

# TORONTO STAFF REPORT

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February 6, 2001

To: Works Committee

From: Barry H. Gutteridge, Commissioner, Works and Emergency Services

Subject: Prince Edward Viaduct – Don Section:  
Proposal to Install Two (2) Electronic Animation Signs Within View of  
Northbound and Southbound Traffic on the Don Valley Parkway

Toronto Centre-Rosedale, Broadview-Greenwood

Purpose:

This report addresses traffic safety issues for Don Valley Parkway drivers/travellers that will arise from the proposed installation of electronic animation signs on the Prince Edward Viaduct (Bloor Street bridge), (or any alternative location that may be proposed), adjacent to the Don Valley Parkway.

Financial Implications and Impact Statement :

The financial status of this project is outlined in a report to Works Committee also on this agenda, titled “Prince Edward Viaduct – Don Section: Measures to Deter Suicide Attempts”.

Recommendations :

It is recommended that:

- (1) this report be received and forwarded to City Council for its meeting on March 6, 2001, for information;
- (2) the Chief of Police be requested to submit a report directly to City Council for its meeting on March 6, 2001 addressing any traffic safety concerns the Police Service may have regarding the installation and operation of the proposed signs;
- (3) the City Solicitor be requested to submit a report directly to City Council for its meeting on March 6, 2001 assessing the need for the City of Toronto to be protected from any and all claims that may arise from the installation and operation of the proposed signs; and

- (4) in the event that City Council approves the installation and operation of electronic animation signs on or adjacent to the Don Valley Parkway,
- (i) approval be granted to enter into an agreement with Tribar Industries Inc. with terms and conditions satisfactory to the Commissioner of Works and Emergency Services and the City Solicitor;
  - (ii) the operational guidelines for these signs and any future signs, as outlined in this report, be adopted as an interim City-wide standard and included in the agreement mentioned in (i); and
  - (iii) funds up to a maximum of \$150,000.00 be set aside from Tribar Industries Inc.'s contribution for, firstly, a pre-installation human factors evaluation and secondly, a post-installation evaluation to quantitatively measure the effects on traffic safety of the new signs on the Don Valley Parkway.

Background:

At its meeting on January 18, 2001, City of Toronto Policy and Finance Committee was presented with a proposal from Tribar Industries Inc. to install two (2) electronic animation signs, with corresponding tri-vision (3 messages) vinyl signs on the Prince Edward Viaduct. In exchange for a 15-year lease agreement, Tribar Industries Inc. would contribute \$3,500,000.00 towards the construction of the suicide prevention structure on the Prince Edward Viaduct.

The sizes of the signs would be as follows:

Each electronic animated sign is 8.3m wide and 7.4m high

Each tri-vision, vinyl sign is 8.3m wide and 7.4m high

Total sign size is 8.3m wide and 14.8m high

At its meeting, Policy and Finance Committee requested the City of Toronto Works and Emergency Services Department to submit a report to Works Committee respecting "the safety aspects of the proposal".

Comments:

The purpose of advertising is to attract the attention of all those whose field of vision embraces the advertising medium. However, case studies of crashes show that inattention is the most frequent human error contribution to collisions. Therefore, it is prudent to limit distractions to drivers, particularly in areas where the driving task is particularly demanding, and a second or two lapse in attention could have serious consequences.

The following comments outline some of the operational issues that should be taken into account in developing an agreement with Tribar Industries Inc. if City Council approves the proposal to install electronic animation signs on the Don Valley Parkway. The comments are categorized as follows:

1. Sign Conspicuity and Brightness
2. Sign Location
3. Sign Legibility/Content
4. Sign Evaluation
5. Legal Issues

## SIGN CONSPICUITY AND BRIGHTNESS

The conspicuity of advertising displays is a key issue for the advertising industry, which assesses many human factors issues to ensure that advertising signs are conspicuous and legible for the target audiences. Signs are most conspicuous if placed in simple backgrounds without other competing displays nearby. This would be the situation on the Don Valley Parkway which today is a “sign-free” zone. Sign brightness increases conspicuity and can overcome the problems of a visually complex background. Signs with high internal contrast, bold graphics and unique messages increase the likelihood of detection. Since all of these factors contribute to conspicuity, and therefore the likelihood of attracting driver attention, they should all be considered in setting policy on advertising signs.

Eye movement studies indicate that during highway driving there is a need to check roadway information frequently - at least once every two seconds. Drivers also need to spend time looking at the road ahead, in addition to looking at specific guidance targets such as lane markers, signs, and other vehicles. This suggests that glances at an advertising display should not be a problem as long as three conditions are met. The first is that the driver keeps the road ahead in view, and does not follow the sign with his or her eyes beyond an angle of 10 degrees off the road path. This allows the driver to continue to detect changes on the road ahead. The second condition is that glances at advertising signs are short and timed to occur at non-critical points. The third condition is that the driver's attention is not drawn so strongly to the sign that he or she misses critical events that are in view ahead.

Moving displays or signs should be limited in the extent of movement and the brightness of the sign. This is also valid for signs off to the side of the road, as movement makes targets seen in peripheral vision more conspicuous.

In view of concerns expressed recently by the Chief of Police with respect to driver attentiveness, the Chief should be requested to submit a report directly to City Council for its meeting on March 6, 2001 addressing any traffic safety concerns the Police Service may have regarding the installation and operation of the proposed signs.

## SIGN LOCATION

On freeways including the Don Valley Parkway, the driving task is most demanding in areas where the number of lanes changes, and at merge areas, exit ramps and construction zones; that is where drivers may be changing lanes and/or slowing. A high degree of attentiveness is also required during stop and go traffic conditions – a frequent occurrence on the Don Valley Parkway. Drivers must be particularly attentive to these changes in speed because headways are often short - on the

order of 2 seconds or less. The time to begin braking in response to the slowing of a vehicle ahead is on the order of 1 to 2 seconds. A delay of even 1 second at a critical moment can result in a rear end collision. This means that advertising displays and signage should be particularly limited around interchanges and intersections, where speed variances increase.

## SIGN LEGIBILITY/CONTENT

Guidance on information processing time requirements comes from research on dynamic message signs, where drivers are reading unfamiliar messages. A study (conducted by Mast and Ballas in 1976) was carried out with drivers who were driving on a low density highway, and it showed that 85% of them were able to read signs with word messages only at a rate of one (1) major word per second or better. This means that under perfect conditions, a driver with 20/20 vision travelling during the day at 100 km/h on a freeway reading 35.6 cm (14 inch) letters has about nine (9) seconds during which the sign text is legible, and therefore could cope with about nine (9) words and/or symbols. At the other extreme, a driver with 20/40 vision, the minimum requirement for licensing, travelling at 80 km/h at night on a major highway reading 15.2 cm (6 inch) letters could cope with only one (1) word and/or symbol.

Other factors that affect the time taken to read any message is the driver workload (i.e. the number of tasks the driver must perform simultaneously), the message familiarity and display format. For driver workload, it is important that the message must be legible at a distance that allows sufficient exposure time for drivers to attend to the complex driving situation and glance at the sign a sufficient number of times to read and comprehend the message. All of the above principles have been applied in the installation and operation of the overhead changeable message signs on the F.G. Gardiner Expressway and the Don Valley Parkway that are part of the City's RESCU system.

## SIGN EVALUATION

It is not surprising that there are few good studies, which assess the impact of advertising signs. Collisions are rare events with multiple causes. There is a large month-to-month variability in the numbers that occur. Given that a particular sign is only visible for approximately one or two kilometres, few collisions would be expected in any given period. For this reason, a study of the impact of advertising signs would require numerous sites with before and after measures of collisions. Approximately one hundred or more collisions would be required to make statistical comparisons.

Changes in collision rates due to advertising would have to be compared with changes that took place at control sites upstream of the advertising sites. Because collision rates change over time due to changes in traffic volume, road geometry, enforcement, reporting practices (e.g. self-reports) and so on, it is important to use control sites which are as similar as possible to the advertising sites. Such a study could be done but would be costly. Identification of appropriate sites would be the most time consuming aspect.

If City Council accepts the proposal to install and operate electronic animation signs, it will be important to closely monitor the impacts on traffic safety on the Don Valley Parkway.

Specifically, funds up to a maximum of \$150,000.00 should be set aside from Tribar Industries Inc.'s contribution for, firstly, a pre-installation human factors evaluation and secondly, a post-installation evaluation to quantitatively measure the effects on traffic safety of the new signs on the Don Valley Parkway. The two evaluations will provide a basis for developing the operational parameters for any future signs.

## LEGAL ISSUES

Road authorities are consistent in their concern over dynamic or flashing displays.

To gather information on experiences with "billboard" signs in other jurisdictions, staff contacted all members of the Freeway Operations Committee of the U.S. Transportation Research Board (National Academy of Sciences). This international group is comprised of operators of freeway systems, academics and consultants and represents close to 1,000 person-years of operational knowledge about safe operating practices on Freeways, Motorways, and Highways.

To date, we have received 15 responses that are summarized in Appendix 1, which is attached. It is interesting to note that four states have actually prohibited the use of such signs, namely Minnesota, Texas, Virginia, and Washington. Whilst the table indicates that there are many safety and liability concerns, these concerns are primarily based on qualitative rather than quantitative data. Only in Dallas and Milwaukee is there documentation relating to an increase in collisions.

It is interesting to note that the collision rate on the F.G. Gardiner Expressway (Jameson Avenue to Sherbourne Street) is almost double that of the Don Valley Parkway (Eglinton Avenue to Bloor Viaduct). The F.G. Gardiner Expressway 1995 – 2000 annual rate is 2.51 collisions per million vehicle-kilometres whereas the Don Valley Parkway for the same period is 1.30 collisions per million vehicle-kilometres.

It is not possible to attribute the F.G. Gardiner Expressway's poorer collision record to any one factor. However, it cannot be ruled out at this time that the advertising environment that surrounds the F.G. Gardiner Expressway is in some way contributing to this poor safety record. In view of these concerns, the City Solicitor should be requested to submit a report directly to City Council for its meeting on March 6, 2001 assessing the need for the City of Toronto to be protected from any and all claims that may arise from the installation and operation of the proposed signs.

### Conclusion:

If City Council accepts the proposal from Tribar Industries Inc. to install and operate electronic animation signs on the Don Valley Parkway, the operating and protection guidelines, to be included in the agreement, should be based on the following:

### 1. Sign Conspicuity and Brightness

- ◆ animated video (TV like images) should not be permitted;
- ◆ rapid changing animated graphic displays (more than one change every two seconds) should not be permitted;
- ◆ graphic displays containing moving elements may be permitted;
- ◆ word displays must remain visible to permit the entire message to be read (one word per second, minimum five seconds); and
- ◆ brightness guidelines, as developed by the City, must be complied with.

### 2. Sign Location

- ◆ the sign location must not be within an interchange area in which merging, weaving, and frequent braking movements occur.

### 3. Sign Legibility

- ◆ images must stay on the screen for sufficient time to permit the entire message to be read without the driver having to brake or turn his/her head to look at the sign;
- ◆ the sign will not be permitted to simulate traffic control devices;
- ◆ messages must use fonts that meet acceptable legibility standards;
- ◆ all messages must be sufficiently brief such they can be read easily by drivers; and;
- ◆ all messages must be in accordance with the regulations and standards set by the Advertising Standards Council of Canada, in accordance with good taste, and must not include any content, including and not limited to tobacco and alcohol products, which are prohibited by the policies of City Council. In addition, advertising is not permitted which is, in the opinion of the Commissioner, offensive to the public on religious, racial or other grounds.

### 4. Sign Evaluation

- ◆ the sign proposal in its final version must be evaluated by an independent Human Factors Specialist to be selected by the Commissioner, Works and Emergency Services Department, prior to installation; and
- ◆ the independent Human Factors Specialist should conduct studies to quantitatively measure the effects on traffic safety following the installation and operation of the new signs.

## 5. Legal Issues

- ◆ comments pertaining to the need to protect the City of Toronto from all claims related to the installation and operation of the sign will be provided by the City Solicitor in a report to be submitted directly to City Council.

In the preparation of this report, staff were assisted by Dr. Alison Smiley of Human Factors North Inc., Toronto.

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### List of Attachments:

Appendix 1: Animated Video Changeable Message Sign (AVCMS) Experience; Feedback from Transportation Research Board – Freeway Operations Committee

**ANIMATED VIDEO CHANGEABLE MESSAGE SIGN (AVCMS) EXPERIENCE**

**FEEDBACK FROM TRANSPORTATION RESEARCH BOARD – FREEWAY OPERATIONS COMMITTEE**

	<b>Jurisdiction</b>	<b>Experience</b>	<b>Comments on key issues</b>			
			<b>Distraction</b>	<b>Safety</b>	<b>Litigation</b>	<b>Standards</b>
<b>1.</b>	<b>British Columbia</b>	Sign installed by developer, resulting in significant public backlash	Advertising is distracting	-	Municipalities may become liable, offsetting any revenue generation	-
<b>2.</b>	<b>Dallas</b>	Sign at Dallas/Forth Worth Airport	Sign was too large and provided too much information	Motorists slowed down to read the sign causing a number of collisions	Collisions resulted in significant litigation	Sign did not conform to good human factors standards
<b>3.</b>	<b>DAMBACH Inc.</b>	Sign systems for motorist information	Animated signs take away from main task for motorists of attentive driving	-	Animated signs should not be considered due to possible litigation	-
<b>4.</b>	<b>Denver</b>	-	-	-	-	<p><b>Manual of Uniform Traffic Control Devices states:</b></p> <ul style="list-style-type: none"> <li>• Private signs can't simulate a traffic control device</li> <li>• To be on public right of way, any sign must meet the rules for advertising signs.</li> <li>• Even on private land, if the sign is a legitimate hazard, an engineering study can be performed and the city can require the private agency to remove the sign on the basis of public hazard. (Requires accident data for a before and after period).</li> <li>• It is easier to deal with this if a local ordinance prohibits what the local operations staff is objecting to, but that won't help with a sign that is already in place.</li> </ul>

**ANIMATED VIDEO CHANGEABLE MESSAGE SIGN (AVCMS) EXPERIENCE**

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	Jurisdiction	Experience	Comments on key issues			
			Distraction	Safety	Litigation	Standards
5.	<b>McMaster University, Hamilton</b>	-	-	-	Concern that if a collision occurs in the vicinity of the sign, there will be no way to prove that the sign did not contribute	-
6.	<b>Milwaukee</b>	Signs installed by private enterprise adjacent to a freeway	-	Increase in collisions noticed	-	-
7.	<b>Minnesota</b>	Request from Chamber of Commerce to install signs to promote business events	-	-	-	Department of Transportation denied the request "----- signs are for use in emergency and incident situations"
8.	<b>Netherlands Police Agency</b>	-	Commercial advertising along freeway easily distracts motorists	Trading off human life for commercial revenue is a "crime"	-	-
9.	<b>New York City</b>	Animated "fireworks" displayed on signs for a few days	Camera monitoring provided evidence of motorists slowing down resulting in traffic disruptions	No collisions, but many close calls seen on camera	-	-

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	<b>Jurisdiction</b>	<b>Experience</b>	<b>Comments on key issues</b>			
			<b>Distraction</b>	<b>Safety</b>	<b>Litigation</b>	<b>Standards</b>
<b>10.</b>	<b>Phoenix</b>	Signs installed by private enterprise adjacent to freeway, subsequently reviewed by State Department of Transportation	-	-	-	Non-essential information along a freeway should be prohibited
<b>11.</b>	<b>Portland, Oregon</b>	Received a request to install large "video" billboard				Request denied
<b>12.</b>	<b>Rhode Island</b>	-	Once advertising is displayed, motorists will tend to ignore traffic related messages	-	-	-
<b>13.</b>	<b>Texas</b>	-	Concerned about driver in-attentiveness due to aggressive "off the highway" advertising on private property	In-attentiveness leads to collisions	-	No public advertising allowed on state Right of Way

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	Jurisdiction	Experience	Comments on key issues			
			Distraction	Safety	Litigation	Standards
14.	Virginia	-	-	-	-	Signs not permitted within sight of freeway
15.	Washington State	Two signs installed on native land adjacent to a freeway	Resulted in motorists slowing down and public complaints regarding the distraction	Dangerously bright at night	-	Standards developed to limit use and to minimize distraction to drivers