



Report to: Development Services Committee

Report Date: November 13, 2017

SUBJECT: Centreline Flexible Sign Pilot Program in School Zones

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REVIEWED BY: Loy Cheah, Senior Manager, Transportation, ext. 4838

RECOMMENDATION:

- 1) That the report entitled “Centreline Flexible Sign Pilot Program in School Zones”, be received;
- 2) And that the Centreline Flexible Sign Program be expanded to an additional 16 school zones in 2018, from 8 current locations to a total of 24 locations;
- 3) And that staff be authorized and directed to do all things necessary to give effect to this resolution.

PURPOSE:

This report summarizes the findings of the centreline flexible pilot program, including recommendations pertaining to future implementation and expanding the program to other school zones.

BACKGROUND:

Traffic safety in school zones has become a growing concern in communities throughout the City, specifically with respect to vehicle speeds and pedestrian safety. Currently, the City employs several measures within school zones, including 40 km/h speed limits, parking restrictions, crossing guards, crosswalk enhancements, edgeline markings, and deployment of speed radar display boards to improve safety. Staff also works closely with local schools, the school board and the York Region Health Services to support active transportation education initiatives. While these measures have varying degrees of success, there is a continued interest in exploring other opportunities to slow traffic through school zones.

The centreline flexible sign is a relatively new concept in Ontario, aimed at reducing the speed of vehicles on two-lane collector and local streets. These flexible signs are installed on the centreline of the road, creating a physical narrowing effect of the street (see Attachment “A”), thereby giving drivers a perception that they need to slow down.

The primary advantages of a centreline flexible sign are as follows:

- Lower capital and operating costs compared to traditional physical traffic calming measures, radar speed display boards and photo radar technology;
- Does not impact emergency or transit vehicles;
- Devices are designed to fold down on impact and then return to its initial position.

There are also disadvantages for using this type of device:

- Risk of personal property damage and associated liability if struck;
- Requires removal during winter season as snow plows will damage the device;
- Additional operating costs associated with seasonal installation and removal.

DISCUSSION:**A pilot project was conducted at 8 school zones in 2017**

From April 2017 – November 2017, Traffic Operations staff conducted a pilot project, implementing centerline signs at eight (8) school zones across the City (one school zone per ward). The objective of the study was to obtain qualitative data that would measure the effectiveness of the flexible signs, namely, whether vehicles reduced their speeds as they entered the school zone. The pilot was conducted at the following schools:

- Ward 1: Henderson Public School (Henderson Ave.)
- Ward 2: St. Justin Martyr Catholic School (Hollingham Rd.)
- Ward 3: Unionville Meadows Public School (South Unionville Ave.)
- Ward 4: Markham District High School (Church St.)
- Ward 5: St. Joseph Catholic School (Cornell Centre Blvd.)
- Ward 6: Castlemore Public School & All Saints Catholic School (Castlemore Ave.)
- Ward 7: Sir Richard W. Scott Catholic School (Roxbury St.)
- Ward 8: Randall Public School (Randall Ave.)

Each school zone was provided with two (2) centreline flexible signs installed at opposing ends of the school zone to slow traffic approaching from either direction. It is at these transition points where it is critical to advise drivers that they are entering into a designated school zone and must exercise increased awareness, and drive according to the posted speed limit.

Effectiveness of the flexible signs is variable and dependent on many factors

The flexible signs placed at opposite ends of the school zone effectively creates a school zone “gateway” feature. Speed data was collected at these gateways before and after installation and is summarized in Attachment “B”.

Based on the data analysis, staff concluded that vehicles typically slowed as they approached and departed the gateway. Because the signs are installed on the centerline, they physically constrain the travel lane, regardless of direction of travel. Although it was not measured, it is likely that vehicles would return to their normal operating speeds outside of the school zone, beyond the flexible signs.

The effectiveness of the flexible signs is largely dependent on a number of factors, and were not consistent at all locations. These factors, which will be summarized in the subsequent sections, include initial vehicle speeds, travel lane widths, and proximity to other road features, such as intersections, and changes in road alignment.

Flexible signs were effective at reducing vehicle speeds at all pilot locations

Prior to the installation of the flexible signs, all candidate school zones had a posted speed limit of 40 km/h and operating speeds ranging between 44 - 57 km/h. Following installation, analysis of the speed data indicated that the flexible signs were most effective at locations where operating speeds were initially in excess of 50 km/h (5 km/h reduction, on average). Where operating speeds were initially 50 km/h or less, speed reduction was less (2 km/h reduction, on average). The results are comparable to the effectiveness of the speed display boards. Because there was only an appreciable change in speed reduction on streets with operating speeds 50 km/h or greater, it is recommended that only school zones where operating speeds are above 50 km/h be considered as candidates.

Narrow travel lanes are effective in reducing vehicle speeds

A primary feature of the centerline flexible sign pilot is introducing a physical barrier on the road to create a narrowing effect of the roadway. As such, the pilot program reviewed the effectiveness of the flexible signs based on various travel lane widths.

Some locations selected had roads that were exceedingly wide and previously provided with edgeline pavement markings (i.e. bicycle lanes, parking lanes) to narrow the travel lanes to 3.0 – 3.5 metres. At these locations, edgeline flexible posts were used to physically enhance the narrowed travel lanes (see bottom image of Attachment “A”).

Where edgeline posts were implemented in addition to the centerline flexible sign, operating speeds were reduced by 6.1 km/h, on average. At locations where the road was in excess of 9.0 metres and no edgeline posts were used, operating speeds reduced by 2.8 km/h, on average.

It should be noted that, at locations with 3.0 metre travel lanes, local residents and transit operators reported difficulties in comfortably negotiating past the centerline and edgeline posts. These concerns were subsequently validated through site observations of driver actions and visible evidence of the posts being struck and/or dislodged from the road.

In order to effectively reduce vehicle speeds and accommodate transit and large service vehicles, it is recommended that lane widths of 3.3 – 3.5 metres be established, when implementing the flexible sign posts.

Road geometrics and proximity to other road features is critical to ensure effectiveness

While street selection and appropriate lane spacing is critical to achieve desired results, it is also important to ensure the flexible posts are installed appropriately in relation to other road features, such as intersections and changes in road alignment.

Many school zones in Markham currently have relatively low vehicle speeds due to one or more traffic control devices, such as an all-way stop, already in place within the school zone. While all-way stops are intended to control traffic at intersections, they have an added effect at reducing vehicle speeds. Therefore, the effectiveness of providing a flexible sign within these school zones would result in a negligible reduction in vehicle speeds. Henderson Avenue Public School is a case example of this.

During the course of the pilot project, there were two confirmed instances where vehicles impacted and caused significant damage to the flexible sign posts, requiring their replacement. One flexible sign on South Unionville Avenue (Ward 3) experienced significant damage and was sheared from its base. The sign was located on a curved portion of road and was likely struck by a vehicle crossing the centerline as they negotiated the curve (likely at an excessive speed). The flexible sign was subsequently replaced and re-installed on a straight section of road, about 30 meters west of the curve.

A flexible sign on Randall Avenue (Ward 8) was also damaged twice by vehicle impacts, likely by a wide-bodied vehicle (such as a bus) turning at the adjacent intersection. Some other locations have superficial “wear and tear”, but are otherwise in satisfactory condition.

For future installations, it is recommended that flexible sign posts not be installed within 80 metres of a curve or existing traffic control device, where possible. Further, staff will be seeking a higher quality product that is specified to withstand multiple, high speed vehicular impacts.

Staff recommends expanding the program to 16 additional school zones in 2018

The pilot program has demonstrated that the flexible posts are generally effective at reducing vehicle speeds in school zones. Staff will be reviewing candidate locations to expand the program to an additional 16 school zones in spring 2018, in consultation with individual Ward Councillors, and as per the following criteria:

- 1) Must be on a two-lane road (one lane per direction);
- 2) Operating speeds must be 50 km/h or above;
- 3) Lane widths of 3.3 – 3.5 metres can be achieved; AND
- 4) Flexible signs can be positioned at least 80 metres from a curve or traffic controlled intersection, yet still be within the school zone.

The school zones that were selected for the pilot program will continue to have the flexible signs in 2018. However, adjustments to the sign placements will need to be made on Henderson Avenue (Henderson Ave. P.S.) and Hollingham Road (St. Justin Martyr C.S.) to align with the aforementioned criteria, thereby improving their effectiveness.

FINANCIAL CONSIDERATIONS:

The pilot program consists of 8 original locations which Staff propose to expand by another 16 additional locations for a total of 24 locations. The funding for these additional 16 locations in the amount of \$17,000 (including HST) has been requested in the 2018 capital budget, under capital project #18056 “Traffic Operational Improvements,” subject to Council approval of the 2018 capital budget. An annual operating impact in the amount of \$4,800 is required for the seasonal installation and removal of the flexible sign posts, which will be funded from the existing operating budget 740-998-5399 ‘Other Contracted Services.’

The ratio of signs to school zones is 2:1 (one flexible sign is placed at either end of the school zone). The estimated useful life of a sign is 5 years. Therefore, the incremental replacement cost of the signs over 25 years will be \$80,000 (16 schools x 2 signs/school x \$500 per sign x every 5 years). The Lifecycle Reserve Study will be adjusted accordingly.

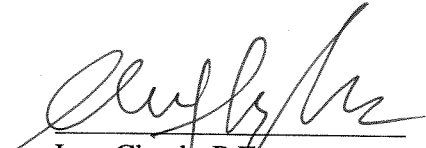
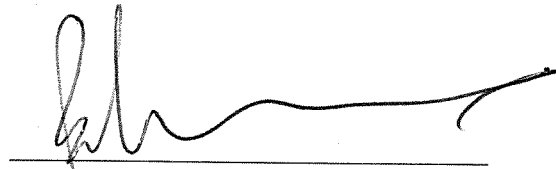
ALIGNMENT WITH STRATEGIC PRIORITIES:

The recommendations identified within this report align with the strategic focus for a Safe & Sustainable Community, through the ongoing management of the City’s transportation network.

DEPARTMENTS CONSULTED AND AFFECTED:

Operations Department has been circulated this report, recognizing impacts associated with ongoing road maintenance activities.

RECOMMENDED BY:

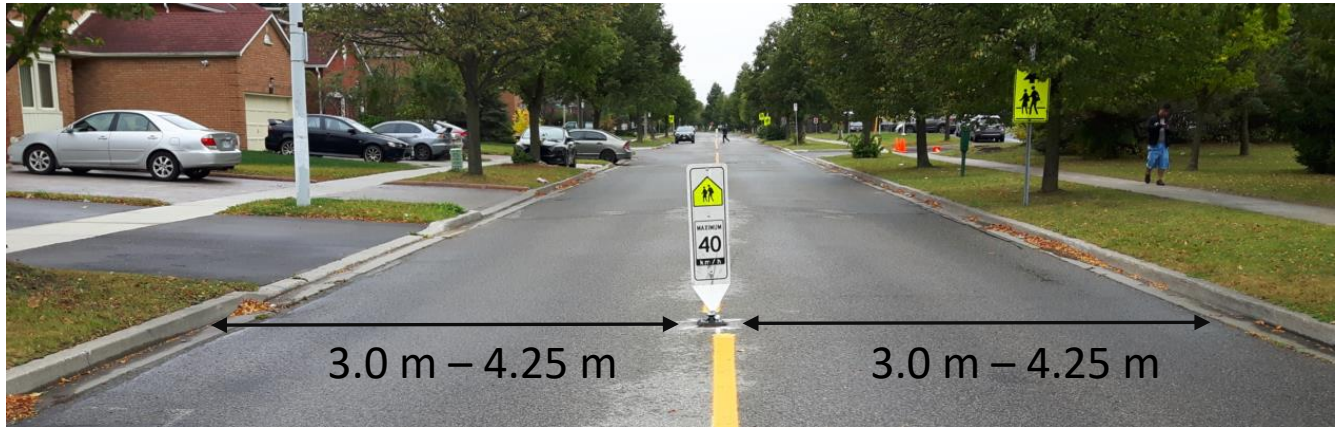

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ATTACHMENTS:

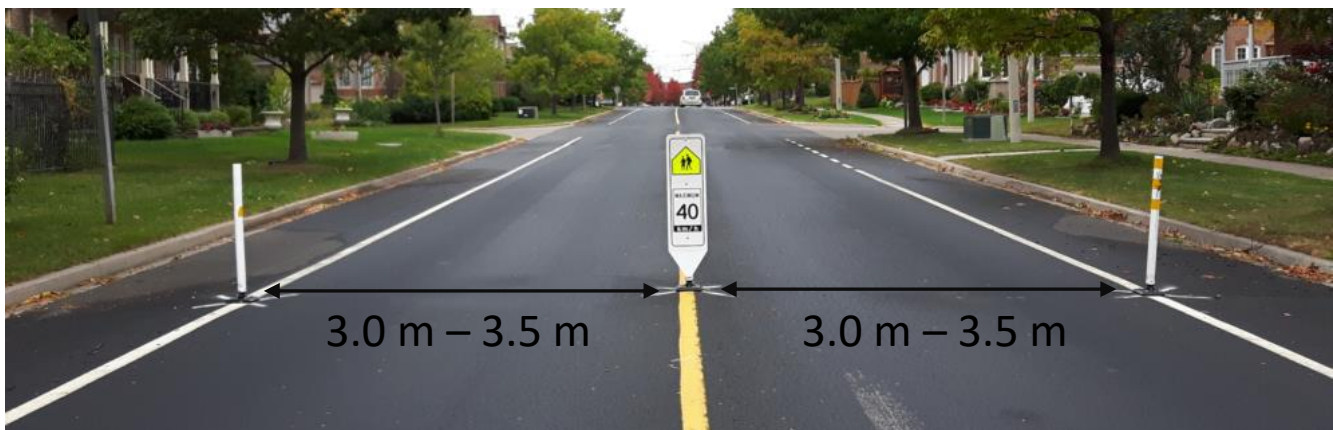
Attachment "A" – Centreline Flexible Signs Typical Layouts

Attachment "B" – Effectiveness Study Results

CENTRELINE FLEXIBLE SIGNS TYPICAL LAYOUTS



Two-way streets with a width between 6.0m and 8.5m



Two-way streets with a width greater than 8.5m

**For streets with frequent on-street parking, delineators on each side may not be required*

NOTE: Imagery on signs subject to change

ATTACHMENT “A”

Centreline Flexible Sign Pilot Program - Effectiveness Study Results

Flex Sign Location within School Zone	Edgline Flex Posts Provided?	OPERATING SPEED (km/h)		
		BEFORE	AFTER	DIFF.
WARD 1: HENDERSON AVE (HENDERSON AVE. P.S.)				
North End	N	51	50	-1
South End		51	50	-1
Overall		51	50	-1
WARD 2: HOLLINGHAM RD (ST. JUSTIN MARTYR C.S.)				
East End	N	48	48	0
West End		50	48	-2
Overall		49	48	-1
WARD 3: SOUTH UNIONVILLE AVE (UNIONVILLE MEADOWS P.S.)				
East End	Y	55	48	-7
West End		51	49	-2
Overall		53	49	-5
WARD 4: CHURCH ST (MARKHAM DISTRICT H.S.)				
East End	N	57	55	-2
West End		54	50	-4
Overall		56	53	-3
WARD 5: CORNELL CENTRE BLVD (ST. JOSEPH C.S.)				
North End	Y	55	50	-5
South End		50	47	-3
Overall		53	49	-4
WARD 6: CASTLEMORE AVE (CASTLEMORE PS & ALL SAINTS C.S.)				
East End	Y	53	47	-6
West End		53	44	-9
Overall		53	46	-8
WARD 7: ROXBURY ST (SIR RICHARD W. SCOTT C.S.)				
East End	Y	51	46	-5
West End		55	47	-8
Overall		53	47	-7
WARD 8: RANDALL AVE (RANDALL P.S.)				
East End	N	44	41	-3
West End		47	45	-2
Overall		46	43	-3

ATTACHMENT "B"