

Continuous Improvement Fund

Project #351- Implementing On-Truck RFID Tracking for Collection

CORP. OF THE CITY OF TIMMINS

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Introduction

The City of Timmins is centrally located in Northeastern Ontario, and is the regional centre for shopping, culture, commerce, health, industrial supplies and distribution channels. The City of Timmins has a population of 44,000, but draws consumers and business-to-business trade from throughout the Cochrane District, the James Bay Coastal area and nearby communities such as Chapleau and Kirkland Lake for a total regional market of approximately 118,000.

The City of Timmins currently provides waste and recycling collection to 10,250 households. On average 10,000 metric tonnes per year of waste are collected. Of that volume, 3,000 metric tonnes are diverted from the landfill to various recycling facilities.

Project Background

The City of Timmins provided curbside waste collection on a weekly basis and for blue box recycling on a bi-weekly basis.



Figure 1: Timmins Manual Waste Collection

The City of Timmins Waste and Recycling collection system consisted of four (4) side-load (1 operator each) trucks and one (1) rear-load (2 operators) truck for waste collection per day, with

2 additional trucks as spares. Recycling collection (single-stream) and processing was contracted out to a third party, which consisted of 3 trucks per day. Over time, a few challenges emerged for the waste management department: 1) varying ages of vehicles employed for waste collection which resulted in increased yearly cost for vehicle maintenance; 2) an expiring recycling contract with third party contractor.

Table 1: Status Quo Garbage and Recyclable Material Curbside Collection Program

Material Type	Tonnes/ Year	Tonnes/Day (252)	Tonnes/Day/ Truck	Trucks Per Day
Garbage	7,075	28.08	5.62	5.00
Recycling	2700	10.71	3.57	3.00

The City of Timmins Waste Management Department developed a waste management plan to increase waste diversion and initiate a long term waste management plan in 2009 (CIF Project #129). The waste management plan outlined what would be a paradigm shift in the way waste and recyclable services are delivered to residents and represents best practices within the industry in keeping with the province initiatives towards waste diversion and best practices. The City of Timmins decided to initiate one of the recommendations from the waste management plan: *Conversion from the current program to an automated dual stream collection program through current fleet replacement.*

Automated Waste Collection System Benefits

While a manual dual stream collection program presents a lower cost option than the automated program, the automated program offers a high productivity based program (compared to manual). The potential advantages to this automated program would be the benefit of reduced potential for worker injury and WSIB related incidences for the City, a system suitable to any city collection staff demographic and a system that may substantially reduce waste scavenging by bears.

Another benefit to the automated program is that the distribution of carts, renewed promotion and education of the program and the move to weekly (as opposed to bi-weekly) collection of recyclables will almost certainly increase participation rates in the recycling program. The R.W. Beck & KPMG *Blue Box Program Enhancement and Best Practices Assessment Project*, May 2007 report cites that municipalities that collect recyclables less frequently than garbage tend to exhibit lower recovery rates, as compared to municipalities where collection frequency of garbage and recyclables is equal.

To fully initiate an automated waste collection system the City of Timmins will require a new fleet of automated trucks and to purchase waste and recycling carts for an entire municipality.



Figure 2: New 35 cubic yard, dual stream automated side loading refuse packer

Cart Roll Out

A key component of the automated collection program is the purchase 22,000 residential carts and associated tracking routing software. Rehrig Pacific Company was awarded the contract to supply and deliver 22,000 residential carts to the City of Timmins. In addition to the contract, each cart was installed with Radio Frequency Identification (RFID) technology, and data management software (C.A.R.T.S.).

Container Asset Recovery Tracking System (C.A.R.T.S)

Container Asset Recovery Tracking System (C.A.R.T.S) is a web-based software which is customized towards specific needs and requirements of the City of Timmins. The C.A.R.T.S program has provided the City of Timmins with the following:

- **Delivery and Inventory Management:** track the progress of container shipments and manage inventory levels.
- **Container Distribution:** record container deliveries in real time by using hand held scanners that run C.A.R.T.S. software.
- **Monitor Container Distribution Progress:** generate daily distribution reports that include household address, container serial number, RFID number, type, size, date and time of delivery.
- **Route Auditing:** utilizing the C.A.R.T.S. system for a new distribution, retrofit, or route audit.

- Cart Maintenance: C.A.R.T.S. provides maintenance work orders systems that tracks container inventories (at multiple locations), repairs, and work flow at each household address and allows the City of Timmins to maintain an accurate account database to better control their assets and provide the foundation for tracking collection data.
- Collection Data Tracking Services: RFID technology and data collection equipment equipped to accurately track container collection data (date and time of pickup)/service verification and manage the data in C.A.R.T.S. with various reports.

Address	Service #	Route	City	State	ZIP	Serial	Truck	Tip Date
1 266 PARK AVE	9444	01	TIMMINS	ON	P4R 1E9	95R002346	RW14	6/13/2012 07:54:58 AM
1 266 PARK AVE	9444	01	TIMMINS	ON	P4R 1E9	65G004710	RW14	6/13/2012 07:54:48 AM
1 266 PARK AVE	9444	01	TIMMINS	ON	P4R 1E9	95R002346	RW14	6/6/2012 08:22:53 AM
1 266 PARK AVE	9444	01	TIMMINS	ON	P4R 1E9	65G004710	RW14	6/6/2012 08:22:38 AM
1 266 PARK AVE	9444	01	TIMMINS	ON	P4R 1E9	95R002346	RW14	5/30/2012 08:14:59 AM
1 266 PARK AVE	9444	01	TIMMINS	ON	P4R 1E9	65G004710	RW14	5/30/2012 08:14:39 AM
1 266 PARK AVE	9444	01	TIMMINS	ON	P4R 1E9	95R002346	RW14	5/23/2012 09:53:44 AM
1 266 PARK AVE	9444	01	TIMMINS	ON	P4R 1E9	65G004710	RW14	5/23/2012 09:53:29 AM
1 266 PARK AVE	9444	01	TIMMINS	ON	P4R 1E9	95R002346	RW14	5/9/2012 08:18:57 AM
1 266 PARK AVE	9444	01	TIMMINS	ON	P4R 1E9	65G004710	RW14	5/9/2012 08:18:47 AM
1 266 PARK AVE	9444	01	TIMMINS	ON	P4R 1E9	95R002346	RW14	5/2/2012 08:20:16 AM
1 266 PARK AVE	9444	01	TIMMINS	ON	P4R 1E9	65G004710	RW14	5/2/2012 08:20:06 AM

Figure 1: C.A.R.T.S. Program – Collection Data Tracking

Figure 2: C.A.R.T.S. Program – Manual Work Order Creation

Radio Frequency Identification (RFID) Technology

Radio-frequency identification (RFID) is the use of a wireless non-contact system that uses radio-frequency electromagnetic fields to transfer data from a tag attached to an object, for the purposes of automatic identification and tracking. RFID technology was able to provide the City of Timmins with the foundation for taking better control on waste and recycling collection carts. The RFID has provided accurate collection data that can aid to report individual household participation in waste and recycling programs and improve efficiencies.

C.A.R.T.S. and RFID Implementation

The C.A.R.T.S. software combined with the RFID system was up running in February of 2012 through the City of Timmins's extensive in house Wi-Fi system. After some initial debugging data capture was excellent.

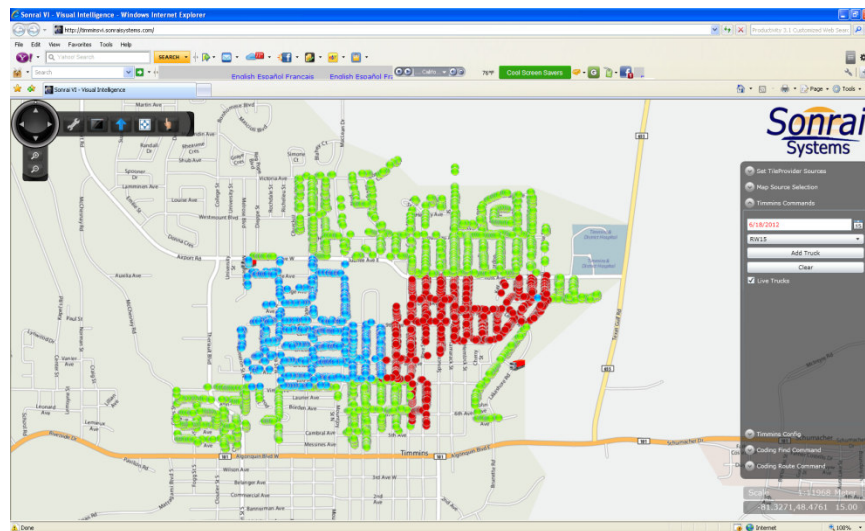


Figure 3: City of Timmins RFID Data – Household Participation

With the use of C.A.R.T.S. and the RFID technology helped reduce and address numerous customer complaints and issues. Each automated/manual dual stream refuse packers is equipped with “exemption buttons” which identifies the City of Timmins most common reasons why waste and/or recycling was not picked up (i.e. late put out, etc.). In the past when residents complained about missed collections it was very difficult to identify the reasons why collections were missed. This constantly resulted in having waste and recycling operators return to those residences to conduct collections. With the use of data collection equipment, the time and date is recorded once each cart is tipped and as the automated/manual dual stream refuse packers approach any City Wi-Fi “Hot Spots” data is downloaded onto the server and viewable through

the C.A.R.T.S. program. This data aids in identifying collection issues which can be immediately relayed back to the residents once they call in with their complaint. This also results in savings as collection operators do not have to double back to these residences.

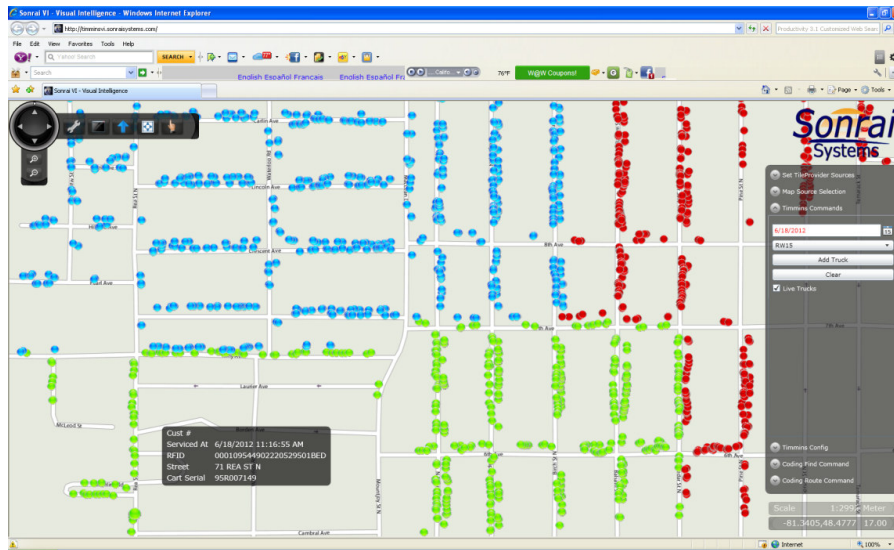


Figure 4: RFID data collection - cart pickup with route identification

During a detailed productivity review by our Routing consultant, it was identified approximately 1 hour per day of delays occurred. Routes were fully visible and Route consultant was able to micro route based on the collected data. Based on data from the RFID system helped the waste management department staff propose that waste and recycling collection be altered from a five (5) - 8 hour days to four (4) -10 hour days (*this initiative has yet been approved and implemented*). This would help eliminate the need to add additional resources and the hiring of contractors on “Double Days” following statutory holidays.

Project Financials

The total cost of the automated waste collection project was \$2,294,565 (see Project #173 report). The RFID technology and implementation total cost was \$59,275.

The Continuous Improvement Fund (CIF) funded a portion of the project where the City received \$30,528 in funding. The remaining balance of unfunded costs will be paid for by the City of Timmins.

Lessons Learned

Implementation of this project went relatively smooth, although we have encountered a few issues.

Initial issues were with the handheld scanners as technical issues arose while running the asset management software. The scanners would not last more than a few hours as they were equipped with defective batteries. The batteries were replaced but the handhelds still had technical difficulties downloading data to the server at end of day. It was determined that the City of Timmins Information Technology Department network security was denying access from the handhelds and data management software as they were flagged as intrusive viruses. Once corrected however, all worked seamlessly.

During the installation and setup of the RFID truck readers we faced some delays as Canada Customs and the contractor had border issues with RFID equipment. This delayed implementation by a couple months.