

# OPTICOM™ | CASE STUDY

## St. Cloud (MN) Plows Snow Faster with Opticom



On average, the city of St. Cloud, Minnesota gets four feet of snow every year. Since most people get around town by vehicle, the performance of the public works department and its snowplows is critical.

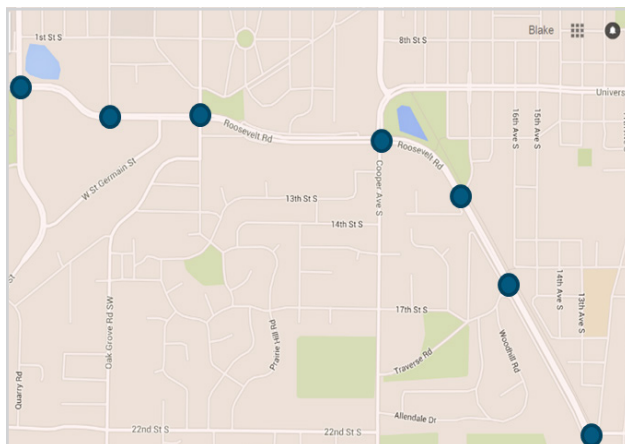
For years, Opticom has been utilized by cities for emergency vehicle preemption (EVP) and transit signal priority (TSP), but a recent pilot program in St. Cloud has demonstrated that its utility goes beyond just those uses.

### The Beginning

In October of 2014, a new technology was introduced to the City of St. Cloud's operations personnel at the Minnesota Fall Maintenance Expo. Known as relative priority, this technology provided an intermediate level of traffic signal preemption for service and maintenance vehicles to get green lights on a conditional basis while still yielding to emergency vehicles, such as fire trucks, police cars and ambulances. Many in the public works department believed it could aid in other maintenance operations, such as snow plowing and pavement marking.

But with insufficient statistics to explore the idea and legal hurdles in the way, St. Cloud Traffic Systems Manager Blake Redfield and his team couldn't move forward on a permanent basis. "There's been limited data on the implementation of this technology on snowplows," Redfield said, "so little was known about how well the technology would function or what efficiencies and safety benefits might be gained by its use." Thus, a pilot program was proposed.

The five-year program tested Opticom on four city snowplows equipped with Opticom across seven traffic signals on the two-mile segment of a two-lane road in each direction. At 40 miles per hour, the speed limit for this corridor made it an ideal, relatively safe stretch of roadway to test. The pilot's primary objectives were to determine: a) the time efficiencies gained through data analysis and b) if a model could be developed to predict efficiencies gained by utilizing this technology.



### Solution Overview

#### CHALLENGE

The St. Cloud (MN) Public Works Department was confident priority control could have utility for public works applications, such as snow plowing, collecting garbage, pavement marking and more, but they lacked enough data to substantiate that belief.

#### SOLUTION

To leverage the city's existing infrastructure, St. Cloud ran a five-year pilot program, including data collection and analysis by the statistics team at St. Cloud State University.

#### PERFORMANCE

Opticom™ relative priority enabled the city's snowplows to plow routes 22 percent (22%) faster, while cutting fuel consumption in the process.





In St. Cloud, police and fire get emergency vehicle preemption (EVP) and the buses have enjoyed transit signal priority (TSP) for the past few decades, so the city was able to leverage its existing infrastructure (approximately 100 traffic signals equipped to support EVP). It also agreed to upgrade some of the traffic controllers and add new equipment to the traffic cabinet to support expanded TSP.

## The Process

The original project timeline was slated to be three years, but St. Cloud requested and received an extension from the Minnesota Department of Transportation (MDOT) to collect more data. The truck preemption system feeds vehicle proximity to the traffic signals to preempt the traffic signals, allowing all four snowplows to get the green.

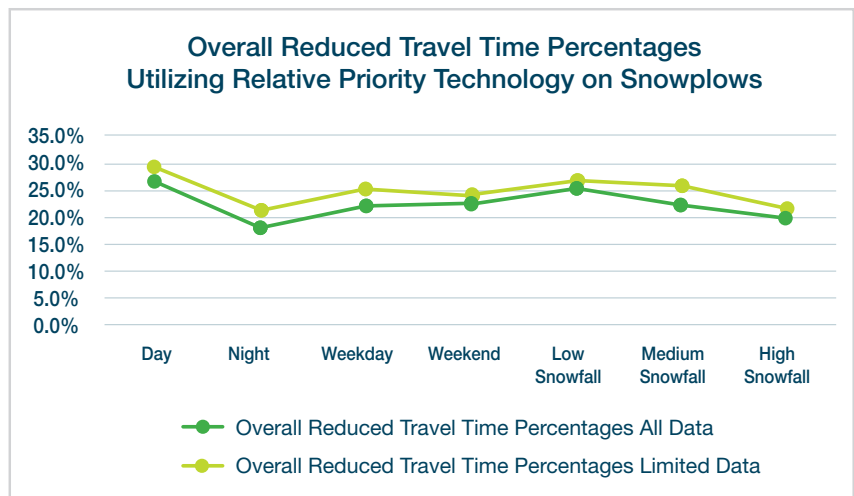
St. Cloud's public works department collected and shared data with three statistics graduate students and their advising professor from St. Cloud State University for an unbiased analysis. This group was asked to determine the time efficiencies gained and determine if a model could be developed to predict efficiencies gained utilizing relative priority. They analyzed four years' worth of snowplow data to determine the effects of Opticom Priority Control on snowplow efficiency.

## The Results

St. Cloud State's final report – **The Effects of Opticom™ on Snowplow Efficiency** – highlights the value of priority control to Department of Public Works' applications, such as snowplowing. The study found that routes with Opticom were plowed 4.25 minutes faster than those without Opticom, which reduced driving time by 22 percent and cut fuel consumption.

Opticom worked particularly well in low snowfall amounts. As they wrote in their conclusion, "[Relative preemption] has a great future for the roadway maintenance world and should become part of the traffic signal infrastructure for every agency that operates traffic signals."

Data aside, relative priority for snowplows also provides qualitative operational and safety benefits, including keeping snowplows



"The faster [our drivers] can plow the roads, the more open they are for the general public and emergency vehicles that need to be out there," Redfield said. "Every time we can reduce stops, we reduce pollution, we reduce fuel consumption [and] we improve safety."

in a platoon, preventing stalled snowplows from having to back up to continue their work and offering emergency vehicles cleaner, clearer roads for faster response. Redfield recently wrote about the results of the pilot program for the October 2020 edition of the International Municipal Signal Association (IMSA) newsletter.

## Northern Exposure

St. Cloud isn't the only North American city that has benefitted from having Opticom on its snowplows.

Since 2018, the Cincinnati suburb of Mason, Ohio has utilized four low-priority units on their plow trucks that cover its main routes. When they upgraded all their traffic signals and installed new Opticom on their emergency vehicles three years ago, city officials saw an opportunity to add relative priority to snowplows at a minimal cost.

These units are secondary to their emergency vehicles and give priority to police and fire vehicles if approaching an intersection at the same time. The confirmation lights do not activate for the low-priority units, so the driver really doesn't notice much of a difference, other than getting the green light more often.

"It's performed really well," Mason Public Works Director Ryan Tyree said. "The low-priority units don't get the confirmation light, so it works in the background. [The plows] get a lot of green lights, but there isn't an expectation of one, as with our ambulances."

With just one salt storage facility to cover the trucks that plow and salt 400 lane miles of public streets, Opticom can help Mason's trucks go continuously to and from that facility. "It makes our response time and efficiency much better when we have those devices on our trucks," Tyree said.

In the city of York (Ontario), plow operators used a combination of GPS/radio at a particularly tricky intersection and experienced reduced travel times, delays and numbers of stops. The city had EVP for fire/EMS and TSP for transit but decided to implement snowplow preemption to clear snow more effectively from a bus rapid transit corridor, known locally as a "rapidway."

They programmed the snowplow preemption to be "high priority", which allows the traffic signal to stay green until the snowplows have cleared the intersection. The city noticed improved traffic flow along the rapidway during and after snow removal, in addition to reduced fuel consumption and carbon emissions. To reduce traffic disruptions, preemption is automatically cancelled when the snowplows clear the intersection.

Highland (IN) Police Commander George Georgeff worked with the Highland Public Works Department to install emitters on snowplows. Most snow removal is performed early in the morning when traffic is minimal, so plows don't waste time waiting for the traffic signal to turn green. With Opticom multimode, snow removal requires fewer trucks and less time, while reducing carbon emissions. "As with any investment, it's important to compare costs versus benefits for the community," Commander Georgeff said. "That's why we're actively pursuing other ways to leverage this technology, including for snow removal."

## Conclusion

Ultimately, the pilot program proved the hypothesis of the St. Cloud Public Works Department, which was that priority control indeed can have utility for public works. And cities with existing infrastructure in their traffic cabinets can maximize their investment by granting relative priority in non-fire and law enforcement applications.

"I see relatively priority not only as an answer to future snowplow use, but also on some other vehicle types," Redfield said. "It's difficult for a big paint striper to stop at a traffic signal. If they could use [relative priority] on their equipment, it would make it much better and safer for them to be on the street."

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-Blake Redfield,  
Traffic Systems Manager  
St. Cloud (MN)

## MUNICIPALITIES

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