



## **Project Report: Speed Monitoring in Highway Construction Zones (46-18PHT)**

Department of Transportation and Works

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## ABSTRACT

This report provides an overview of a pilot project conducted by the Government of Newfoundland and Labrador to monitor vehicle speeds in highway construction zones. The project was undertaken as a result of frequent reports of motorists ignoring reduced speed limit and other highway traffic signs posted in areas where construction or maintenance work is being carried out. This type of behaviour can pose a serious risk to the safety of road construction and maintenance workers, as well as other members of the travelling public.

The pilot project was conducted during fall 2018 via three contracts with private companies to utilize camera-equipped monitoring technology at the sites of various highway construction activities. The equipment was set up to detect vehicles that were speeding, recognize vehicle license plate numbers and record relevant information. Contractors were asked to collect and analyze vehicle speed data for provision to government at project conclusion and to provide information on the parameters and capabilities of their respective speed monitoring systems.

The locations and construction activities selected for speed monitoring included: guide-rail installations on several sections of the Trans-Canada Highway; preparatory site work (i.e., grading and blasting) for future passing lane installation on Route 75, Veterans Memorial Highway; and road rehabilitation and paving on Route 420 in western Newfoundland.

This report examines the results of the speed monitoring initiative and offers comment on the prevalence of speeding in the province's construction zones. The capability and effectiveness of the different monitoring technologies employed during the pilot is also discussed, as well as the potential for more systematic use of this type of technology in future to assist in enforcing speed limits in construction zones.

## 1. INTRODUCTION

The Department of Transportation and Works (TW, or “the department”) is responsible for over 9,763 km of provincial roads and, as part of a strategic road improvement program, conducts numerous construction and maintenance projects each year. Traffic control plans (TCPs) are developed for all projects and outline measures for slowing and/or diverting traffic while work is ongoing. Despite this, TW receives repeated reports from road contractors, department staff, and the public of motorists driving at dangerous speeds through construction/maintenance zones.

In 2018 the department undertook a pilot project to monitor speed compliance on a number of road construction projects. The purpose of the pilot was two-fold: to collect data to help inform an assessment of the extent and severity of the speeding issue; and, to test the capabilities and effectiveness of several speed monitoring technologies, as well as their potential for use in highway speed enforcement.

## 2. OVERVIEW OF EQUIPMENT/TECHNOLOGY

In response to a public request for proposals, the department selected three companies - Shanahan’s Investigation and Security, Redflex Traffic Systems and Sensys Gatso Group - to provide speed monitoring services at three construction sites between September and December 2018. Each company was tasked with temporarily installing mobile, camera-based technology to monitor vehicle speeds in the selected construction zones and present the resulting data to the department. It should be noted that, before any monitoring commenced, the department conducted a Privacy Impact Assessment (PIA) for each of the companies engaged. These were completed to ensure that the information collected was done under appropriate legislative authority and that the information was protected from inappropriate access through electronic and physical security measures. The PIAs also ensured that the information was used only for the intended purpose and that the public was made aware of its collection.

### Shanahan’s Investigation and Security

Shannahan’s Investigation and Security (Shanahan’s), through a partnership with Enforcement Logix, provided the Enforcer Camera System to monitor construction zone speed. This system uses optical sensing technology to capture and record traffic violations with real-time photos.

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Using a 16-channel light sensor and LEDDAR<sup>1</sup> technology, the camera can identify exact vehicle speeds and precise vehicle locations even with multiple vehicles in multiple lanes. The infrared technology is fully operational in all weather conditions including fog, rain, snow, or intense heat or cold. Data captured with the system is accessible from anywhere with an internet connection via a cloud platform.

The system used on this project was a mobile version with the camera unit mounted on a tripod. The system operates autonomously, without human interaction. In this case, however, members of Shanahan's project team remained with the unit while in use for security purposes.



Mobile Enforcer Camera System on the TCH

### Redflex Traffic Systems

Redflex Traffic Systems (Redflex) provided its dual radar-based, mobile speed van to complete the requested speed monitoring. The van is equipped with a system that utilizes two 11 mega-pixel, industrial-grade digital cameras, central processing units, software, wireless communication, dual radar detection and flashes to capture images and data on speeding vehicles. The system is suitable for all weather conditions including temperature extremes, rain, snow, freezing rain, hail, fog, darkness, shadows and bright sunlight.

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<sup>1</sup> LEDDAR (Light-Emitting Diode Detection And Ranging) is a proprietary technology owned by LeddarTech. It uses the time of flight of light signals and signal processing algorithms to detect, locate, and measure objects in its field of view.



Redflex Mobile Speed Van

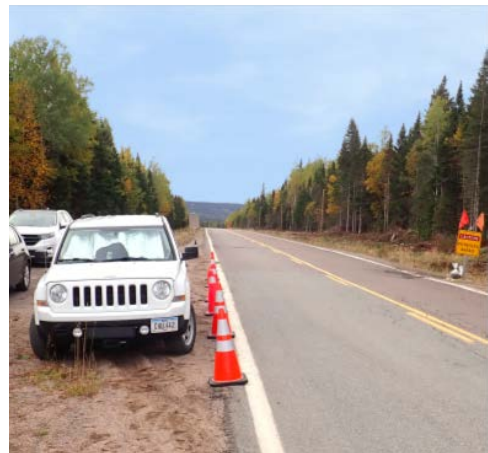


Redflex Dual Radar System

Once the system is setup, it is fully operational without the need of human intervention and can monitor either direction of travel on up to four lanes. Each image captured by the system is timestamped and information pertaining to the speeding event is imprinted onto the top of the related image. Information includes location code and description, direction of travel, incident/detection number, roadway speed limit, measured vehicle speed, system serial number, and date and time.

### Sensys Gatso Group

The Sensys Gatso Group chose to utilize its T-Series In-Vehicle platform for the pilot project. The system includes a high resolution digital camera and radar capable of monitoring up to six lanes of traffic and up to 32 vehicles in bi-directional travel. Platform components are installed in a vehicle (typically a pickup or SUV) in such a way as to be operated from the driver's environment. This allows the driver to activate, calibrate and control the system from the driver's seat or internal workspace, however once set up the system can operate autonomously. Like the other systems, the T-Series technology is suitable for use in all weather and lighting conditions and records comparable data points, along with photos of offending vehicles.



T-Series In-Vehicle Platform

### 3. ROADWAYS MONITORED

Construction zones with differing conditions were chosen for speed monitoring in order to include various construction activities, traffic control set-ups and traffic volumes.

#### Trans-Canada Highway, Avalon Peninsula (Shanahan's Investigation and Security)

Shanahan's was assigned to monitor vehicle speeds on multiple sections of the Trans-Canada Highway (TCH) on the Avalon Peninsula where guiderails were being installed. Monitoring was conducted on September 28 in the west bound lane near the Soldiers Pond culvert and from October 1 – 4 at several locations in the east bound lane including near Soldiers Pond Switch Yard, Foxtrap Access Road, the Conception Bay South overpass, and the Donovans Industrial Park ramp.

#### Veterans Memorial Highway (Redflex Traffic Systems)

Redflex was assigned to monitor construction zone traffic on Route 75, Veterans Memorial Highway, between Route 70 and 71. During a portion of the monitoring, Route 75 was closed and a detour put in place to divert all traffic onto Route 70. During this time traffic monitoring was conducted on Route 70.

The vendor selected a deployment location on each road that provided a safe area to work from and where vehicles were free flowing. From November 27 to November 29, traffic monitoring was completed on Route 70. The mobile speed van was then relocated to Route 75 from November 29 to December 2.

#### Western Newfoundland, Route 420 (Sensys Gatso Group)

The Sensys Gatso Group was deployed its speed monitoring equipment within a construction zone along Route 420, located in the western region of the province. Route 420 begins at an intersection with the TCH near Sandy Lake, and ends at the town of Jackson's Arm. The team was instructed to monitor speeds within the construction zone beginning 11 km north from the intersection of the TCH and Route 420. All monitoring occurred from October 7 to October 12, 2018.

## 4. FINDINGS

Over the course of the pilot project, the vendors successfully deployed their respective technologies to complete speed monitoring at their assigned locations. All three performed monitoring tasks in different types of weather and daylight conditions with no obvious concerns noted with regards to the operation or effectiveness of equipment.

As required, construction zone signage was in place at all three sites, including signs advising of a reduced speed limit of 50 km/h. Speed camera equipment was set to monitor all traffic that passed through the zone and record information only for those travelling at speeds greater than 60 km/h or more. The following table provides a summary of the data collected.

	<b>Route 420</b>	<b>Route 75 &amp; 70</b>	<b>Route 1, TCH</b>
<b>Roadway Posted Speed Limit (km/h)</b>	80	100 & 50	100
<b>Construction Zone Speed Limit (km/h)</b>	50	50	50
<b>Duration of Monitoring (hours)</b>	128	113	23
<b>Total Vehicles Passed Through Site</b>	1,915	16,378	9,663
<b>Number of Vehicles in Violation*</b>	912	9,001	1,999
<b>Violation Rate</b>	~ 48%	~ 55%	~ 20%

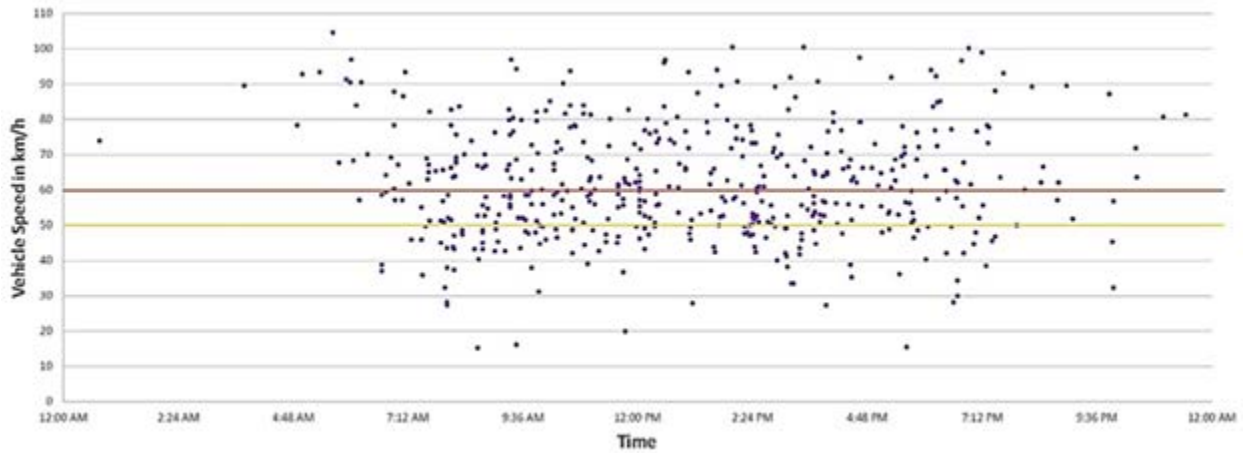
*\* Vehicles recorded as being in violation were those travelling at a minimum of 10 km/h above the construction zone speed limit.*

Based on these findings, it appears that speeding in construction zones is a significant issue, regardless of project location or type. Further, the data clearly shows that speeding occurs at all times of day and night, including while crews are actively working on site.

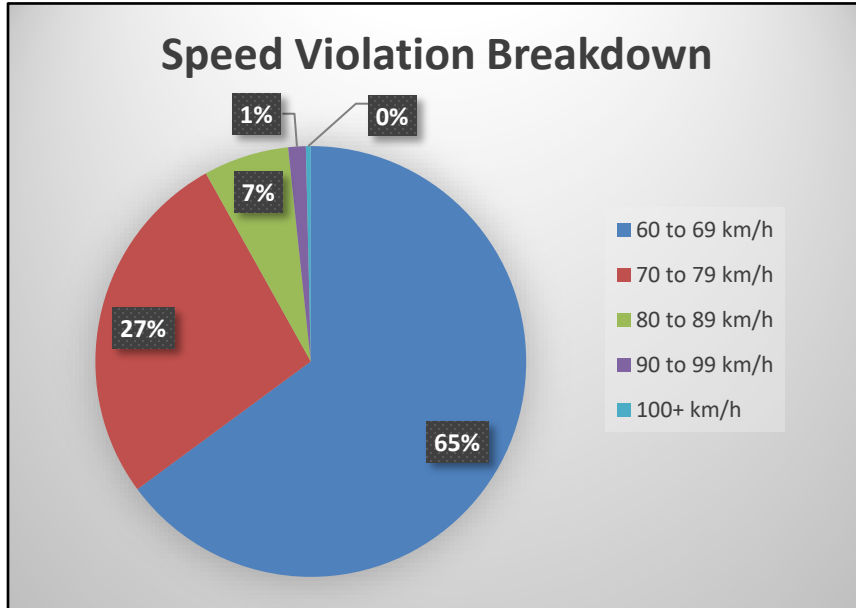
The scatter diagram below provides a breakdown of the data obtained during just one 24-hour monitoring period at one of the sites. The lower, yellow line represents the posted speed limit (i.e., 50 km/h) while the upper, red line represents the threshold speed of 10 km/h above the posted speed. All data points above the red line represent vehicles using excessive speed.



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Data gathered at another site shows the range of violation speeds recorded. At this particular site, the construction zone set-up reduced a regular, two-lane highway to one lane only. Even with higher traffic density, 21 per cent of vehicles still violated the construction zone speed limit. Of these, some were recorded as travelling at speeds as high as 100 km/h or more.



## 5. CHALLENGES

The different types of equipment used provide various options with respect to data collection, reporting and system maintenance or changes. In all three cases a remote option was available whereby the system could be accessed through a secure, remote login. Although not used during this trial it was noted that there were locations from which remote communication would be problematic due to intermittent internet connections. These issues were the result of local geography and cell service areas and not a limitation of the equipment. Additionally, it was noted that there were a limited number of suitable monitoring locations along some of the roadways monitored during the pilot project. In order to be most effective and provide the greatest area of coverage, speed monitoring equipment generally requires a safe location along a straight, flat section of road with an unobstructed view of the roadway. Many provincial roads include curved stretches, elevation changes and/or limited shoulder widths which can pose challenges in the selection of monitoring sites.

## 6. CONCLUSIONS AND NEXT STEPS

The pilot project proved to be a valuable exercise, confirming that speeding in highway construction zones is a significant issue in Newfoundland and Labrador. Data collected during the project revealed that, for the construction sites studied, 21 to 55 per cent of all vehicles travelling in the selected construction zones exceeded the posted speed limit by at least 10 km/h. The results further showed that some of the offending motorists were driving at speeds 40 km/h or more over the posted limit and that speeding occurs while workers are present on site. Given the many reports received over the years from contractors and staff about such behaviour, these results are not necessarily surprising, but they are disappointing and signal that more work is needed to help correct these patterns.

The project also provided helpful insight into several types of speed-monitoring equipment/technologies. Specifically the findings verified that the technologies all function well in local geographic and climatic environments and provide similar functionality, accuracy and efficacy. Based on the results, either of the systems could be considered for future use in the province.

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In some jurisdictions, technologies of this kind have been deployed to deter speeding by linking speed monitoring with automatic ticketing of offending motorists. Implementing a solution of this nature in Newfoundland and Labrador would involve a coordinated effort by the Department of Transportation and Works, ServiceNL and the Department of Justice and Public Safety which, collectively, are responsible for highway maintenance, safety and enforcement. In particular, a number of legislative, policy and program amendments would be required in order to enable this form of enforcement.