



LED Blank-Out Signs

BY-LAW TURN PROHIBITION ENHANCEMENT

City of Toronto

Presentation to ITS Canada

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A Solution for By-law Turn Prohibition Enhancement

The City of Toronto is utilizing LED illuminated electronic signs (LED Blank-Out signs) to help road users recognize time-of-day turn prohibitions to improve compliance and traffic flow.

Outline to be Covered

- Background
- Innovation Process
- Pilot Project
- Benefits
- Deployment
- Next Steps
- Conclusion

Background

○ Issues

- Non-compliance with turn prohibitions
 - Contributing Factors
 - Time of day – The times of prohibited turning movements are not consistent throughout the City and can lead to driver confusion.
 - Size of the static regulatory sign font – The small font makes it difficult to read at a distance. This can lead to drivers making "last minute" decisions and in turn, contribute to dangerous or aggressive driving behaviour.
 - Dedicated left turn lanes with time-of-day turn prohibitions – Vehicles often move in to the left turn lane before realizing that the left turn movement is prohibited.
- Old mechanical VeePed signs



Yonge and Bloor NB

Innovation Process

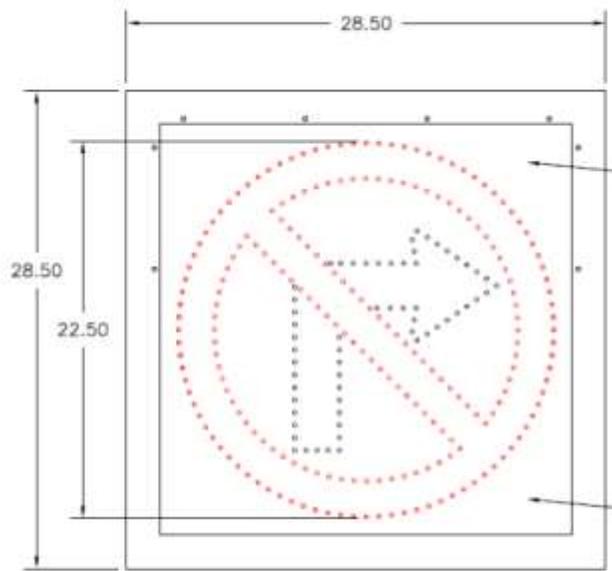
- City's Need
 - Was looking to replace the older signs with digital electronic signs to display turn prohibitions at intersections and make turn prohibitions clearer and more readable.
- Industry Scan
 - Was initiated in-house in 2013 and found LED illuminated (LED Blank-Out) signs from a local manufacturer.
- LED Blank-Out Sign (LBO)
 - These signs are well-illuminated, are able to indicate turn prohibitions at intersections and make turn prohibitions clearer and more readable.



Lake Shore and Park Lawn/Marine Parade EB No RT

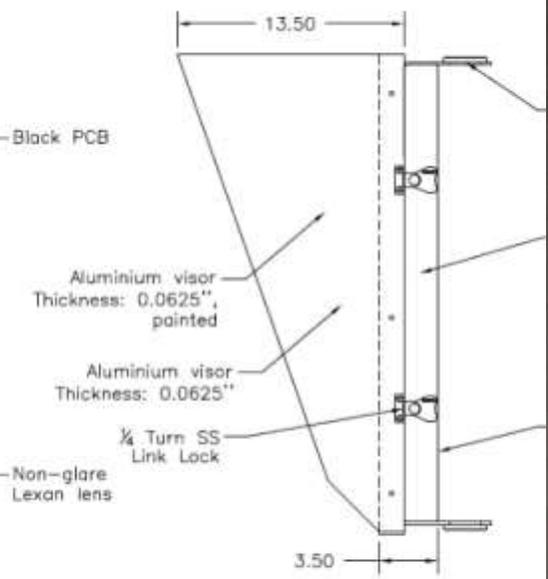
Innovation Process

REVISION	DESCRIPTION
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FRONT VIEW

- MESSAGE "RB-11"
- OUTLINE MESSAGE
- 210 RED LED'S
- 60 WHITE LED'S



Weight of sign including power supplies: 34lbs

ALL DIMENSIONS



Pilot Project

- Two major intersections along King St (a major streetcar route) were chosen for the pilot in 2014.
 - Installed No LT LBO signs for both Eastbound and Westbound directions.
 - Utilized GPS programming time clocks (time-of-day) to activate and deactivate the signs.
 - Conducted before and after study to
 - evaluate the number of non-compliance, and
 - determine if LBO signs installed had an impact on driver behaviour.
 - Results were convincing, and the road users, residents and the City achieved the intended results.
 - The LBO signs had been removed due to King St Pilot.

LED Prohibited Turn Signs
Restricted Left Turns - Before / After Summary
February 2015

King St at Universtiy Ave (Eastbound & Westbound)

Date	Total Restricted Left Turns	Diff	% Diff
	(7 a.m. - 10 a.m & 3 p.m. - 7 p.m.)		
Before (30-Jul-2014)	55		
After (16-Oct-2014)	38	-17	-31%
After (20-Jan-2015)	34	-21	-38%
After (21-Jan-2015)	33	-22	-40%
After (22-Jan-2015)	29	-26	-47%
Average	34	-22	-39%

King St at Spadina Ave (Eastbound & Westbound)

Date	Total Restricted Left Turns	Diff	% Diff
	(7 a.m. - 10 a.m & 3 p.m. - 7 p.m.)		
Before (30-Jul-2014)	91		
After (22-Oct-2014)	41	-50	-55%
After (20-Jan-2015)	46	-45	-49%
After (21-Jan-2015)	44	-47	-52%
After (22-Jan-2015)	38	-53	-58%
Average	42	-49	-54%

Benefits

○ Compliance

- The LBO signs were found to have increased compliance of time-of-day turn prohibitions.
- Installation of the LBO signs resulted in an average reduction in prohibited left turns during common restricted times ranging from 39% to 54%.

○ Safety

- These signs are well-illuminated, clearer and more readable at a distance. This reduced drivers making "last minute" decisions and in turn, contributed to safe driving behaviour.

○ Mobility

- These signs provided assistance with minimizing delays on transit corridors as TTC vehicles are exempted from the times of prohibited turning movements.

Deployment

- Planning
 - Location selections
- Design (in-house)
 - LBO operation
 - Methods to activate / deactivate signs
 - Controller timer through load switch
 - GPS Programmable Time Clock Unit
 - Direct power source
 - Design drawings
 - Tender documents
- Procurement (Not to be covered)



LBO Installation

Deployment

○ Construction

- Programming sheets and I/O logic script
- Installations
 - Cabling
 - LBO signs along with the existing regulatory prohibition static signs
 - Standalone GPS Programmable Time Clock Unit
- Script programming to field controller timer
- GPS time clock programming
- Activation / Test
 - LBO Signs
 - GPS Programmable Time Clock Unit

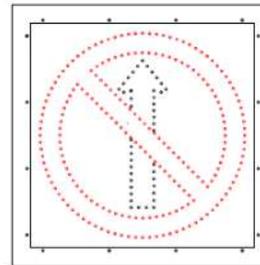


GPS Time Clock Unit Installation

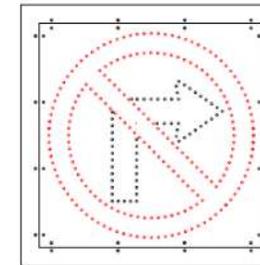
Next Steps

- 2018 Deployment
 - Hydro Pole Attachment Permitting Process
- King Street Improvement Deployment
 - All-in-one LBO sign –
Able to display multiple messages
- 2019 Deployment

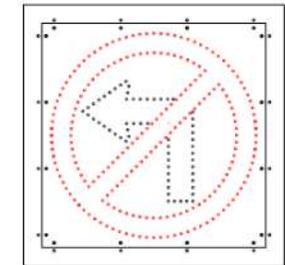
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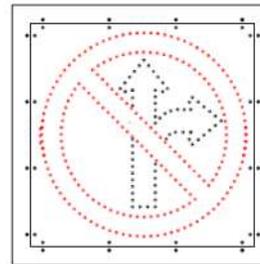
MESSAGE "Rb-10"
 * OUTLINE MESSAGE
 * 210 RED LED'S
 * 43 WHITE LED'S



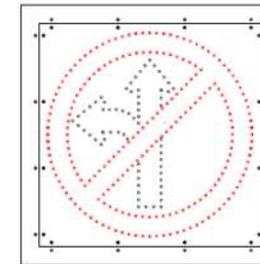
RB-11
 * OUTLINE MESSAGE
 * 210 RED LED'S
 * 60 WHITE LED'S



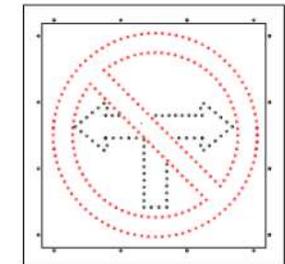
RB-12
 * OUTLINE MESSAGE
 * 210 RED LED'S
 * 60 WHITE LED'S



RB-13
 * OUTLINE MESSAGE
 * 210 RED LED'S
 * 66 WHITE LED'S



RB-14
 * OUTLINE MESSAGE
 * 210 RED LED'S
 * 66 WHITE LED'S



RB-15
 * OUTLINE MESSAGE
 * 210 RED LED'S
 * 80 WHITE LED'S

ALL DIMENSIONS IN INCHES

Conclusion

To summarize, what I shared with you today includes a technology-initiated innovation process, our current practice, benefits achieved and ongoing efforts of deployment.

A Final Note to Quote:

“Sometimes we stare so long at a door that is closing that we see too late the one that is open.” – Alexander Graham Bell

Questions?

