Presentations and Delegations

OVERHEAD PRESENTATION

"PAVEMENT MANAGEMENT SYSTEM"

Presented By: MR. ROBERT PIANE, P.ENG.,
VICE PRESIDENT,
DEIGHTON ASSOCIATED LIMITED

Greater Grand Sudbury

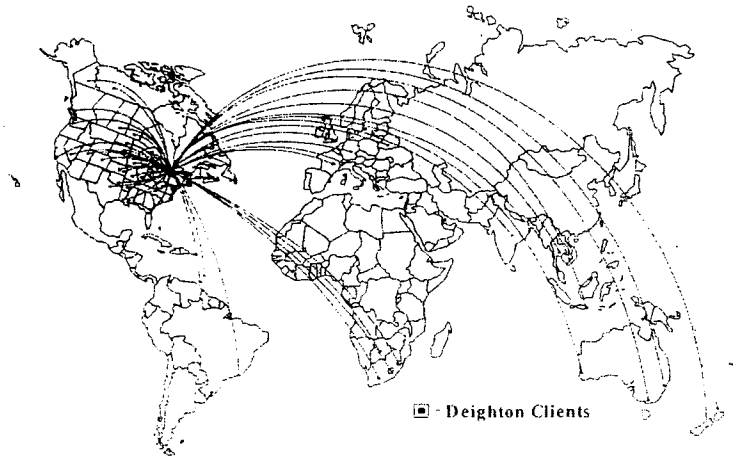
City of Greater Sudbury
Pavement Management System

October 23, 2002

deighton

Information tools for managing resources

Deighton Clients



deighton

Information tools for managing resources

Sudbury

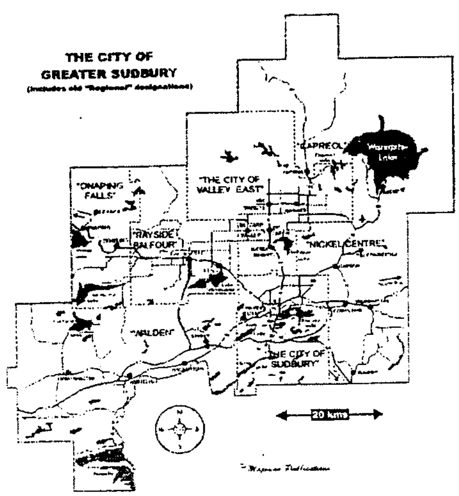
Local Deighton Clients

- City of Greater Sudbury
- City of Brampton
- City of St. Catharines
- Region of Peel
- City of Oshawa
- Region of York
- Region of Durham
- Municipality of Clarington
- City of Cornwall
- Region of Niagara
- Town of Whitby

deighton
Information tools for managing resources

Greater Grand Sudbury

Project Scope



Former Agency Name	Planning Classification (Centreline-km)				Total
	Local	Collector	Arterial	Other	
Capreol	18.75	6.12	-	13.90	[illegible]
City of Sudbury	260.98	68.04	1.19	38.20	368.31
Nickel Centre	95.43	10.26	-	17.65	[illegible]
Onaping Falls	42.82	10.87	-	[illegible]	[illegible]
Rayside Balfour	105.39	21.39	-	23.44	150.23
Region of Sudbury	5.53	92.66	252.21	4.75	364.17
Unorganized	6.50	-	-	[illegible]	[illegible]
Valley East	134.36	[illegible]	-	[illegible]	[illegible]
Walden	124.14	19.34		[illegible]	255.23
Total	[illegible]	[illegible]	263.40	[illegible]	[illegible]

deighton
Information tools for managing resources

Greater Grand Sudbury

PMS Input Data

Inventory	Condition
Road Name	Longitudinal Wheelpath
From Description	Fatigue Cracking
To Description	Longitudinal Cracking
Length	Transverse Cracking
Width	Block Cracking
Pavement Type	Roughness
Planning Class	Rut Depth
Traffic	
Jurisdiction	

deighton
information tools for managing resources

Sudbury

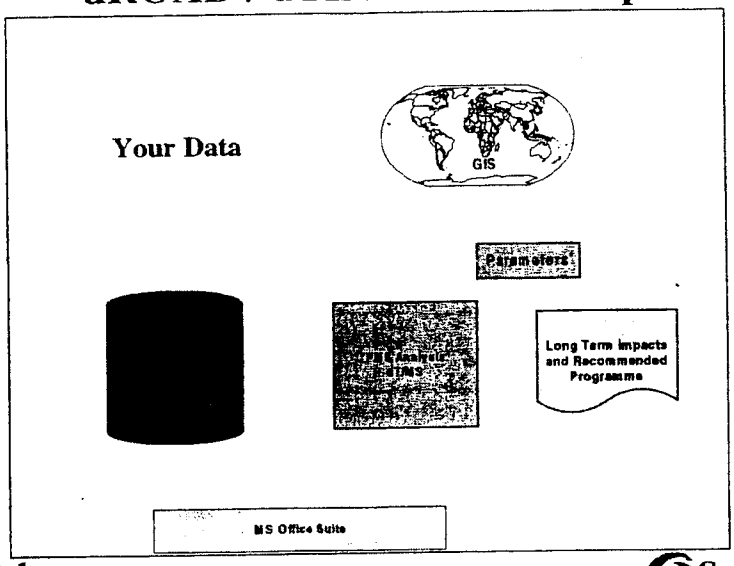
Analysis Consideration

- 40% of Infrastructure Improvement Budget allocated to PMS analysis
- Not considered in the analysis
  - 5th lane additions
  - Structure work
  - Storm/Sanitary improvements
  - Capacity widening
  - New links

deighton
information tools for managing resources

Sudbury

dROAD / dTIMS Relationship

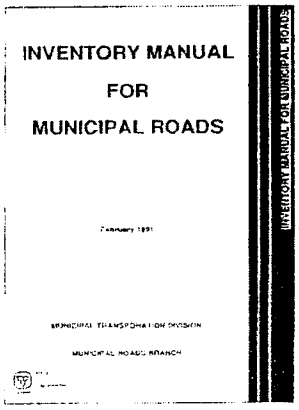


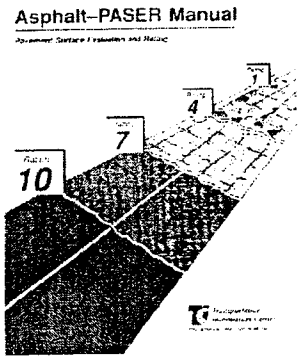
deighton

Sudbury

Parameters

1. Inventory database fields



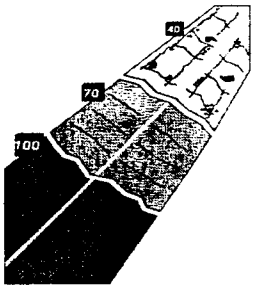


deighton

Sudbury

Parameters

1. **Inventory database fields**
2. **Performance Indexes**



Pavement Distress		dTIMS Index	Code	Measurement Units
Longitudinal Wheelpath Cracking	↘	Structural Cracking	STCK	Metres
Fatigue Cracking				Square metres
Longitudinal Cracking	↘	Non-Structural Cracking	NSTC	Metres
Transverse Cracking				Metres
Block Cracking				Square metres
IRI		Roughness	RUFF	mm/m
Rut Depth		Rutting	RUT	Millimetres
		Pavement Condition Index	PCI	

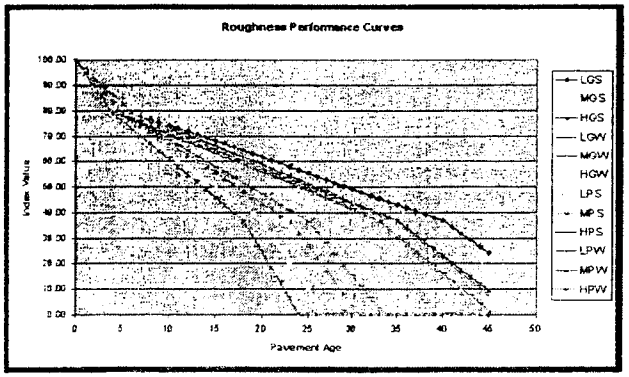
deighton

Information tools for managing resources

Sudbury

Parameters

1. **Inventory database fields**
2. **Performance Indexes**
3. **Performance Curves**



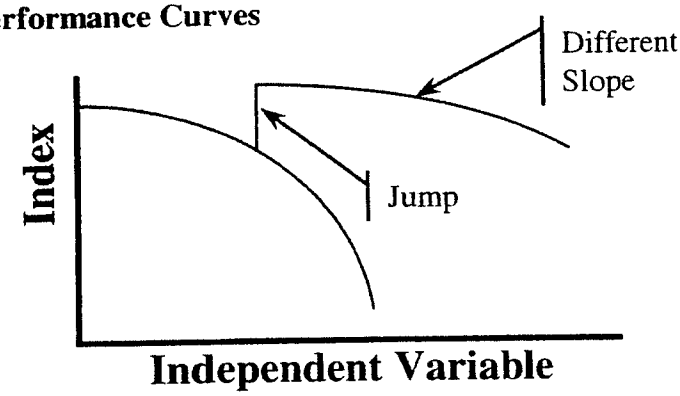
deighton

Information tools for managing resources

Sudbury

Parameters

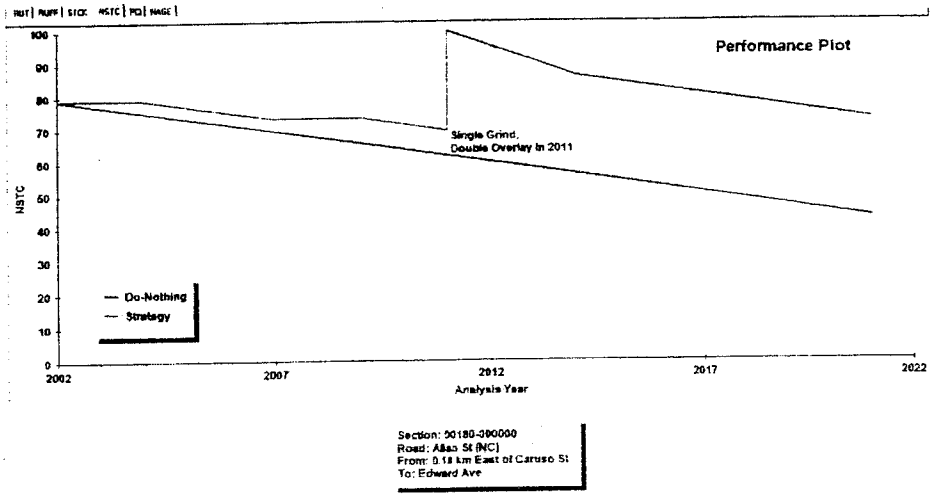
1. Inventory database fields
2. Performance Indexes
3. Performance Curves
4. Treatments (costs, impacts, triggers)



deighton

Sudbury

Performance Plot

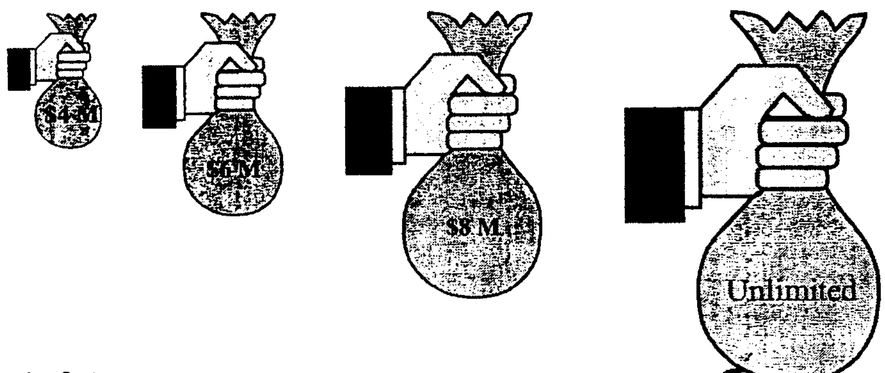


deighton

Sudbury

Parameters

1. Inventory database fields
2. Performance Indexes
3. Performance Curves
4. Treatments (costs, impacts, triggers)
5. Budget Scenarios



deighton
information tools for managing resources

Greater Grand Sudbury

Programme Report

Analysis Set ASET_ART

Programme Report by Year (Filtered)

Budget Scenario: [illegible]

2002 Programme

00510-000000	252.00	Big Nickel Mine Rd (E-N R	Hwy 17	Big Nickel Mine Rd	550M	$27,[illegible]
00515-000000	121.00	Big Nickel Mine Rd (N-E R	Big Nickel Mine Rd	Hwy 17	550M	$11,859
00520-000000	[illegible]1.00	Big Nickel Mine Rd (N-W R	Big Nickel Mine Rd	Hwy 17	550M	$70,478
00525-000000	168.00	Big Nickel Mine Rd (S-E R	Big Nickel Mine Rd	Elm St	550M	$16,[illegible]
00530-000000	[illegible]	Big Nickel Mine Rd (Sud)	Lorne St	Elm St	[illegible]	$394,245
00535-000000	452.00	Big Nickel Mine Rd (W-N R	Hwy 17	Big Nickel Mine Rd	[illegible]	$44,296
00540-000000	162.00	Big Nickel Mine Rd (W-S R	Elm St	Big Nickel Mine Rd	550M	$15,876
01915-001430	121.00	Cote Blvd (VE)	Old Hwy 69N (Con)	Radar Rd	550M	$26,520
02990-000296	201.00	Falconbridge Hwy (Sud)	Auger Ave	0.18 km North of Auger Ave	550M	$107,164
02990-0[illegible]	1,199.00	Falconbridge Hwy (Sud)	0.18 km North of Auger Ave	0.1 km North of Hudson St	570M	$632,544
02990-0[illegible]	1,295.00	Falconbridge Hwy (Sud)	Josephine St	Maley Dr	[illegible]	$251,267
03425-0[illegible]	4,3[illegible].00	Garson-Coniston Rd (NC)	1.5 km South of Maki Rd	Hwy 17	[illegible]	$461,413
05215-004852	1,265.00	Lasalle Blvd (Sud)	0.030 km West of Holland Rd	Montrose Ave	[illegible]	$1,153,660
05215-010765	338.00	Lasalle Blvd (Sud)	0.2 km East Of Snow Dome Rd	0.2 km West Of Snow Dome Rd	[illegible]	$74,122
05215-011103	1,315.00	Lasalle Blvd (Sud)	0.2 km West Of Snow Dome Rd	Elm West	700M	$345,582
05375-027100	930.00	Lone Lake Rd (Sud)	Ester St	Regent St	500M	$219,220
05750-079805	1,1[illegible].00	Main St (VE)	0.5 km West of Martin Rd	1.654 km West of Martin Rd	[illegible]	$170,772
[illegible]-0[illegible]206	567.00	Maley Dr (Sud)	0.040 km East of Box Culvert	0.247 km West of Box Culvert	500M	$69,474
06220-006361	[illegible]0.00	Old Hwy 1[illegible]	0.1 km South of Monte Principale	0.1 km North of Montee Principale	[illegible]	$49,590
14310-00[illegible]	742.00	Old Hwy 69N (VE)	0.4 km North of Neal St	0.2 km South of Hubert St	[illegible]	$369,[illegible]
					[illegible]	$121,[illegible]
04310-008525	4[illegible].00	Old Hwy 69N (VE)	Fifth St	Second Ave	[illegible]	$96,300
					[illegible]	$72,[illegible]
07115-00[illegible]	752.00	Panache Lk Rd (Wal)	South Property Limit of Indian Reserve	North Property Limit of Indian Reserve	[illegible]	$75,576
07115-0[illegible]	2,680.00	Panache Lk Rd (Wal)	North Property Limit of Indian Reserve	Oubway Rd	[illegible]	$269,440
07115-012826	[illegible]0.00	Panache Lk Rd (Wal)	Oubway Rd	South End	[illegible]	$92,460
[illegible]	[illegible]4.00	Westmount Ave (Sud)	Attlee Ave	Barrydowne Rd	[illegible]	$114,[illegible]
					[illegible]	$61,4[illegible]
	24,[illegible]					$[illegible]

deighton
information tools for managing resources

Greater Grand Sudbury

For Example

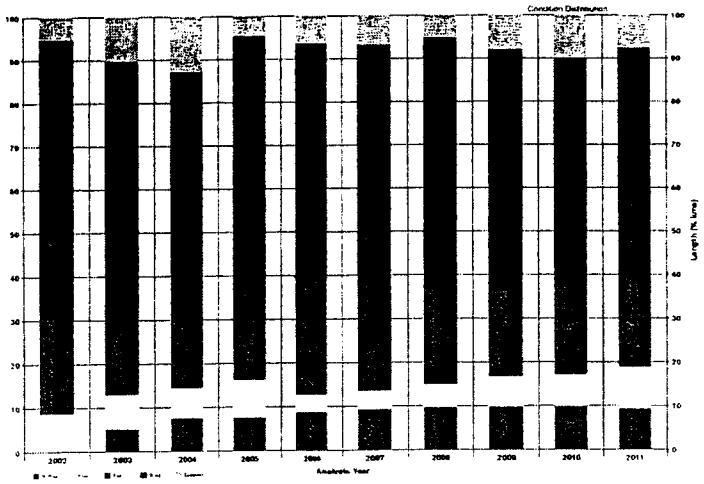
- If $10 M was allocated to the roads budget in the PMS
- $10 M could be applied to the entire network (L,C&A)
- Or the budget could be subdivided between Planning Classifications
  - $7 M Arterial
  - $2 M Collector
  - $1 M Local
- Optimized programmes can be generated for each case

deighton

Information tools for managing resources

Sudbury

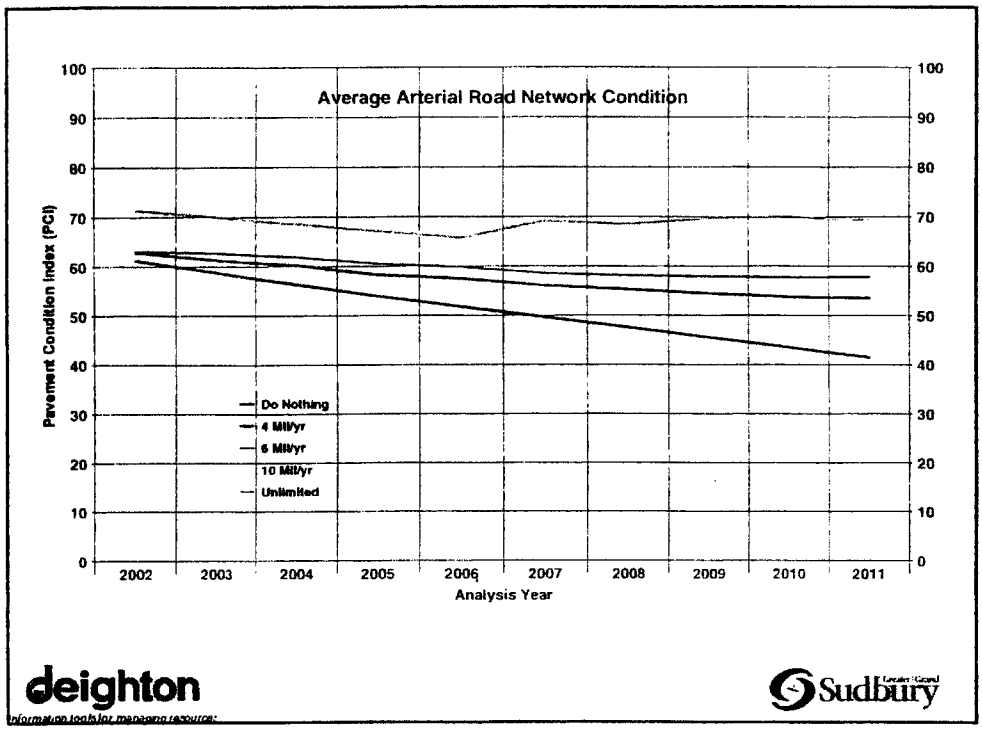
Condition Distribution

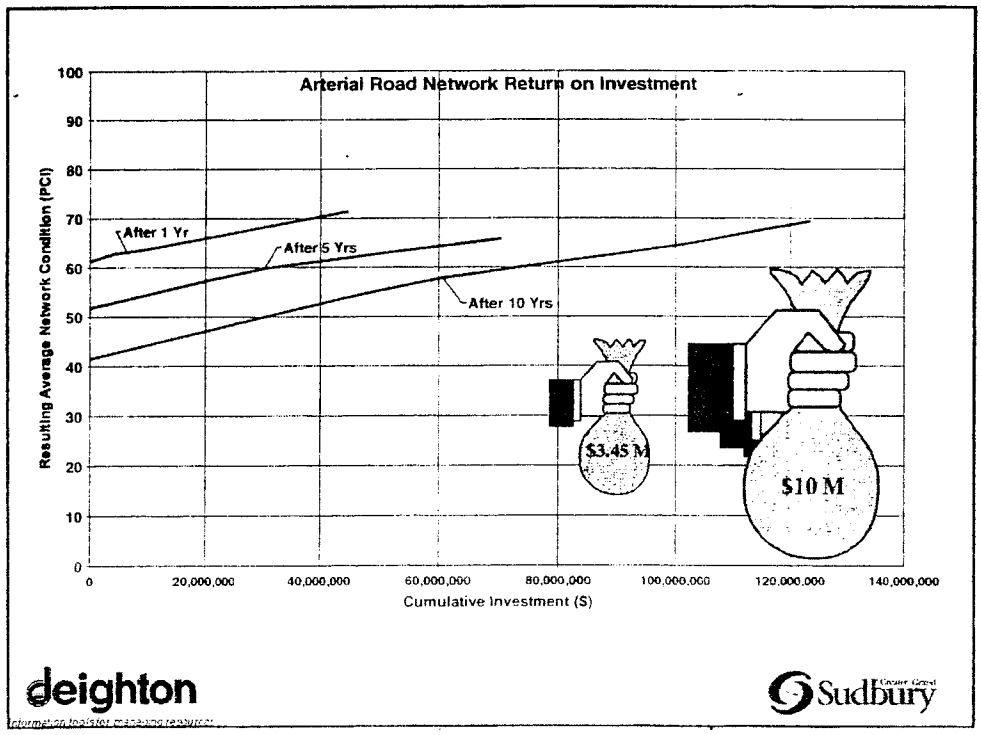


deighton

Information tools for managing resources

Sudbury


Average Arterial Road Network Condition
Pavement Condition Index (PCI)
Analysis Year
Do Nothing
4 Mil/yr
6 Mil/yr
10 Mil/yr
Unlimited
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
deighton
Sudbury


Arterial Road Network Return on Investment
Resulting Average Network Condition (PCI)
Cumulative Investment ($)
After 1 Yr
After 5 Yrs
After 10 Yrs
$3.45 M
$10 M
deighton
Sudbury

Conclusions and Recommendations

- PMS maintenance required now that Sudbury has taken possession of the software
  - Condition data update
  - Review analysis models
  - Consider including other assets
- Upgrade to dTIMS CT

deighton
information tools for managing resources

Sudbury

Request for Recommendation
Priorities Committee

Greater | Grand Sudbury
www.city.greatersudbury.on.ca

Type of Decision

Meeting Date	February 12, 2003					Report Date	February 4, 2003			
Recommendation		X	Yes		No	Priority	X	High		Low
		Direction Only				Type of Meeting	X	Open		Closed

Report Title

Northeastern Ontario Dementia Assessment and Consultation Network

Policy Implications + Budget Impact

	This report and recommendation(s) have been reviewed by the Finance Division and the funding source has been identified

Policy Implications: The Northeastern Ontario Dementia Assessment and Consultation Network pilot project will support individuals with dementia by providing an efficient and comprehensive model of service focussed on early diagnosis and treatment.

Budget Impact: There is no budget impact with the approval of the noted recommendation, however, as a point of interest, approximately $48,000 will be available for the implementation of the project. These funds were made available through the generosity of the Northeast Mental Health Centre, the Northern Ontario Heritage Fund Corporation, Pfizer and Janssen Pharmaceuticals.

X	Background attached

Recommendation

Whereas there are no geriatricians residing in Northeastern Ontario; and

Whereas a 41% increase in the prevalence of dementia cases in Northeastern Ontario is forecasted for 2011; and

Whereas representatives from all the territorial districts in the Northeast, including Algoma, Cochrane, Manitoulin, Muskoka, Nipissing, Parry Sound, Sudbury and Timiskaming, have voiced their support for specialized geriatric services and a memory

X	Recommendation attached

Recommended by the General Manager

C Sandblom

Catherine Sandblom
Acting General Manager
Health and Social Services

Recommended by the C.A.O.

Mark Mieto
Chief Administrative Officer

12

Revised: January 8, 2003

Report Authored By	Division Review
B. Walicki Bernadette Walicki Program Co-ordinator - Community Initiatives	

assessment service for Northeastern Ontario; and

Whereas a one year pilot implementation project for a Northeastern Ontario Dementia Assessment and Consultation Network is being undertaken by the Seniors Campus to demonstrate to funding bodies the need for this unique telemedicine service that will fill an identified gap and relieve pressures currently being experienced by service providers in the Northeast.

Therefore, let it be resolved that the Priorities Committee of the City of Greater Sudbury endorse the implementation of a Northeastern Ontario Dementia Assessment and Consultation Network focussed on early identification, assessment and treatment planning to support individuals with dementia through the use of telemedicine.

Background

Project History

A Seniors Campus Steering Committee, comprised of government and community partners, was created to oversee and coordinate the development a Seniors Campus for all of Northern Ontario to be located on the grounds of Pioneer Manor. The Seniors Campus will combine the expertise, resources and management of health care and education professionals to offer long-term care, supportive housing, an Alzheimer day centre, applied research and a memory assessment centre among other projects.

In order to realize the vision of a Seniors Campus, the Steering Committee formed sub-committees to focus on the development of the five services to be offered. One such sub-committee was the Memory Assessment Working Group. The Memory Assessment Working Group was formed to research the development of a memory assessment service as part of the continuum of care for dementia in Northeastern Ontario. It was their aim to ensure that memory assessment services link existing resources, augment current programs and improve access to appropriate services in a timely manner through an innovative telehealth model. The experts and professionals who constitute the Working Group include representatives from:

- Algoma, Cochrane, Manitoulin and Sudbury District Health Council
- Cambrian College
- City of Greater Sudbury
- Huntington University
- Ministry of Health and Long-term Care
- North Bay Psychiatric Hospital
- Northeast Mental Health Centre
- Northern Shores District Health Council
- Pioneer Manor

- Sault Ste. Marie Group Health Centre
- St.Joseph's Health Centre
- Sudbury-Manitoulin Alzheimer Society
- Sudbury Psychogeriatric Outreach Clinic
- Timiskaming Community Care Access Centre
- Timmins and District Hospital

To synthesize the vast amounts of mental health literature related to dementia and identify best practices and emerging trends of memory assessment services, a consultant was contracted in June 2001 by the Memory Assessment Working Group to conduct a needs assessment and develop a business case. The resulting document, *Specialized Geriatric Services and the Memory Assessment Network in Northeastern Ontario,* was made possible through grants from the Ministry of Health and Long-Term Care, the Northern Ontario Heritage Fund Corporation, Pfizer and Janssen Pharmaceuticals.

In support for the development of a memory assessment service, the business case revealed that in 2001 only 16% of an estimated 6000 persons residing in the Northeast region suffering from dementia were served. Even more telling, the forecast for the number of dementia cases looks as follows:

District	Population +65 2000	Population +65 2011	Dementia Cases 2000	Dementia Cases 2011
Northeastern Ontario	90,600	108,430 (20% increase)	5,926	8,339 (41% increase)

Implementation

A twelve month pilot project to launch a memory assessment service, to be known as the Northeastern Ontario Dementia Assessment and Consultation Network, is being undertaken by the City of Greater Sudbury, in cooperation with community partners, on behalf of the Memory Assessment Working Group while permanent funding is being pursued. The purpose of the pilot project is to:

- show the commitment of our partners to develop a memory assessment service;
- immediately relieve the demand for specialized dementia services by making them available to partners across the Northeast; and
- directly identify the needed services through implementation rather than waiting for funding to determine the right mix of services.

As part of this implementation process, members of the Memory Assessment Working Group travelled to communities throughout the Northeast during the months of September and October 2002 to share the results of the business case, present plans for the interim pilot project and request letters of support for the initiative. The support from Northeastern Ontario partners has been overwhelming. The following quotes are from letters of support received by the Working Group:

> "*The issue is of enormous importance, especially in light of the aging of our population, and we congratulate you on your initiative.*" Lillian Morgenthau, Founder and President of Canada's Association for the Fifty-Plus

"*By using existing resources and new technologies, clients from the Cochrane District would be able to access specialized geriatric services not presently available.*" Joy Galloway, Executive Director Cochrane District Community Care Access Centre

"*The utilization of the technology of the North Network is a logical recommendation to achieve an effective solution to the challenges in service delivery. The blending of existing local services with specialties in tertiary centres is sound practice.*" Esko Vainio, Chief Executive Officer Timmins and District Hospital

Since the community visits, the Memory Assessment Working Group has, with the assistance of partners:

- acquired the services of an Occupational Therapist from Pioneer Manor to function as the Clinical Manager for the implementation of the pilot project;
- secured the expertise of a Gerontology Professor from Huntington University, through a contract with Pioneer Manor, to develop an evaluation tool for the Network and research funding opportunities, including the availability of rural health research opportunities;
- received the professional assistance of a researcher contracted by the Sudbury Regional Hospital St. Joseph's site;
- posted a position for a FedNor Youth Intern Information Technology Support Technician;
- acquired the services of Dr. Trevor Bon, a geriatrician from St. Joseph's Care Group in Thunder Bay;
- received support for the initiative from the Northern Ontario Medical School Implementation Management Committee; and
- applied for funding from the Ministry of Health and Long-Term Care, in cooperation with the Northeast Mental Health Centre, for five Primary Care Nurse Practitioners to serve throughout the Northeast to work with Alzheimer Society Chapters and host facilities/ organizations in an outreach capacity to assist in the diagnosis, treatment and follow-up of persons with dementia and other geriatric issues.

With excitement, the Northeastern Ontario Dementia Assessment and Consultation Network will begin to offer services to Greater Sudbury and Manitoulin residents by the end of February, with staged implementation throughout the Northeast to include:

- Cochrane
- Muskoka/ Parry Sound
- Timiskaming
- Algoma
- North Bay/ Nipissing.

The Network will function by using telemedicine services provided by the Northern Ontario Remote Telecommunication Health Network (North Network), specializing in medical consultations and education. Standardized screening and assessment tools, referral and follow-up processes, service protocols and consultation will be provided through the Northeastern Ontario Dementia Assessment and Consultation Network, while dementia treatment, in-home support, day programming, residential alternatives, and education to community providers and caregivers will remain locally governed and operated with existing services.

The Northeastern Ontario Dementia Assessment and Consultation Network will respond to an identified need in Northeastern Ontario. Through the implementation of the interim pilot project, support for individuals with dementia disease will be provided through an efficient and comprehensive model of service. Upon securing permanent funding, the Northeastern Ontario Dementia Assessment and Consultation Network will physically be located within the 20,000 square feet at Pioneer Manor dedicated to the Seniors Campus, as was the intent from the outset of the project. With limited numbers of geriatric health professionals in the Northeast, a telemedicine network will address the needs of patients, health professional, families and caregivers.

Request for Recommendation
Priorities Committee

Greater | Grand Sudbury
www.city.greatersudbury.on.ca

Type of Decision										
Meeting Date	February 12, 2003					Report Date	February 6, 2003			
Recommendation		Yes	X	No		Priority	X	High		Low
	Direction Only					Type of Meeting	X	Open		Closed

Report Title

Full Cost Recovery: Solid Waste Management

Policy Implications + Budget Impact

	This report and recommendation(s) have been reviewed by the Finance Division and the funding source has been identified

	Background attached

Recommendation

For information only.

	Recommendation attached

Recommended by the General Manager

Don Bélisle
General Manager of Public Works

Recommended by the C.A.O.

Mark Mieto
Chief Administrative Officer

Title: Full Cost Recovery: Solid Waste Management
Date: February 6, 2003

Report Authored By	Division Review
Chantal Mathieu Manager of Waste Management	

At the Finance Committee meeting of February 5, 2003, additional information was promised to Council with regards to the Solid Waste User Fee budget option (page 60 of Reduction Options). Enclosed is a recent report commissioned by the City of Toronto and funded by the Waste Diversion Organization. The study examines the impacts of container limits and user pay in some detail.

During the Budget meeting of February 5, 2003, we mentioned that there may be an opportunity to lower this year's tax levy as a result of implementing a user pay program, even though the program would only be launched in 2004. Essentially, an amount could be taken from Reserves and applied to the levy this year, with the commitment that the 'loan' would be repaid in 2004 from the new user pay revenue stream.

At the Policy & Priorities Committee meeting of February 12, 2003, we will be making a presentation that outlines the key issues associated with a Solid Waste User Pay program.

The Waste Diversion Impacts of Bag Limits and PAYT (Pay-As-You-Throw) Systems in North America

April 2001

Submitted to:
City of Toronto
Policy & Planning, Works & Emergency Services Dept.

Funding provided by:
The Ontario Waste Diversion Organization

Submitted by:
ENVIROSRIS
161 Eglinton Avenue East, Suite 200
Toronto, Ontario M4P 1J5
Tel (416) 480-2420 Fax (416) 480-2419
www.ris.ltd.com

The Waste Diversion Impacts of Bag Limits and PAYT (Pay As You Throw) in Selected Systems in North America

Executive Summary

User pay, also referred to as Pay-As-You-Throw (PAYT), unit-based pricing, variable rate and user fee, is becoming an accepted method for financing residential waste management services and making householders more directly responsible for their waste generation and disposal habits. Bag limit programs appear less universal in their application than user pay programs.

Throughout Canada and the United States, all user pay/PAYT programs are "volume based" systems. Most user pay/PAYT communities used one of two systems, a tag system or variable standardized container system. In general, most Canadian user pay programs use the tag system, whereby residents are required to purchase tags, which they attach to some, or all of the bags/cans of garbage set out for collection. In the case of the variable standardized container system, commonly used by US cities, householders are offered different sizes of containers and pay a monthly or bi-annual fee according to the size of the container.

This study examines the impacts of bag limit program and user pay/PAYT programs on residential waste disposed and diverted over time. The communities profiled in this report represent a selection of different bag limit and user pay/PAYT programs across North America. A long list of potential case studies was developed based on characteristics of the communities that were similar to the City of Toronto (i.e. large, urban populations) or communities which could provide potentially relevant information and insights for Toronto (i.e. located in the GTA). After an initial screening process, a list of over 15 communities were surveyed. Information and data was compiled on the program evolution and the long-term impacts of the programs on curbside diversion of recyclables, leaf and yard waste, backyard composting and bulky goods (where applicable).

Bag Limit Results: Communities that establish a bag limit program at four or more bags rarely experience a noticeable reduction in waste sent to landfill or an increase in materials diverted through recycling or composting programs. Since many communities experience set out rates between 2 to 3 bags of garbage per household per week, a bag limit greater than 3 will not encourage residents to re-think their waste generation and disposal habits or to participate to a greater extent in waste diversion activities. Nor is there any reason for the resident to engage in source reduction activities.

While only a handful of communities have established bag limit programs of three bags or less, they did result in a reduction in waste sent to landfill and increased waste diversion. For some communities, the bag limit helps to make the transition to a user pay program easier for residents. With a gradual lowering of the bag limits over several years, residents can make moderate adjustments to their waste generation and disposal activities without feeling burdened.

User Pay/PAYT results: The introduction of user pay/PAYT programs does have a positive impact on residential waste generation and diversion behaviours, especially immediately following their implementation. Residents respond to the direct financial cost associated with waste generation although in the case of the Ontario user pay case studies, the behaviour change is not necessarily maintained at the original level over time.

Observations from the study are:

- User pay programs work more effectively than bag limit programs in diverting garbage from landfill and increasing recycling rates (unless the limit is set at two bags or less).
- Most Ontario based communities elect to implement a user pay program rather than adopting a low bag limit program (exceptions are Peterborough - 2 bag limit with no user pay and Northumberland County - 3 bag limit with full user pay).
- Over time, all profiled user pay/PAYT programs continued to achieve greater waste diversion from landfill and higher recycling rates than before. In some cases, however, the positive impacts plateau or taper off slightly.
- For the majority of profiled user pay/PAYT programs, the lower the number of "free" bags, the greater the increase in garbage diverted from landfill and recyclables recovered.
- All the profiled communities had in place, or introduced, comprehensive curbside recycling programs and leaf and yard waste programs at the time user pay/PAYT was implemented.
- Many of the profiled user pay/PAYT programs did not show consistent increases in the rates of diverted leaf and yard waste over time.

Findings and Implications for Toronto: The research conducted on bag limit and user pay/PAYT programs highlights several key findings is summarized below:

1. *Custom Design is Necessary:* There is no standardized approach to the design and implementation of a user pay program. The level of education and promotional needs, fee structure, and level of recycling and leaf and yard waste curbside collection services varied considerably among the communities studied.

2. *Comprehensive Waste Diversion Program Required:* Comprehensive waste diversion and recycling programs must be part of a user pay/PAYT program. All the communities highlighted in the case studies had adopted recycling programs, augmented with leaf and yard waste composting programs and backyard composting programs.

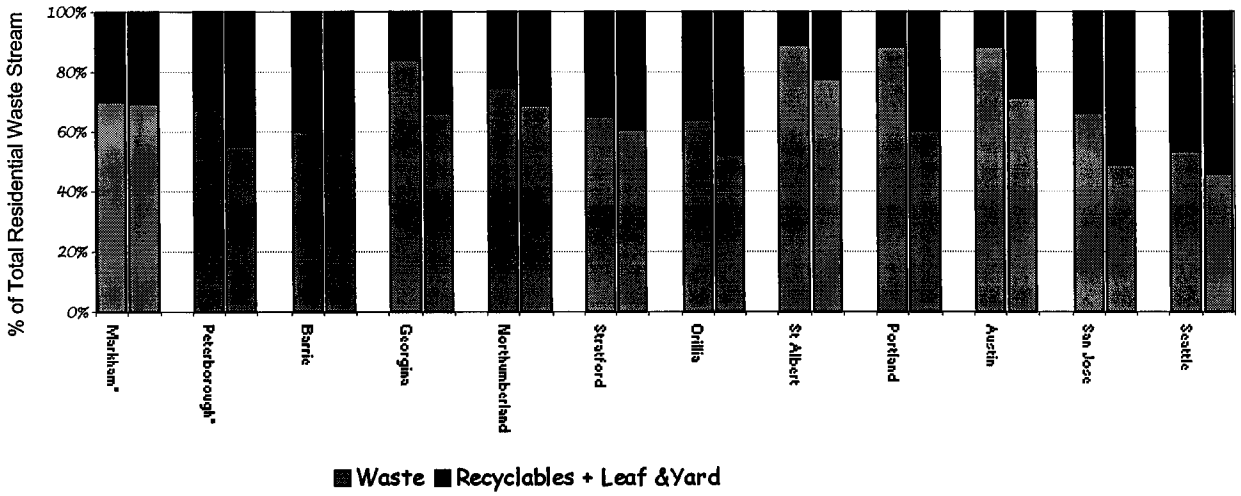
3. *Public Education is Critical:* Public education programs play a critical role during the early stages of bag limit or user pay/PAYT implementation. Each of the communities studied has implemented an extensive education and promotion campaign focusing on printed materials, advertisements, and hotlines.
4. *Separation of Waste Management System Financing a Viable Option in the United States:* The need to establish a separate "enterprise or utility" fund dedicated to waste management activities was common to the PAYT programs studied. The only large Canadian community identified that has established a separate utility fund was the City of Edmonton.
5. *Carts and Automated Equipment have Trade-offs:* Many large municipalities in the United States are moving towards user pay programs that offer a variety of container sizes that are collected using semi-automated collection equipment. There may be some concern in Toronto that access to the carts will be a problem in the winter; however, there are examples of communities located in northern climates (such as Minneapolis, Minnesota; St. Albert, Alberta; and Drummondville, Quebec) that have successfully used cart collection systems.
6. *Multi-Family Buildings Continue to Present Challenges*: There are no systems currently in place for dealing with individual tenants within multi-family buildings. Most communities have

decided not to get involved in servicing multi-family buildings or to charge directly for the individual waste generated by the tenants.

7. *Mixed Commercial and Residential Areas:C an Present Challenges*: Communities that have established separate waste collection programs for commercial and residential areas that receive municipal curbside waste collection have run into problems deciphering the different programs. This problem has been resolved by applying the same user pay/PAYT rules to the retail and commercial establishments that receive municipal curbside collection.

Impacts on Waste Diversion: Figure 1 illustrates that in all cases, waste diversion percentage increases when user pay systems are implemented.

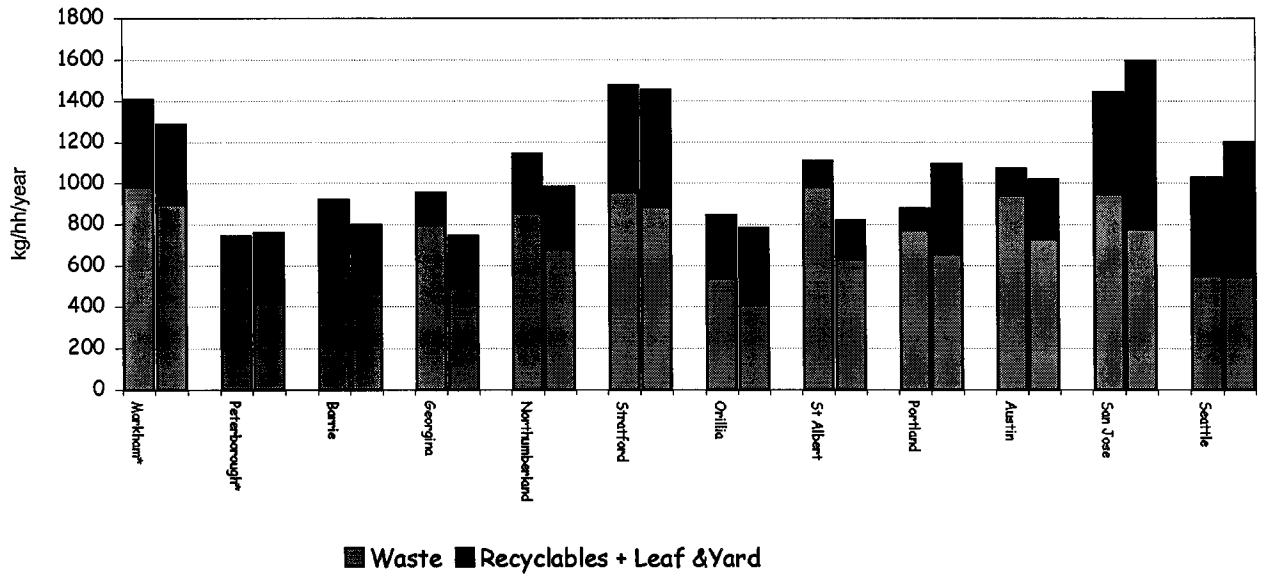
Figure 1
% Waste Disposed and Diverted Pre and Post Bag Limit or User Pay/PAYT



Note: "Post" is 1999 data
* bag limit program

Impacts on Waste Disposal: Figure 2 shows that is all the communities examined, the amount of garbage landfilled decreased. This is a significant finding for Toronto, particularly when it now has to pay full market prices for disposed waste. The specific reduction was different for each community, depending on the user pay system and diversion opportunities in place.

Figure 2
Diversion and Disposal Pre and Post Bag Limit or User Pay/PAYT
(kg/hh/year)



Note: "Post" is 1999 data
* bag limit program

TABLE OF CONTENTS

TABLE OF CONTENTS

Tables

Figures

Appendices

1.0 INTRODUCTION

User pay, also referred to as Pay-As-You-Throw (PAYT), unit-based pricing, variable rate and user fee, is becoming an accepted method for financing residential waste management services and making householders more directly responsible for their waste generation and disposal habits. User pay has been adopted in North America as well as in other countries including Japan, China, Germany, Italy and Holland (Horton, 1999). Bag limit programs appear less universal in their application than user pay programs.

1.1 Evolution of User Pay in Canada

User pay and bag limit programs have become an increasingly adopted approach for promoting diversion of waste from landfill and increasing recycling rates throughout much of Canada, and in particular Ontario[1]. Bag limit programs serve the function of getting residents to recognize that waste should not be considered limitless and that waste management services are costly to provide. Sometimes bag limits have been used as the first step towards implementing a user pay program. In this case, communities impose bag limits for garbage and gradually reduce the limit until they can make an easier transition to user pay programs.

User pay programs have gained momentum across most of Canada with most of the growth occurring in the mid to late 1990's. In the early 1990's, only a handful of Canadian communities had implemented user pay programs (9 in 1991; 35 in 1993; and 53 in 1994). There were about 120 user pay programs across the country in 1996, mostly in B.C. and Ontario. Today, there are more than 200 programs. Most of the growth has occurred in Ontario where there were 59 user pay programs in 1996 (all of which were implemented between 1991 and 1996 and the majority in communities smaller than 25,000) and almost 120 today. With one exception, all user pay programs adopted in Canada use marked bags or tags/stickers rather than variable standardized containers (see section 5.2 for definitions).

The recent implementation of user pay programs in Ontario has mostly occurred in communities with 25,000 or more residents. In the early years, user-pay programs were found only in smaller communities and there was some doubt that the approach could be implemented in larger centres. The trend changed when some larger municipalities such as Barrie, Stratford, Niagara Region, Northumberland and Georgina moved forward. Georgina was the first municipality in the Greater Toronto Area to implement a user-pay system. This was precipitated by a crisis when the local landfill closed and the costs of the waste management system increased substantially.

The evolution of bag limits and user pay in Canada has progressed more slowly than the evolution in the United States. Whereas Canadian communities have relatively recently embraced the concept of bag limits and user pay, communities in the United States have been adopting PAYT programs over the past two decades (since the mid 1980's).

[1] The adoption of user pay programs in Ontario and Canada appear to be less for financial reasons than elsewhere, especially in the United States.

1.2 Evolution of PAYT in the United States

Since the 1970's, a trend in the United States is to have communities establish separate waste management enterprise (utility) funds dedicated to financing the operations of residential waste management and diversion programs. Enterprise Funds are defined as "financial mechanisms used by local governments to finance and operate a given activity like a private business. Agencies that use the enterprise funds usually must collect sufficient revenues to cover the full cost of agency operations and services provided" (EPA, December 1998). This approach to financing waste management programs has encouraged the implementation of Pay-As-You-Throw (PAYT) programs, which integrates easily in to the utility funding approach, "growing number of communities are turning to PAYT and thereby shifting toward managing MSW services as they would any other utility" (EPA, January 1999).

The introduction of PAYT programs in the United States is as much an economic approach (i.e. method of financing waste management programs) as an environmental approach (i.e. a method for diverting waste from landfill and increasing recycling rates). PAYT systems force communities to take a good look at the direct and indirect costs to provide their municipal solid waste programs and services (EPA, January 1999).

Currently, over 10 US states have legislation that mandates or promotes the implementation of PAYT programs within their jurisdictions (i.e. Minnesota, Iowa, Wisconsin and Washington mandate PAYT and Massachusetts, Indiana, and Rhode Island provide direct financial incentives and grants to communities using or implementing PAYT). Whereas US communities have embraced PAYT programs, there has been not as much interest in establishing bag limit programs, "Most U.S. waste agencies have traditionally provided unlimited refuse removal to all citizens, funding that service either from general funds or through flat-rate, 'all-you-care-to-dump' billing" (Skumatz, June 1993). Communities in the United States have skipped the bag limit stage and moved directly to PAYT programs. Currently, there are over 4,000 communities in the United States with PAYT programs, serving over 27 million U.S. residents (Burgiel et al., 1998). Table 1.1 provides a list of the largest communities with PAYT programs (Miranda, 1999).

Table 1.1
Largest Cities in the United States with PAYT Programs

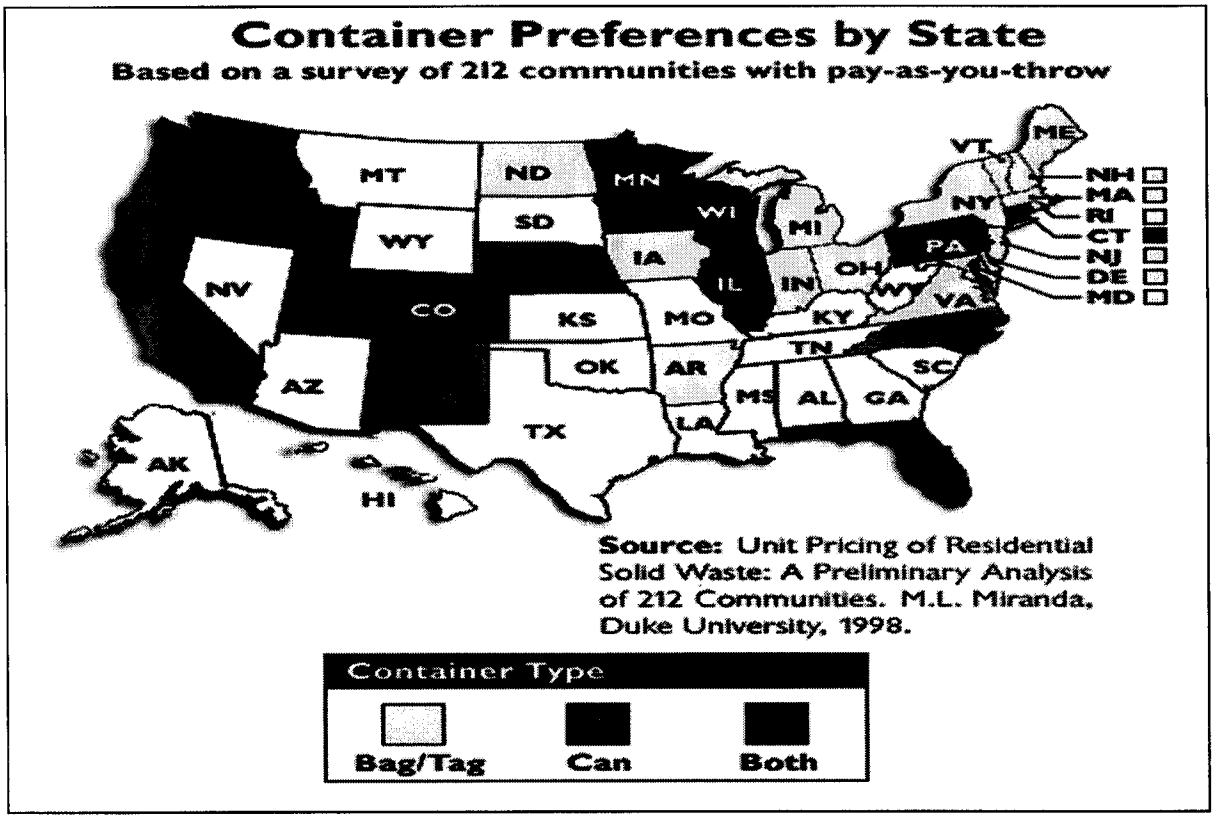
Com	Population (1,000 area)	Year Implemented	System
1. Los Angeles, CA	3,485,398	1996	variable container
2. San Jose, CA	782,248	1993	variable container
3. San Francisco, CA	723,959	1980s	variable container
4. Seattle, WA	516,259	1981	variable container
5. Austin, TX	465,622	1997	variable container
6. Oklahoma City, OK	444,719	1997	variable container
7. Portland, OR	437,319	1992	variable container
8. Albuquerque, NM	384,736	1995	variable container
9. Oakland, CA	372,242	1985	variable container
10. Sacramento, CA	371,854	1999	variable container
11. Sacramento, CA*	369,365	n.a.	variable container
12. Minneapolis, MN	368,383	1995	variable container
13. Snohomish, WA*	308,317	1992	variable container
14. Pima County, AZ	304,926	n.a.	variable container

* Unincorporated Areas

Increasingly, large cities are adopting PAYT programs in the United States, with half of the cities listed in Table 1.1 adopting PAYT programs in the mid to late 1990s. Currently, 58 communities with populations greater than 100,000 (representing 15% of the population living in large communities nationwide) have PAYT programs (Burgiel et al., 1998). This trend is expected to continue.

These large U.S. communities have adopted variable standardized container PAYT programs (see section 5.2 for definitions), which contrasts significantly with the marked tag/sticker approaches characterized by the large Canadian communities with user pay programs. The variable container programs enable large communities, especially those located in the more temperate climates, to use semi-automated collection vehicles, thus reducing worker injuries, and establish an automated billing system. Fewer large communities use the variable container system in the northern regions[2] (City of Toronto, 1993). However, there are examples of communities situated in northern climates that have successfully used cart systems (i.e. Minneapolis, Minnesota; St. Albert, Alberta; and Drummondville, Quebec). Figure 1.1 shows the preference of U.S. States for bag/tag programs or variable container programs.

Figure 1.1
Container Preferences By State



[2] City of Toronto staff informally surveyed over 40 cities in the United States examining the type of collection system in place and the reasons for choosing the system. Communities located further north tended to user bags rather than carts for the following reasons: snow impeded movement of the carts and collection by automated vehicles; and streets were narrower, housing was denser and street parking more characteristic thus making access to carts more difficult.

A Duke University study conducted by Miranda and LaPalme (1997) analyzed 212 communities in the United States with PAYT programs (bag/tag and containerized systems) to determine the effectiveness of the programs in reducing waste to landfill. The study excluded communities that had launched new recycling programs or had made significant modifications to existing recycling programs at the same time as launching PAYT programs. This eliminated the influence of these extraneous factors on the impact of PAYT programs. The study concluded that during the first year of PAYT, communities averaged 14 – 27% decrease in the amount of waste sent to landfills.

2.0 METHODOLOGY

Information for this study was obtained from various sources, including use of Enviros RIS internal databases and resources (in particular a study completed for the City of Calgary in 2000), the Internet, reports and interviews with the appropriate representative(s) from the selected communities. A survey was prepared to ensure the consistency of information collected. (Appendix A).

The two main areas of focus were:
1. Bag limits
2. User pay/PAYT

Information and data was compiled on the program evolution and the long-term impacts of the programs on curbside diversion of recyclables, leaf and yard waste, backyard composting and bulky goods (where applicable). All surveyed communities were asked to provide tonnage data for single-family households for the following curbside waste streams: waste, recycling and leaf and yard waste collection.

Where good, reliable data were available, the quantitative analysis involved setting the year prior to program implementation (i.e., introduction of bag limit or PAYT) as the base year. Resulting impacts on waste to landfill, recyclables collection and leaf and yard waste collection were calculated using this base year as a benchmark. In addition, trends in overall diversion through curbside recycling and leaf and yard waste collection were calculated over all years since the introduction of the program.

The communities profiled in this report represent a selection of different bag limit and user pay/PAYT programs across North America. A long list of potential case studies was developed based on characteristics of the communities that were similar to the City of Toronto (i.e. large, urban populations) or communities which could provide potentially relevant information and insights for Toronto (i.e. located in the GTA area). Table 2.1 provides a long list of communities screened for available and reliable long-term impact data. The long list consisted of the following potential case studies:

- Ontario – 12 screened candidates
- Western Canada – 5 screened candidates
- United States – 20 screened candidates (the largest known US PAYT communities were identified by using the US Environmental Protection Agency's Pay-As-You-Throw listing.[3])

[3] http://www.epa.gov/epaoswer/non-hw/payt/comm-3.htm

Table 2.1 Long-list of Targeted Communities for Toronto PAYT Research

Community	Population	Information Available (long case study)	Information Unavailable (no case study)	Data Provided Incomplete (short case study)
Canada				
Ontario				
Peel	933,000		✔	
Markham	191,527	✔		
St. Catherines	161,352	✔		
Barrie	100,000	✔		
Belleville	44,000		✔	
Newmarket	76,000			✔
Northumberland	74,000	✔		
Peterborough	68,748	✔		
Georgina	38,335	✔		
Stratford	30,000	✔		
Orillia	27,882	✔		
Orangeville	23,500		✔	
Western Canada				
Edmonton, Alberta	620,000	✔		
CRD – Capital Regional District	222,100			✔
Delta, B.C.	93,000			✔
Burnaby, B.C.	180,000			✔
St. Albert, Alberta	51,700	✔		
United States				
Los Angeles, California	3,485,400			✔
San Jose, California	840,000	✔		
San Francisco, California	752,000			✔
Seattle, Washington	516,000	✔		
Austin, Texas	466,000	✔		
Oklahoma City, Oklahoma	444,700		✔	
Portland Oregon	437,000	✔		
Albuquerque, New Mexico	384,700		✔	
Oakland, California	372,200		✔	
Sacramento, California	371,850		✔	
Minneapolis, Minnesota	368,400	✔		
Snohomish County, Washington	308,300		✔	
Pima County, Arizona	305,000		✔	
Norfolk, Virginia	261,000		✔	
Baton Rouge, Louisiana	224,000		✔	
Grand Rapids, Michigan	189,000			✔
Worcester, Massachusetts	170,000	✔		
Tompkins County, N.Y.	95,000		✔	
Berkeley, California	102,700			✔
Aurora, Illinois	100,000			✔

During the screening process a number of data limitations and challenges were encountered as follows:

- Some programs have not been in place long enough to have reliable, long-term impact data and demonstrable outcomes.
- Some communities do not keep historical records of waste or recycling data and/or were unable to provide it in a useful format.
- Some communities collect from residential and commercial establishments along the same route and were unable to provide data for the residential sector only.
- At the time of this report, some selected communities had not responded to the request for information, despite several repeated phone calls.

Consequently, a number of communities were eliminated from the detailed case studies (see Table 2.2 for explanations) resulting in the following short list of case studies (see Appendix B for detailed case studies):

Ontario

- Markham (bag limit program)
- Peterborough (bag limit program)
- Barrie (partial user pay program)
- Orillia (partial user pay program)
- St. Catherines (partial user pay program)
- Stratford (full user pay program)
- Georgina (full user pay program)
- Northumberland County (full user pay program)
- Newmarket (partial user pay program) – short case study

Western Canada

- Edmonton, Alberta (flat fee program) – short case study
- St. Albert, Alberta (full user pay program)
- CRD, British Columbia (partial user pay program) – short case study
- Burnaby, British Columbia (bag limit program) –short case study
- Delta, British Columbia (partial user pay program) – short case study

United States

- San Jose, California (variable container program)
- Seattle, Washington (variable container program)
- Austin, Texas (variable container program)
- Portland, Oregon (variable container program)
- Minneapolis, Minnesota (variable container program)
- Worcester, Massachusetts (full bag program)
- San Fransisco, California (variable container program) – short case study
- Berkley, California (variable container program) – short case study
- Grand Rapids, Michigan (PAYT program) – short case study
- Los Angeles, California (variable container program) – short case study
- Aurora, Illinois (full bag program) – short case study

Table 2.2
Status of Data Availability for Various Communities Contacted

Community	Population	Status of Data
Canada		
Ontario		
Region of Peel	933,000	A report will be introduced to Council in Spring 2001, recommending adoption of a three-bag limit.
Town of Newmarket	76,000	Baseline waste data for 1998 unavailable (introduced September 1999). Prepared short case study.
Town of Orangeville	23,492	The Town recently passed a motion in Council to implement a three-bag limit in June 2001.
Western Canada		
Capital Regional District	222,100	Unable to provide waste data for the Region since each municipality is responsible for waste collection. Contact with municipalities unsuccessful in obtaining data. Prepared short case study.
Delta	93,000	Unable to provide necessary data.
Burnaby	180,000	Only able to provide information for 1998 – 2000. Three bag limit introduced in January 1997. Prepared short case study.
United States		
Los Angeles	3,485,400	Unable to provide the necessary data. Prepared short case study.
San Francisco	752,000	Private haulers collect from commercial and residential customers along the same route. There is not breakout of residential tonnage available. Prepared short case study.
Oklahoma City, Oklahoma	444,700	Data not provided as PAYT system permits residents to place unlimited waste curbside.
Albuquerque, New Mexico	385,000	Data not available.
Oakland, California	372,000	Data not available.
Sacramento, California	371,850	Data not provided as no impacts on waste flows through system have been observed.
Snohomish County, Washington	308,000	Too busy to provide data.
Pima County, Arizona	305,000	County not responsible for waste and recycling collection, and therefore does not track data.
Grand Rapids, Michigan	189,000	**Data provided incomplete. Short case study provided.**
Baton Rouge, Louisiana	224,000	Data not readily available.
Berkley, California	103,000	Unable to provide the necessary data. Prepared short case study.
Norfolk, Virginia	241,000	Data not readily available.
Aurora, Illinois	100,000	The City does not keep waste records past 5 years. Prepared short case study.

A case study has been developed for each community profiling the characteristics of the bag limit or user pay/PAYT program and the long-term impacts on quantities of waste recycled, disposed and recovered in the leaf and yard waste program. The analysis of the case studies assesses the relevance to Toronto.

3.0 BAG LIMITS

3.1 Definition

Increasingly, communities throughout Ontario and across Canada have begun to impose bag limits on the amount of waste that can be sent for disposal by the householder. A bag limit program restricts the number of bags or containers of garbage that may be placed at the curb for weekly collection. If the homeowner exceeds the limit established by the municipality then the additional bags are not collected.

Municipalities tend to impose bag limits only on garbage and not on alternative waste diversion activities, such as recycling or leaf and yard waste collection.

Occasionally, the bag limit program is confused with a user pay/PAYT program, which may or may not impose a bag limit to restrict the number of bags (with or without tags) that may be sent for disposal.

3.2 Advantages

Bag limits achieve the following objectives:

- Bag limits make the householder more conscious of the amount and type of waste they generate on a weekly basis and encourage them to become more personally responsible for their generation of waste.

- Bag limits encourage participation in alternative waste diversion activities, such as curbside recycling, leaf and yard waste composting, backyard composting and source reduction (i.e. purchasing products with less packaging).

- Bag limits can help reduce the community's solid waste management costs by diverting waste from more expensive disposal options, such as landfill, to more cost effective options such as recycling and composting.

- Bag limits are introduced as a precursor to a user pay program, because they enable the residents to make a gradual transition from having no limits on waste generation to eventually paying for their waste.

Bag limit programs achieve higher success rates if coupled with a well-established and convenient waste diversion infrastructure including a curbside recycling program, regular leaf and yard waste curbside collection program, backyard composting, etc. The waste diversion program in Quinte West has been attributed to "the gradual introduction of waste diversion, followed by household composting and finally user-pay and bag limit regulations – has also helped to minimize resistance and maximize cooperation (of local residents)" (Baldwin, October 10, 2000).

3.3 Residential Waste Diversion Impacts of Bag Limits

Bag limit programs work under the right circumstances, when the bag limit is set at a low enough number it encourages waste diversion activities, especially when convenient and appropriate waste diversion programs are made available to the householder.

Communities that establish a bag limit program at four or more bags rarely experience a noticeable reduction in waste sent to landfill or an increase in materials diverted through recycling or composting programs.[4] Since many communities experience set out rates between 2 to 3 bags of garbage per household per week, a bag limit greater than 3 will not encourage residents to re-think their waste generation and disposal habits or to participate to a greater extent in waste diversion activities. Nor is there any reason for the resident to engage in source reduction activities.

The introduction of a three-bag limit can alter waste disposal and diversion behaviour (AMRC, 1996). While most residents can easily achieve the three bag limit the majority of the time, the bag limit benefits the community by targeting the up to 8% of the population[5] that exceeds three bags of garbage a week on a regular basis and does not fully participate in the waste diversion programs.

Impact data resulting from bag limit programs is limited since only a handful of large Ontario communities have introduced bag limits of three or less, to date. The Town of Markham (pop. 175,000) and the City of Peterborough (pop. 70,000) provided reliable impact data demonstrating a positive benefit of bag limits in diverting waste from landfill. The City of Peterborough has experienced a greater percentage change in waste diverted to landfill and increased recycling rate compared with Markham which is partly attributed to its 2 bag limit compared with Markham's 3 bag limit (also, it should be noted that Markham's 3 bag limit is considered very flexible in that residents are provided with numerous alternatives for disposing extra waste, see below for further explanation). These positive impacts have remained consistent over time.

Furthermore, in the case of the City of Peterborough, the community experienced a significant increase in the recycling rate and leaf and yard waste collection beginning the year after it introduced a two-bag limit (from a three bag limit). The Town of Markham has not experienced similar results; in fact, its recycling rate and leaf and yard collection rate has declined over time. Several explanations for these observations include:

- Markham is a fast growing commuter community, therefore new residents may not consistently participate in its recycling program and many newly constructed homes lack lawns and trees, therefore participation in the leaf and yard waste program does not occur;
- The three bag limit program is augmented by 12+ free tags a year and two amnesty days which may not encourage residents to focus their efforts on waste diversion activities in order to reduce the number of bags set at the curb;

---

[4] During the screening process for identifying relevant case studies, communications with Peter Watson, Manager of Waste Management at the Region of Durham established that among the six of the eight municipalities within the Region which have imposed a four bag limit on residential garbage placed at the curb none have experienced any changes in waste diverted from landfill or increased recycling rates.

[5] Based on recent set out data provided by the Town of Markham (2001)

- Variations in growing seasons have resulted in a fluctuation in the amount of leaf and yard waste material recovered in some years.

Other communities in Ontario are gearing towards the introduction of a three-bag limit. The Town of Orangeville (pop. 22,000) recently passed a motion in Council to implement a three-bag limit in June 2001 (the Town currently has a four bag limit in place) and the Region of Peel (pop. 933,000) will introduce a report to Council in Spring 2001 recommending that the Region adopt a three-bag limit (currently the Region has no bag limit policy).

At the same time the communities have imposed a three or less bag limit, they have ensured that adequate waste diversion programs and policies are in place. For example, the Town of Markham introduced a grass ban concurrent with the three-bag limit and has an expanded blue box collection program. The City of Peterborough introduced a ban on recyclables at landfill concurrent with the two-bag limit and has a mandatory leaf and yard waste composting by-law. In 1993, the City offered weekly curbside collection of leaf and yard waste and continues to expand its recycling program since the introduction of the two-bag limit.

Communication has played an important role in the implementation and acceptance of the bag limit programs. Education and promotional campaigns were introduced well in advance of the launch of the bag limit programs and were maintained throughout the early stages of the program. Traditional advertising sources were commonly employed including information brochures delivered to each resident, advertisements run in local newspapers, newsletters, etc. The Town of Markham also hired staff to operate a hotline for the first several months of bag limit policy.

3.4 Public Participation and Behaviour Change

The introduction of bag limits (three or less) makes residents take a look at their waste generation habits and establish moderate modifications in waste disposal and diversion activities. More importantly, these bag limits target those residents who habitually set out large quantities of garbage and participate in waste diversion programs on a sporadic or minimal basis. Bag limits send the message that extra generation and disposal of waste is no longer tolerated by the community, and that a reasonable level of garbage collection service will be provided to the resident.

Most communities with bag limits in place have established enforcement procedures and fines in their waste management by-laws but at the most will leave behind excessive bag of garbage at the curb. Communities rely on education and promotion to inform residents about the "zero-tolerance" towards illegal dumping and enforcement of the bag limit rather than enforcing the by-law penalty sections. This action has established good results in achieving the goals of the bag limit program.

With one or two exceptions, most communities will introduce a partial user pay system instead of a two or one bag limit system. The County of Northumberland is the only community identified that has a full user pay program coupled with a three-bag limit (see the case study).

The bag limit helps to make the transition to a user pay program easier for residents. With a gradual lowering of the bag limits over several years, residents can make moderate adjustments to their waste generation and disposal activities without feeling burdened. Many communities in Ontario are adopting this approach by introducing a fairly high bag limit program (i.e. four or

more bags) and each year reducing the number by one bag or two bags until they feel that the residents will accept the transition to a user pay program (i.e. Region of Durham, the City of Orangeville, Niagara Region).

3.5 Supporting System Needs

Bag limit programs need to have support systems in place to ensure success. These support systems should include:

- Enforcement procedures to ensure the system operates smoothly. Enforcement procedures and fines should be introduced into local waste management bylaws. Often, however, establishing a policy with the collection crew to not collect excessive garbage placed a the curb is enough of an enforcement procedure. Some communities will attach cards to the excessive garbage explaining the infraction.
- Education and promotional campaigns that begins prior to the implementation of the bag limit program and continues throughout. These education and promotion campaigns can address the economic and environmental benefits of the program and the successes achieved as a result of the program.
- Expanded waste diversion programs to ensure that residents have adequate diversion options for dealing with their waste. This should include establishing a common level of service for all residents residing in the jurisdiction.

4.0 USER PAY/PAY-AS-YOU-THROW (PAYT) PROGRAMS

4.1 Definition

In a User Pay System, waste generators pay for waste collection on the basis of the amount of waste generated. User pay may be introduced under one of two scenarios: a full user pay program or a partial user pay program. Under a full user pay program, all garbage that is placed at the curb for collection must be paid for in advance (i.e. by purchasing a tag and placing it on each bag of garbage). Under a partial user pay system, a designated number of bags/cans are permitted to be placed at the curb without requiring advance payment. If the householder exceeds the designated number of bags permitted at the curb then any additional bags/cans must be paid for in advance (i.e. by purchasing a tag and placing it on each additional bag of garbage).

Throughout Canada and the United States, all user pay/PAYT programs are "volume based" systems. The volume-based system charges customers based on the volume of waste generated, using designated bag sizes or container sizes. Under this system there are a number of types of user pay programs that can employed including:

Marked bag – Standardized marked bags can be purchased at local retail outlets, or are distributed to the householder by the city.

Marked tags/stickers – Marked tags or stickers (that stick to bags or are tied to cans) are sold to the householder. The distribution networks for these tags are the same as for metered bags. Some form of volume restriction is generally used with metered stickers. This limits the size of container or bag to which the sticker can be attached (e.g. maximum 30 gallon volume). Some communities offer residences different levels of tags to enable them to put out smaller bags (20 gallon) or larger bags (30 gallons) of waste.

Variable standardized container rate – Generators are offered different sizes of containers and pay a monthly or bi-annual fee according to the size of the container. As the size of the container increases, so too does the subscription price. Many communities offer two or three sizes (30 gallon, 60 gallon, and 90 gallon). Some communities have had to respond to demands for even smaller containers and are offering "mini cans" (12 gallon). The hauler collects waste from only designated containers.

Weight-based systems – These systems tend to be more expensive to implement and operate and require special equipment, including truck-mounted scales for weighing waste and some type of system (for example, bar-coding on waste cans) for recording this information and entering it into a computer. Residents then need to be billed for this service, which may increase a municipality's staffing needs (EPA, 2001). Currently, there are very few communities in the United States that have fully implemented weight-based programs due to infrastructure and technology limitations.

4.2 Advantages of User Pay/PAYT

Experience in North America has demonstrated that there are benefits to be gained from adopting user pay/PAYT programs,

> "The three major selling points of a PAYT program are known as the 'three Es': environment, economics, and equality. PAYT is billed as a program that can encourage residents to recycle and reduce waste, help communities pay for solid waste costs, and distribute costs more evenly among consumers" (Horton, December 1998, pg. 50)

These advantages are particularly apparent if some element of variable rate pricing is included in the funding structure. The Key advantages of user pay/PAYT programs are:

- ***A better understanding of waste management costs*** - In order to implement a utility, or any form of unit or variable rate pricing system, the costs of the current system need to be understood. This step alone can helped communities to identify opportunities for increased efficiencies;

- ***The costs of waste management can be removed from property tax bills*** - This makes the costs of waste management visible to householders and directly links these charges to the actual costs incurred for providing this service;

- ***There is a more equitable distribution of the costs of providing waste management services*** - Households are charged directly for the services provided and in the case of variable rate charges, in proportion to the amount of waste they generate. Waste management charges can be removed from the tax bills of waste generators who may not receive these services from the municipality (i.e. industrial, commercial, institutional and multi-family buildings whose property tax bills often include the cost of waste management services they do not receive).

- ***It can provide a long term funding solution for recycling and composting*** - This can be done by incorporating the costs of waste diversion programs into the fees charged for waste collection and disposal, or by implementing user charges for these services as well.

- ***It can result in increases in the diversion of wastes to recycling and composting programs*** - Communities that have implemented variable rate pricing programs report increases in recycling and composting rates, to a lesser extent.

- ***It can result in reductions in waste disposal*** - Communities report reductions in the amount of waste disposed of between 15% and 45% immediately after a variable rate pricing structure for garbage collection is implemented.

The advantages of user pay/PAYT programs are supported by studies conducted on the impact on residential waste reduction and recycling rates. A study conducted by Hong and Adams (1993) performed an economic analysis of residential recycling, comparing the rate of recycling

by households under two types of pricing systems – a flat fee[6] and unit pricing. Those households charged a flat fee recycled less than those households charged under a unit pricing system; in fact, the households charged under a flat fee did not change their recycling rates. This result is confirmed by Reschovsky and Stone (1996) and Skumatz (June 1993) who argue that flat fees provide no incentive to produce less waste.

In addition, a study conducted by Skumatz (August 2000) demonstrated that PAYT programs lead to 5 to 7% source reduction as expressed as a percentage of residential solid waste generation. Source reduction is attributed to changes in behaviour including buying items in bulk or with less packaging, reusing items, reducing junk mail and backyard composting.

4.3 Partial and Full Bag/Tag Systems and Residential Waste Diversion Impacts

A report published by the Association of Recycling Coordinators (AMRC, 1996), suggested the reduction in the amount of waste sent to landfill following the introduction of user pay programs is as follows:

- Partial, two "free" bags, user pay system will result in 15% to 20% reduction in residential waste sent to landfill;
- Partial, one "free" bag, user pay system will result in 25% to 35% reduction in residential waste sent to landfill;
- Full, no "free" bags, user pay system will result in 30% to 45% reduction in residential waste sent to landfill.

The AMCR notes that the reduction in waste sent to landfill depends on the level of diversion alternatives and participation achieved by the community.

All communities contacted during this study experienced significant reduction in waste to landfill in the first year after the introduction of user pay. In fact the amount of waste diverted from landfill in the first year of the program falls within the ranges reported by the AMRC (1996), as follows:

- The City of Barrie, (population 100,000 with a 2 bag partial user pay program) experienced 16% reduction in residential waste sent to landfill in its first full year of the program
- The City of Orillia, (population 28,000 with a 50 tag/1bag partial user pay program) experienced 25% reduction in waste sent to landfill in its first full year of the program
- The Town of Georgina (population 39,000 with a full user pay program) experienced 41% reduction in residential waste sent to landfill in its first full year of the program
- The City of Stratford (population 30,000 with a full user pay) experienced 25% reduction in residential waste sent to landfill in its first full year of the program

However, as discussed during the introduction of this report, many studies advocating user pay/PAYT programs report on the waste diversion benefits experienced immediately after the

[6] The flat fee method of financing residential waste management programs is commonly employed throughout the United States through the establishment of separate waste management enterprise/utility funds. Few communities in Canada employ flat fee approaches, with the exception of Edmonton, Alberta (see case study). Edmonton has not experienced a change in waste diverted from landfill or increased recycling rates as a result of the establishment of its Waste Management Utility fund.

implementation of the program, but not over the long term. The purpose of this study is to evaluate the impacts over a long period of time. Consequently, the results from the case studies for the bag/tag programs (mostly Ontario based programs) indicate that while all communities experience significant positive impacts in waste diverted from landfill shortly after the implementation of a partial or full user pay program, over time the user pay programs do not necessarily continue to achieve the high reduction of waste to landfill observed in the early years. There may be several explanations for this observation.

Householders will adjust to the minimal waste reduction and diversion requirements imposed by a user pay program but will not go beyond those minimal requirements; therefore, once the initial modifications in behaviour are established to meet the mandates of a new user pay program, the householder makes no additional modifications and maintains status quo. This is supported by reviewing the changes in set out rates before and after the introduction of a partial user pay program. While the weekly set out rate for residential garbage declines after the introduction of the partial user pay program, the level dips just below or slightly above the established "free" bag limit. For example, the City of Barrie has a 2 bag partial user pay program and staff have observed the average set out rate is approximately 2 bags/hhld/wk.; the City of Orillia's set out rate averaged 1.4 bags/hhld/wk in 1999 for a one bag partial program[7].

The $1 tag fee is not high enough to maintain or promote further waste reduction efforts over time. Residents become complacent about the $1 tag fee and over time the fee looses its drive as a financial incentive to encourage waste reduction. In situations where a community has imposed a high tag fee, it maintains high waste diversion rates; for example, the City of Trenton continues to experience significant diversion of residential waste to landfill and participation in its recycling program mainly because it charges $2.50 per tag and requires all bags of garbage to have a tag attached (full user pay program).[8] The $1 tag fee is rarely based on any financial assessment or needs of the community, rather it is considered an acceptable fee to charge residents during the launch of a user pay program without causing significant backlash by residents – " It's a way to get in the game."[9]

Residents will find alternative means for legally disposing of their garbage if the means are made available. For example, the City of Stratford, which has a full user pay program, charges $1.20 per bag at the curb but only $0.50 per bag at the landfill. Consequently, it has experienced a 160% increase in residential self-haul waste going to landfill, with the average vehicle discarding 2.1 bags (compared with 1.0 bags per household placed at the curb). The City of Barrie is also experiencing a surge in residential waste sent to landfill as a result of a policy permitting householders to take unlimited amounts of waste to the landfill up to four times a year. In both cases, City staff feel that these policies do not encourage further waste reduction or diversion and want to see the "loopholes" closed.

In all the partial and full user pay case studies, the user pay programs had a positive impact on recycling rates, which for the most part has been maintained over time. The authors of one study argue that provision of a convenient curbside recycling program is more important than the introduction of a user pay program for encouraging participation in the recycling program, "unit pricing is less effective than curbside collection in fostering increased intensity of recycling"

---

[7] The City of Orillia distributed 50 free tags to each household in 1999, which translated to one "free" bag of garbage per week.

[8] The City of Trenton faced financial bankruptcy if it didn't impose full costing of its waste management system through the user pay program.

[9] Communications with Peter Watson, Manager of Waste Management, Region of Durham.

(Jenkins et. Al., May 1999, pg. 15). However, a curbside recycling program coupled with a user pay program can promote higher recycling rates than either program operating on their own, as demonstrated by the case studies.

Many of the Ontario based communities consistently report a decline in the collection and diversion of leaf and yard waste material over time. Some explanations for this anomaly are as follows:

- Those communities characterized by high growth rates (i.e. Barrie) have new subdivisions with no lawn or trees and therefore no leaf and yard waste material, which skews the per SFH or per capita leaf and yard waste collection rates[10].
- The quantity of leaf and yard waste collected from year to year is highly weather dependent. Early snow moves leaves from one year to the next. A wet fall results in heavy leaves and greater tonnages and conversely a dry fall results in lower tonnages. A wet spring and summer results in much more yard waste.[11]
- Over the past decade, gardening has become a popular past time among homeowners, which may result in more households using backyard composters to generate compost for the gardens. Leaves can be used as a protective covering for flower beds in the winter and plowed under for added nutrients in the spring.

4.4 Container Subscription Systems and Residential Waste Diversion Impacts

Those US communities profiled in the case studies (City of Austin, Texas; City of Portland, Oregon; City of San Jose, California; and City of Seattle, Washington) have operated PAYT programs since the late 1980s or early 1990s and were able to provide good data over a long period of time. However, this was not the situation for many of the contacted US cities, which were unable to provide reliable data over the period of time required for this study. Those cities with data problems encountered provided the following explanations:

- Some communities did not keep records of waste collection activities over a long period of time;
- Some communities did not break down waste collected from residential and commercial units;
- Some communities did not keep records since the collection of residential waste is franchised to the private sector or for other reasons.

All the profiled US communities have implemented variable standardized container PAYT programs. The variable containerized approach enables communities to use automated or semi-automated collection vehicles, which has several benefits:

- One collection crew can be used to operate the collection vehicle;
- Worker injury is reduced and thus the cost of medical insurance (if applicable);
- Reduced salaries from reduction in collection crew (Knapp, February 1997).

---

[10] Communications with City of Barrie staff – In the case of Barrie, the city is experiencing a growth of 2,000 to 5,000 new homes in new suburbs each year.

[11] Communications with Peter Dance, Director of Operations, City of Orillia

However, there are trade-offs. The City of Austin, Texas discovered that it was unable to cover the same number of residential stops in an 8-hour day due to the increased time required to use the semi-automated equipment. Consequently, the City of Austin had to hire four additional collection crew after automated collection vehicles were used.[12]

The profiled US cities have implemented variable containerized PAYT programs ranging in size from a micro can (12 gallons) offered by the City of Seattle, Washington to a large 90+ gallon cart offered by the Cities of Austin, Texas; San Jose, California; and Portland, Oregon. These cities offered containers ranging in size from 32 gallons to 60 gallons to 90 gallons. Two of the cities employ a default strategy whereby the resident is issued a specific sized container (60 gallons in Austin, Texas and 32 gallons in San Jose, California) and the onus is on the resident to request a different size. Needless to say, these highest container subscriptions correspond with the default settings (82% of residents subscribe to the 60 gallon container in Austin, Texas and 87% of residents subscribe to the 32 gallon container in San Jose, California). In those cities where the resident chooses the size of container, fewer resident subscribe to the large containers (61% of residents subscribe to a 32 gallon container in Portland, Oregon and 63% of residents subscribe to a 32 gallon container in Seattle, Washington).

The PAYT program has had a beneficial impact on residential waste diverted from landfill in all profiled US cities. In all cases, PAYT has achieved an average of 15 to 25% reduction in waste sent to landfill as a result of the PAYT program[13] and the levels have been more or less maintained over the years. This observation is partly explained by the nature of the variable container program, in that residents are more likely to fill the subscribed garbage container because presumably if they did not continually fill the container then they would switch to a smaller and less expensive container. For this reason, bag tag programs may be more successful at diverting waste as reported by Kinnaman and Fullerton (April, 1997) who examined over 100 U.S. communities with PAYT programs and discovered that "bag and tag programs reduce garbage (and increases the amount of recycling) by much more than a subscription program" (pg. 24 and 26).

Some cities encourage the switch to smaller containers; for example the City of Portland offers its smallest 20 gallon container at a rate below the cost to provide the service and Austin, Texas charges $15 to increase the size of the container but does not charge to decrease the size.

In three of the four variable container subscription studies case studies, a new or expanded recycling program was introduced concurrent with the implementation of PAYT. Consequently, it is not surprising to see recycling rate increases of over 100 to 200% since the beginning of the PAYT program. Furthermore, all profiled US cities continue to experience increased recycling rates each year since PAYT was introduced. Some of this is explained by the continued expansion of materials accepted in the recycling programs over the years. It can also be explained by more widespread adoption of recycling as a social norm.

The diversion of leaf and yard waste varies considerably among the profiled US cities with two cities (San Jose, California and Seattle, Washington) experiencing moderate increases in diversion of leaf and yard waste materials since the introduction of PAYT and the City of Austin, Texas experiencing major increases in diversion rates (leaf and yard waste curbside collection

[12] City staff did report significant decreases in employee injuries as a result of the switch to semi-automated collection vehicles.

[13] It should be noted that in the cases of Seattle, Washington; Austin, Texas and Portland, Oregon a new or expanded recycling program was introduced at the same time as the PAYT program.

was introduced shortly after PAYT). The cities of Portland, Oregon and Seattle, Washington charge for some level of leaf and yard waste collection in order to provide a greater incentive for householders to engage in backyard composting and grass cycling and this approach has had an impact on the rate of diversion achieved.

An EPA document (June 1999) states that the most successful strategies employed by communities to achieve high participation and waste diversion rates include making waste diversion programs convenient, enacting mandates (i.e. mandated recycling by-laws/ordinances, grass bans, etc.) and implementing PAYT programs. In fact, eleven of eighteen communities profiled as community record-setters in achieving more than 50% diversion rate of the residential waste stream have PAYT programs in place. The case studies for the Cities of San Jose, California and Seattle, Washington show them achieving over 50% diversion rate for the residential waste stream.

4.5 Multi-Family Buildings

To date, no program has been established in any North American community that provides a direct charge for garbage disposed on the tenant of a large multi-family dwelling. While technology required for such a task has been proposed, no company has succeeded in developing a device that would measure (by weight or volume) waste sent for disposal (via a chute or direct to a dumpster) by each tenant and charge accordingly. Instead, where larger apartment units are served by private haulers, or contract for service with the municipality, the costs of waste management are charged back to the residents as part of their rent or property fees.

In the case where a building receives private collection services, the owner or manager of the building pays directly for the collection service according to the size of the bin and the frequency of collection provided. Passing these direct costs back to the tenant is too onerous for owners/managers of large buildings and, therefore, no direct economic incentive is provided to residents at the household level to reduce the quantity of waste they generate. Charging by the size of the bin and the frequency of collection, however, will act as an incentive to the property owner or manager to implement recycling programs in an effort to reduce the frequency of collection. The onus is on the property owner or manager to encourage renters to use the recycling bins and then to pass on the disposal savings. One building owner in San Jose, California was able to reduce his waste disposal costs by 50% through an aggressive recycling program implemented in his complex. The savings were used for a beautification program, whereby over 26 trees and 800 plants were planted around the property.

In the case of municipal collection, most municipalities provide collection services on a regular basis. Since payment of service is not directly related to frequency of collection and size of the bin, there is no incentive for property owners or managers to minimize the amount of waste being generated and to introduce recycling programs. For this reason, municipalities engaged in user pay have either opted to discontinue providing collection services to multi-family buildings or have introduced payment schedules based on size of bin and frequency of collection (i.e. San Jose, California; and Seattle, Washington)

In situations of low-rise buildings (5 stories or less) where residents must bag their garbage and deliver it to the curb for collection, it is possible to require residents to use metered bags/stickers/tags and to have them pay directly for their use. Some landlords will distribute the bags/stickers/tags to the tenants and charge accordingly or they may require the tenant to

purchase the bags/stickers/tags at designated outlets just as a resident living in a single-family household must do.

4.6 Mixed Commercial and Residential Areas

Some of the studied communities with user pay/PAYT programs have applied the user pay/PAYT program to retail and commercial establishments receiving municipal curbside collection. This approach reduces the administrative burden associated with developing a separate program for this sector and also reduces confusion for the collection crew in residential and commercial collection areas. For example, The City of Orillia, which has a partial user pay program in place, requires that all retail and commercial establishments receiving municipal curbside collection comply with the user pay program requirements. City Staff report that the retail and commercial establishments have not experienced difficulties making the adjustment since most of their waste is recyclable.

Those communities with separate programs for the residential sector and the retail/commercial sector, receiving municipal curbside collection, have experienced problems in administering the program. For example the City of Barrie has a partial 2 bag user pay program for its residential sector, yet permits its retail and commercial sector, which receives municipal curbside collection to place up to ten bags of waste at the curb every week. Consequently, the collection crew tend to collect all waste placed at the curb in the downtown core from mixed residential and commercial establishments and have ignored the user pay program requirements.

4.7 Public Participation and Behaviour Change

The introduction of user pay/PAYT programs does have a positive impact on residential waste generation and diversion behaviours, especially immediately following their implementation. Residents respond to the direct financial cost associated with waste generation although in the case of the Ontario user pay case studies, the behaviour change is not necessarily maintained at the original level over time. In the PAYT cases, the behaviour is maintained although this is somewhat explained by the nature of the variable container program (as explained in section 5.4).

Once introduced, user pay/PAYT programs are generally well received by the public. Surveys conducted after the introduction of PAYT programs have received favourable comments, for example:

- In 1996, a survey conducted by the City of Seattle revealed that 90% of residents were satisfied with the PAYT system;
- In 2000, a survey conducted by the City of San Jose revealed that 88% of the population were satisfied with the PAYT program (up from 80% in 1993);
- In 1998, a City Auditor's Report for Portland found that 76% of residents rated the garbage and recycling services as good or very good.

Despite initial concerns about illegal dumping, the majority of communities with user pay/PAYT programs did not experience serious illegal dumping problems. As in the case of the profiled communities with bag limit programs in place, most communities have established enforcement procedures and fines in their waste management by-laws/ordinances to deal with illegal dumping. Communities rely on education and promotion to inform residents about the "zero-tolerance" towards illegal dumping rather than enforcing the by-law/ordinance penalty sections.

4.8 Supporting System Needs

Successful implementation of a user pay system requires a number of elements. These include:

Education - It is critical to allow adequate time and resources for elected representatives, staff, media and citizens to fully understand the objectives and the merits of user pay programs for waste management. Key messages include:

- the increased incentive and reward for waste reduction and diversion
- success stories in other comparable communities
- the opportunity to reduce or at least hold the line on taxes
- the fairness in having people pay directly for excess garbage they produce

Community Involvement in the Design of the Program - Increasingly, program designers are recognizing the importance of interacting with the community by developing community task groups that provide direct feedback and input into the design process. This approach ensures that members of the community feel comfortable with the program and ensures buy-in at the onset of program implementation.

3Rs Opportunities – Residents must have alternatives, other than the garbage bin, to manage their waste. These include good recycling, composing, bulky drop-off/pick-up and other programs. A common level of service should be provided for all residents in the jurisdiction.

Convenience - The user pay/PAYT system must be convenient for the community to use. There must be a good distribution network set up for bags, tags or carts to ensure that they are readily accessible to the public. The equipment used must work effectively, for example bags must be durable and tags must stick. Most communities encourage householders to place the sticker around the neck of the bag with each end of the tag sticking together. This approach minimizes the chance of the sticker falling off the bag or being stolen or reused.

Tag Distribution System - Tag distribution is the responsibility of the municipal government, which will select retail stores and municipal buildings (i.e. libraries or city hall) as distribution locations. Retail stores often include grocery stores, corner convenience stores, and drug stores. Store owners are provided with advertisements (i.e. window ads and stickers) to promote the program and are listed in local newspapers and other educational material as a participating outlet. Most surveyed communities suggested that this level of promotion is enough for the retail owners, who also benefit from customers coming in to purchase the tags and other merchandise. Rarely are the retail owners financially compensated.

Infrastructure Modifications – Depending on the type of system introduced, there may be a need to alter the existing waste management infrastructure to accommodate the system. For example, a variable subscription system will require the establishment of an automated billing system and the possible retrofitting of collection vehicles for semi or fully automated collection.

Enforcement - Some form of enforcement is necessary to keep the system operating smoothly. Methods are needed for solving potential illegal dumping by the homeowner. Some communities will hire additional enforcement staff for the early stages of program implementation and will enact anti-dumping legislation with fines that act as a deterrent to illegal

dumping. Consequently, illegal dumping rarely becomes a long-term problem for communities. Keeping enforceable weight limits on bags and containers discourages over-compaction of the containers.