Final Report

CIF 425

City of Woodstock
Scale Automation

Final Project Report, May 2014

CITY OF WOODSTOCK

CIF Project number 425

Acknowledgement:

This Project has been delivered with the assistance of Waste Diversion Ontario's Continuous Improvement Fund, a fund financed by Ontario municipalities and stewards of blue box waste in Ontario. Notwithstanding this support, the views expressed are the views of the author(s), and Waste Diversion Ontario and Stewardship Ontario accept no responsibility for these views.

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EXECUTIVE SUMMARY

In 2011, the City of Woodstock purchased and installed an automated scale function to the existing weigh scale at the municipal waste transfer station. The City applied for and received funding from the Continuous Improvement Fund (CIF) as the implementation of this automated system demonstrated an opportunity for cost savings. The total cost for the implementation of the automated scale function was $23,664.82, with an expected payback period of one year on the CIF investment.

The City of Woodstock operates a waste transfer station that services Blue Box recyclable materials collected from the City and the Township of Southwest Oxford, the County of Oxford recycling depot, and the Town of Ingersoll. Automation of the weighing sequence frees up supervisor and clerical staff from routine data entry, by generating a daily spreadsheet file of the trucks and weights entering the transfer station. The cost savings of this project are realized through two means: one, a reduction in the site supervisor's time reviewing driver chit sheets and manually entered data, and two, the avoidance of hiring an additional administrative staff to complete manual data entry; which would have been required given the demands on existing staff.

The installation of the automated weighing sequence was completed in October 2012. Since the installation, operations staff have been working with the supplier and drivers to optimize the weighing sequence. Initially, projected cost savings were anticipated to produce a return on investment after one year. However, troubleshooting logistics of the new system has required that the site supervisor commit significant oversight to ensure materials have been categorized appropriately. City staff have revised the payback period from one year to two in order to account for this variation. City staff continue to work with the scale service provider and drivers to develop administrative controls to ensure the accurate identification and measurement of Blue Box materials entering the transfer station.

The transfer station received 3,174 tonnes of fibres & 1,315 tonnes of containers during the operation period since the scale went into operation in October of 2012 to December 31, 2013. Collection data is now easily captured, integrated into the monitoring program, and used to generate reports, which allows City staff to actively manage the collections program. The ability to anticipate, detect and respond to trends early, allows staff to prevent potentially costly problems further down the road. Similarly, the new system provides the opportunity to easily measure the impacts of P&E and other program related changes, by quickly generating reports for the time periods and metrics of interest.

The installation of the automated scale function has improved the operational efficiency, monitoring of the Blue Box materials entering the waste transfer site, and ability to actively manage changes & trends in the collections program. For further information please contact:

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1 BACKGROUND INFORMATION

1.1 Municipal Information

The City of Woodstock (City) provides waste management services to 16,448 households. Blue Box recycling is provided through biweekly two-stream curbside and a depot collection services. The City targets the following materials: fibres, containers including PET, film plastics polycoat, HDPE, Polystrene, aluminum, steel, and glass. Collection of recyclable materials is completed by City staff. The City's Blue Box recycling program is a member of municipal group 4, Oxford County, on the Waste Diversion Ontario datacall, and operates at a net cost of $197 ($/tonne material collected).

1.2 Project Description

Prior to the installation of the automated scale system, data collection was a totally manual system with inherent errors in the weighing sequence. In the previous weighing sequence, drivers crossed the scale two times and used a constant tare weight for the truck. This gave an inherent error in the system since the tare weight of the truck will vary throughout the day with fuel consumption and is subject to seasonal variations such as material frozen on or in the truck.

Through funding for this project, the City was able to install an automated weighing sequence to the existing scale system. The automated weighing sequence tracks all the loads in an excel spreadsheet and each day a comma separated value data file is sent remotely to the City's computer servers. As the demands on clerical and Supervisory staff have increased significantly in past years, the intent of the upgrade was to reduce data entry time for staff, therefore reducing the workload on clerical and Supervisors. Without this scale upgrade, the current demands at the waste transfer station would have required an additional administrative staff person. With the reduction in clerical time by both Supervisors and administration staff, realized through the automation of the scale function, the anticipated payback for this upgrade was one year.

Weigh Sequence for Manual System:

1. Tare weight recorded for truck
2. Driver pulls into scale area fully loaded, records weight on chit sheet, then dumps fibres
3. Driver pulls into scale area, less mass of fibres, records weight on chit, then dumps containers
4. Driver submits the chit sheet end of work day
5. Staff to manually enter data

Weigh Sequence for Automated System:

1. Driver pulls into scale area fully loaded, then dumps fibres
2. Driver pulls into scale area second time, less mass of fibres, then dumps containers
3. Driver pulls into scale area for final time to record empty weight
4. Automated system reports truck activity daily

2 IMPLEMENTATION

2.1 Goals and Objectives

Cost Savings

It costs the City approximately 1 hour of staff time per day to review and enter the data captured from the manual scales through driver's chit sheets into the control spreadsheet. The hourly cost of the Supervisor without the cost of benefits and overhead is $42.53. This equates to a cost of data entry of $11,058 per year. The objective of the installation of this software was to eliminate the need for manual scale data entry and reviewing by the site Supervisor. This would result in cost savings to the municipal Blue Box program of approximately $11,000 per year. Furthermore, activity at the scale house had been increasing prior to the implementation of this project. The trending activity would have resulted in the need to hire additional administrative staff to support the process of manually entering/verifying data.

Accuracy through Automation of Data Entry

A by-product of this automation is a reduction in human error. Assuming the scales are functioning properly, the control spreadsheet will have an improvement in accuracy as a result of a reduction in errors from three sources: driver records, data entry, and the manual tare-weight system employed by the manual system. The objective of this project was therefore to improve the veracity of the Blue Box materials data reportedly collected and managed through the transfer site operations.

2.2 Budget

Table 2 outlines the costs associated with the City of Woodstock's installation of the scale automation project. The costs shown in the table above are for service contracts for this project. Civil works such as trenching for the installation of electrical conduits and restoration work was completed by City staff. The estimated cost of the work completed by City staff is $2,000. The proposed budget to CIF was $20,000 with 50% funding from CIF. This project is 18.3% over the original budget submitted to CIF.

Table 1: Automated weigh scale function implementation costs.

Item	Cost
Supply and install scale automation equipment, including: traffic control lights, cards, card readers, new scale control, certification and testing	$14,433.49
Scale Automation Software	$3,898.50
Electrical installation and connections	$3,332.83
Trenching and asphalt restorations by City staff	$2,000.00
Total	**$23,664.82**
CIF Funding	$10,000.00

3 EVALUATION

The scale has been in service since October 2012. To date 4,489 metric tonnes of Blue Box recyclables have been managed by the City's waste transfer station. Whenever possible, the City involved key staff to ensure a successful and smooth implementation. Key aspects of the implementation included:

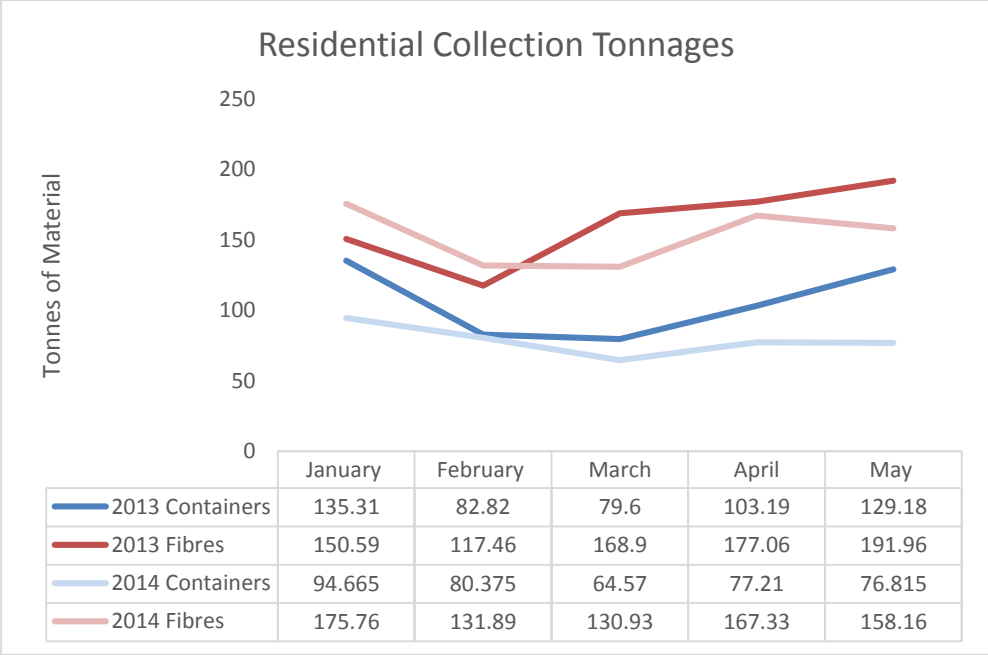
- Mounting lights on the weigh station in locations where drivers' could see them and would not interfere with mirrors on trucks
- Card readers were positioned that driver could access them without having to leave the vehicle
- Staff was involved during the installation of the wiring and scale setup, so that in the event there was an issue with the scale, they knew how to trouble shoot the problem and determine the issue. Thus, staff are now able to determine if issues require a service call or if repairs/troubleshooting can be completed by municipal workers

City staff completed a follow up evaluation of the cost savings as a result of the automated scale function implementation and have identified future steps to Blue Box programming that will make use of this new system.

3.1 Results

Cost Savings

The payback period forecasted to have been 1 year was not realized. Although the one year payback period was not met, an evaluation by staff has identified time savings in the data collection and entry of approximately half of the projection. City staff have revised the payback period to two years. In terms of the actual project cost to implement an automated weigh scale function into an existing manual system, the total costs of such a project are estimated at $23,664.82.



	January	February	March	April	May
2013 Containers	135.31	82.82	79.6	103.19	129.18
2013 Fibres	150.59	117.46	168.9	177.06	191.96
2014 Containers	94.665	80.375	64.57	77.21	76.815
2014 Fibres	175.76	131.89	130.93	167.33	158.16

Accuracy

The automation of the scale has made it easier to track, monitor, and report out on materials entering the waste transfer station. This has increased the veracity of our Blue Box measuring and monitoring system. The graphic above is an example of the reporting aspect of the automated scale function. Since the data captured through the software is easy to manipulate, staff are able to create statistics on demand to actively monitor and detect changes or trends in collections.

3.2 Analysis of project

The anticipated cost savings will likely be realized in a period of 2 years, which is a longer period of time than initially projected. Since the data is being reviewed on a constant basis and the manual system is operating in parallel to the automated, as a double check, the cost savings have not yet been realized. Retrospectively, the delay in the realization of systems optimization is not entirely surprising. It is recommended that other municipalities, switching from manual to automated systems, allocate up to a one year period to complete the trouble shooting/verification phase of implementation. The weighing sequence would not be as difficult to troubleshoot for single stream collection systems, as the drivers would only need to remember to weigh in with materials and weigh out empty.

In addition to improved operational efficiency, the impact of the automated function is that truck weights are now easily captured from the scale and populated in the City's monitoring system. Because the data is now essentially available on demand, supervisory staff are easily able to regularly generate reports to identify trends in the collections system. By knowing what's going on curbside, on any given day and in any given area, staff now have the ability to anticipate, detect and respond to trends early, which provides the opportunity to make better more informed decisions.

For systems considering this feature in other communities, consider the number of times the truck has to cycle across the scale and the type of curbside collection. One issue we had to overcome with the operators when collecting a cardboard only route, was they had to cross the scale empty twice to account for 0 containers on the truck. If they did not, the next time the truck came in; it would cycle through as containers, not fibres.

The next steps for the City are to develop processing tools that will consolidate the data collected by the automated system into a functional reporting system. In scoping out the next steps, City staff have identified that the functional reports will review the effectiveness of P& E campaigns, Multi Residential collections by tracking the performance of certain Multi Residential areas with a single truck collection. The City plans on having an engineering coop student complete this next step during the summer of 2014.

APPENDIX A

Table 2: Example output for Blue Box materials deposited at the City of Woodstock Transfer Station

Date Out	Time Out	Truck #	Truck desc	Product	Gross	Tare	Net	Unit	Date In	Time In
16-Oct-13	6:36:30	92	Truck 92	Containers	10210	9830	380	kg	15-Oct-13	13:30:59
16-Oct-13	6:44:23	92	Truck 92	Product 1	9930	9830	100	kg	16-Oct-13	6:40:46
16-Oct-13	8:16:04	83	Truck 83	Product 1	11570	10450	1120	kg	16-Oct-13	8:11:33
16-Oct-13	8:19:31	83	Truck 83	Containers	10450	9990	460	kg	16-Oct-13	8:16:04
16-Oct-13	8:26:05	90	Truck 90	Product 1	11600	10480	1120	kg	16-Oct-13	8:21:59
16-Oct-13	8:30:23	90	Truck 90	Containers	10480	10040	440	kg	16-Oct-13	8:26:05
16-Oct-13	9:17:32	92	Truck 92	Containers	11540	9830	1710	kg	16-Oct-13	6:44:23
16-Oct-13	9:25:16	92	Truck 92	Product 1	10400	9980	420	kg	16-Oct-13	9:21:45
16-Oct-13	10:49:49	90	Truck 90	Product 1	11540	10440	1100	kg	16-Oct-13	10:45:30
16-Oct-13	10:53:40	90	Truck 90	Containers	10440	10020	420	kg	16-Oct-13	10:49:49
16-Oct-13	11:34:37	83	Truck 83	Product 1	11370	10390	980	kg	16-Oct-13	10:47:40
16-Oct-13	11:38:20	83	Truck 83	Containers	10390	9960	430	kg	16-Oct-13	11:34:37
16-Oct-13	12:02:00	92	Truck 92	Containers	11380	9980	1400	kg	16-Oct-13	9:25:16
16-Oct-13	12:14:36	92	Truck 92	Product 1	10390	9950	440	kg	16-Oct-13	12:11:09
16-Oct-13	12:39:49	90	Truck 90	Product 1	10640	10210	430	kg	16-Oct-13	12:34:53
16-Oct-13	12:43:53	83	Truck 83	Product 1	10510	10150	360	kg	16-Oct-13	12:35:31
16-Oct-13	12:44:47	90	Truck 90	Containers	10210	10010	200	kg	16-Oct-13	12:39:49
16-Oct-13	12:47:02	83	Truck 83	Containers	10150	9950	200	kg	16-Oct-13	12:43:53
16-Oct-13	13:02:53	92	Truck 92	Containers	9980	9950	30	kg	16-Oct-13	12:14:36