

# Technology instead of buildings

*Study shows intersection traffic pre-emption systems can get firefighters to the scene as quickly, more safely and less expensively than adding fire halls*

By KARIN MARK  
with Fire Chief LEN GARIS

One of Canada's fastest-growing cities, Surrey, B.C., employs traffic pre-emption systems at 34 per cent of its 250 intersections and now requires them to be installed at all new intersections as part of the city's development cost charges (DCC). A one-time capital investment of \$417,500 in November 2003 raised the number of pre-emption devices on existing intersections from 86 to 178. According to a recent study, the installation's anticipated result is a 14-second reduction in response times and improved public and firefighter safety. In terms of response time saved, that would be the equivalent to building five new fire halls with an annual ongoing cost of \$7.62 million.

"It's just a better way to distribute resources," explained Surrey Fire Chief Len Garis, who initiated the study in spring of 2003. "The only other way (to get the same results) would be to have more resources, i.e. more locations to respond from."

Signal pre-emption systems use a combination of optical sensors on traffic poles and signal emitters on emergency vehicles. As a fire truck approaches an intersection, it activates a switch that broadcasts a signal from the emitter to the sensor. The sensor, in turn, alerts the traffic signal control computer, which initiates a signal pre-emption timing plan – turning the lights amber then red for opposing traffic, and green for the emergency vehicle and other cars heading the same direction.

The system not only prevents emergency vehicles from having to stop or slow down dramatically at each intersection, it allows the other vehicles in their path to properly pull over rather than stopping in place and creating more congestion. After the emergency vehicles clear the intersection, signal operation returns to normal.

"It doesn't take much imagination to figure out going through a green light versus a red light is faster," Garis said. "Surrey just wanted to be able to quantify it."

The National Fire Protection Association's new response standard, NFPA 1710, recommends a minimum four-person response, turnout (departure) times of one minute, first-response travel time of four minutes and full-alarms travel time of eight minutes. NFPA standards are referred to by the insurance grading system that affects Canadians, the Insurers' Advisory Organization's Classification Standard for Public Fire Protection.

Surrey had an average turnout time of 90 seconds and travel time of four minutes with its previous complement of 86 pre-emption devices plus emitters on all first-line response vehicles and most second-line units. Garis saw the potential in expanding the use of pre-emption technology as a way of moving towards NFPA compliance and improving public and firefighter safety,

while controlling the department's operating costs. With about 300 firefighters and 17 stations, Surrey Fire Service had a \$32.4 million operating budget in 2003.

"I wanted to apply it city-wide so we could realize the long-term benefit. The City of Surrey is growing and it's likely traffic congestion will become more and more of a problem in the future as we grow. I wanted to ease that somewhat in response to incidents and to improve response times," he said. "I suspect if we don't do something, it will get worse over time."

The multi-disciplinary project team included Garis, Assistant Fire Chief Ron Price, Fire Captain Gordon Anderson, Surrey Manager of Traffic Operations Gary Vlieg, Deccan International vice-president Raj Nagaraj, consulting engineer Frederick Culbert and consulting planning analyst Louanne Wong.

The study compared the cost and effectiveness of building five new fire halls to adding 92 new pre-emption units to intersections with high crash rates and traffic congestion problems. Of those, 79 were proposed for two-directional control and 13 were four-way control. As well, 57 per cent were for urban areas, the remainder for suburban areas. The sites were chosen based on extensive consultation with fire service staff from throughout Surrey.

Historical data and field tests helped determine parameters for the Excel-based simulation model developed by Deccan International. For example, Surrey's 17 fire halls are located within a geographic area of 113 square miles. The fire department responds to an average of 16,000 calls per year. There is an average of 0.45 miles between traffic signals and it takes an average of

12 seconds for emergency vehicles to cross an intersection when the signal is red.

Assumptions used for the model included 2.3 intersections being crossed in a typical response, a 50 per cent probability of encountering a red light, and an even distribution of locations and workload.

The study results – considered correct within a 90 per cent confidence level, plus or minus three seconds – indicated that the addition of 92 more pre-emption units improved the department's response capability by three per cent. With the existing numbers, 68 per cent of calls are reached within six minutes of notification, or an average of five minutes, 33 seconds. When the extra units are added, 71 per cent of calls were reached within that same time frame.

The average time saved per call works out to 14 seconds. With that comes improved safety to firefighters and the public, as reduced confusion at intersections limits the risk of accidents, in addition to operational savings, as less stop-and-go braking reduces the wear on brakes and improves fuel efficiency.

"Fourteen seconds is significant when responding to an incident," said Surrey Fire Fighters Union President Lorne

*'The average time saved per call works out to 14 seconds. With that comes improved safety to firefighters and the public, as reduced confusion at intersections limits the risk of accidents, in addition to operational savings, as less stop-and-go braking reduces the wear on brakes and improves fuel efficiency'*

West. "But more importantly, both the public and our members will be safer. Intersections are a dangerous place when a fire truck is coming through, but they can be made a whole lot safer if we can get a green light."

When five extra fire halls were added to the model scenario, the level of performance was approximately the same – the new stations, with the existing level of pre-emption, improved response time by 16 seconds. Adding the five new fire halls to the 92 new pre-emption units shaved a further 12 seconds off response time. The price tag for these options is considerably higher, however, as the annual cost of operating 22 stations is \$7.62 million higher than running 17, due to increases in staff, infrastructure, apparatus and equipment.

The model is scalable and easily adapted with new input to create different simulations and possibly could be used for other

jurisdictions. Garis said a review six months after implementation will test the validity of the assumptions and help calibrate the model.

"Simply, it's a forecast at this point in time," he said. "We have a lot of conservatism built into our modelling process – we are anxious to see the results." 🐾

---

*Karin Mark is an award-winning B.C. journalist who has covered communities, governments and business in the greater Vancouver area for more than 12 years. Len Garis is the Fire Chief for the City of Surrey. Previous positions include Director of Protective Services and Fire Chief in Pitt Meadows, B.C., and Program Co-ordinator for the Justice Institute of British Columbia's Fire Academy.*

---

## Legislation adopted to stop insurance hikes for emergency workers

Insurance companies can no longer increase personal premiums for emergency workers who have accidents on the job, according to a report from the Toronto Star newspaper, after the Ontario legislature passed a bill in June prohibiting the hikes. Bill 40, a private members' bill sponsored by Liberal legislative member John Wilkinson, was adopted on June 23. During second reading debate on the bill in April, Wilkinson – who represents the riding of Perth-Middlesex – said emergency workers "want nothing to slow them down."

"When any of us, God forbid, call 9-1-1, we all want but one thing: that our bravest of public servants come just as quickly

and safely as possible and that can be our legacy today," he said during the debate.

Wilkinson argued that firefighters, police, ambulance drivers and paramedics have faced higher personal car insurance rates after getting into accidents while speeding to emergencies. "Incredibly, when these professionals had renewed their private automobile insurance, they had seen their personal premiums increase as a result of accidents they had while on duty," said Wilkinson.

He said emergency workers should not be penalized for doing their jobs. 🐾

**Opticom™**  
Priority Control System

*An array of products  
Fingerprinted to your community*

1-800-265-1840 ext. 6269

**holmatro**  
rescue equipment  
**CLEARANCE**

- Pumps
- Spreaders
- Cutters
- Rams

**ALL NEW WITH FULL WARRANTY**

**1-800-268-0871**