

What you need to know about...

Traffic signal systems

Traffic signal technologies

TRAFFIC SIGNALS ARE part of advanced traffic management systems, which fall under the ever-growing bundle of services in the Intelligent Transportation System. Computerized field control systems, located at every signalized intersection, run the red-yellow-green light signals. The systems, which differ in sophistication, include:

- Basic controllers that change the light colour on a regular fixed time basis.
- Vehicle actuated controllers where the duration of green varies according to traffic flow. For example, the City of Regina's traffic signal system is being upgraded so green-yellow-red will operate by traffic numbers rather than anticipated traffic volume.
- Controllers with variations by time of day and day of week.
- Adaptive controllers, which adjust timing or re-time every 30 seconds, for example. These are used mainly for highly congested areas in large urban cores.

Centralized control and monitoring allows traffic signal coordination in response to changing traffic patterns. Timing between traffic signals can be adjusted to allow drivers moving at the correct speed to glide through a series of green lights. Traffic signals can be programmed to turn off left-turn arrows to ensure continuous flow. Traffic signal pre-emption allows emergency response vehicles clear sailing – all green lights in the direction they must travel and red lights halting all other traffic.

The trend in traffic control is to distribute control systems at the local signal controller. The central system monitors and polls, conducting a rotation check on each signal intersection and talking to the local controller to ensure everything is running smoothly. Faults or breaks are automatically relayed to the central system in the form of a 'fix-me-I'm-broken' message.

What it can cost

Changing traffic signal technology ranges from \$30,000 to \$100,000 per intersection depending on the quality of field equipment already in place, says Tim Schnarr, vice-president of transportation systems for Toronto-based Delcan Corp (www.delcan.com), one of Canada's largest traffic management consulting companies. Installation involves telecommunication lines to each intersection and purchasing radio equipment with a central transmitter and receiver at each intersection.

The larger suppliers of traffic field controllers, cabinets and vehicle detection devices include:

- Novax Industries Corp., of Vancouver (www.novax.com)
- Econolite Control Products Inc., a US-based company (www.econolite.com)
- Peek Traffic Corp., a US-based company (www.peek-traffic.com)
- Siemens (www.siemens.com).

Getting the goods

Commercial off-the-shelf traffic management software systems can be tailored and scaled to individual municipal clients. Re-engineering a high-volume intersection requires diagnosing the problem, applying feasible traffic treatments, then managing and maintaining the system. Larger consultants in this field include IBI Group (www.ibigroup.com), Delcan Corp. and Lea Consulting Ltd. (www.lea.ca). Delcan served as consultant to the Region of York on its centralized traffic control system with 550 traffic signals. IBI Group, also headquartered in Toronto, advises the City of Toronto, which has the largest, most sophisticated system in Canada with 1,940 traffic signals. Ron Stewart, IBI Group's head of traffic engineering, says that the last decade has seen the creation of more open standards so different traffic management systems can 'talk' to one another. "It creates a more competitive environment from a procurement point of view," Stewart adds.

While traffic signals can be effective tools to reduce collisions at signalized intersections, inappropriate signal timing and placement or poor visibility due to a variety of factors conspire to reduce their effectiveness. "Municipalities are becoming more aware of the state-of-the-practice regarding the effective application of traffic signals and how to maximize the response of road users through human factors," says Jeffrey Suggett, a transportation safety consultant with Synectics Inc. of St. Catharines, Ontario. Synectics (www.synectics-inc.net) recently wrote part of a new US, Federal Highway Administration (FHWA) handbook designed as a guide for traffic engineers and transportation offices on safety guidelines in high-volume signalized intersections.

Training opportunities

Canadian universities and community colleges now offer courses in transportation technology – Mohawk College offers training in computer programs to optimize signal timing

The FHWA is setting up a Completion Certificate Program on signal timing. The International Municipal Signals Association offers certification in electronics and microprocessors in traffic signal controls, inspection and preventive maintenance. Other sources include the US-based National Cooperative Highway Research Program (NCHRP); the Canadian Institute of Transportation Engineers and the Transportation Association of Canada.

What's new

Light emitting diodes (LED) enhance safety and are now cost effective enough to serve as both a money- and energy-saving alternative for large-scale traffic light replacement. The electronic lights are long-lived, burn brighter, use 10 percent of the electrical power of incandescent traffic lights and are not prone to problems of glare during sunrise and sunset. Some energy-saving LED bulbs rely on solar power. *mm*

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