport Research Planning Group and its Conclusions are reproduced below. The full paper can be found at: <http://www.scotland.gov.uk/Publications/2003/08/17782/23546>.

CONCLUSIONS

8.1 There is an extremely large body of empirical data concerning distraction. The general consensus of this body of research is that distraction can take place, even when the driver is concentrating on the task ahead of him/her.

8.2 There is also abundant evidence that billboards and signs can function as distractors. Scientific studies of perception have shown that in situations where subjects are attempting to identify objects on a computer screen, their search can be slowed down with the presence of visual distractors. There is statistical and laboratory evidence that this effect occurs in 'real world' situations and that this is most likely to happen at junctions, or other 'cluttered' visual environments.

8.3 There is also evidence of billboards and signs functioning as distractors in 'low information' situations. This is a situation of 'underarousal' where the driver stops paying attention to the road in front of him/her, and is, therefore particularly prone to distraction by extraneous features. There is also statistical evidence that this represents a 'real world' effect. However, this area is under-researched, and further details are lacking in the literature.

8.4 It is likely that external-to-vehicle distraction is under-represented in the standard accident databases (for example, FARS, and NASS in the United States). It is questionable whether drivers would spontaneously volunteer information that may have deleterious legal consequences for them. Moreover, some distraction effects may function 'unconsciously': therefore, their existence could only be demonstrated by statistical methods, or in the laboratory.

8.5 The vast majority of data pertaining to billboards/signs and their relation to driver distraction is either old (much of it over twenty years old) and/or biased towards the United States and Australia. There is little published research available (in English) relating to the European driver environment, less on the UK, and nothing on particularly Scottish issues. Given the increasing complexity of the driving environment, and the increasingly 'eye catching' and 'explicit' nature of contemporary advertising, it is important that research is carried out such that the relevance of this research to a British/Scottish environment can be demonstrated.

Philip Mendelsohn

Atkins Limited
200 Broomielaw
Glasgow
G1 4RU

Email: Philip.Mendelsohn@atkinsglobal.com

Telephone: +44 141 220 2000

Direct telephone: +44 141 220 2205

Fax: +44 141 220 2001

© Atkins Ltd except where stated otherwise.

The Atkins logo, 'Carbon Critical Design' and the strapline
'Plan Design Enable' are trademarks of Atkins Ltd.