Trash Services Study
Final Report

Presented to

City of Fort Collins, CO

July 1, 2008

R3 Consulting Group, Inc.
Resources, Respect, Responsibility

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July 1, 2008

Ms. Ann Turnquist
Council Policy Manager
City of Fort Collins
300 La Porte Avenue
Fort Collins, CA 80522-0580

Subject: – Trash Services Study Final Report

Dear Ms. Turnquist:

R3 Consulting Group Inc. (R3) was engaged by the City of Fort Collins (City) to complete a Trash Services Study to determine opportunities to reduce the impacts of trash collection services in the City and increase diversion. The attached Final Report presents our findings and recommendations.

We wish to thank you and City staff for their assistance during our review, notably Susie Gordon, Senior Environmental Planner, and Rick Richter, Pavement Management Program Manager. We also wish to thank the management of Gallegos Sanitation, RAM Waste Systems and Waste Management who met with us at the beginning of the engagement and provided valuable information in support of our review.

* * * * * * *

We appreciate the opportunity to be of service to the City. Please do not hesitate to call me or Richard Tagore-Erwin at (916) 576-0306, or e-mail us at wschoen@r3cgi.com or rterwin@r3cgi.com if you have any questions or comments regarding our Final Report.

Yours truly,

R3 CONSULTING GROUP INC.

William H. Schoen
Principal

Cc. Richard Tagore-Erwin

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Executive Summary

Background

The City's residential collection system is an open competition system in which licensed haulers compete for accounts. While the haulers are regulated through the City's licensing process, Municipal Code requirements and applicable ordinances (i.e., Pay-As-You-Throw and Recycling Ordinances), that regulation is limited. There are few regulatory requirements specific to minimizing the impact of trash collection services with respect to air quality, noise, and the cost of street wear or improving neighborhood aesthetics and safety. In addition, while haulers must offer recycling services to residents and businesses, there are no associated diversion levels that the haulers must achieve as a condition of their license.

Project Objectives

The overall project objective was to prepare a comprehensive study that answers the following problem statement/question:

> ***In what ways can the City reduce the impacts of trash collection services in Fort Collins, addressing issues of street wear, air quality, neighborhood aesthetics, noise and other neighborhood impacts?***[1]
>
> ***Are there ways the City might also improve diversion rates for recyclables?***

A major related question is whether there would be a net benefit from switching from the current open competition residential collection system to some form of districted collection system. As specified in the City's Request for Proposals (RFP), the review of options to address the above project objectives, as well as potential changes to the existing open competition system, was to include consideration of:

> ***Alternatives that make improvements to the system without harming existing haulers.***

[1] The City's RFP specifically mentioned safety as an additional issue to address although it was not referenced in the problem statement/ question.

Executive Summary

Summary Findings

Our major findings are presented below followed by our suggested priority options/recommendations, which are listed in ***Bold Italics***. As appropriate, we recommend that the City work with the licensed haulers and seek their input related to the various options/recommendations presented in this report. The objective of any such collaboration would be to implement meaningful improvements to the City's trash collection system that support the City's objectives without being unnecessarily burdensome on the haulers.

Review of Trash Collection Impacts

Street Maintenance Impacts

- Trash trucks are typically the heaviest vehicles regularly operating on residential (local) streets and are a major contributor to wear and tear on those streets.
- The most significant step the City can take to minimize trash truck street maintenance impacts is to reduce the number of trash truck miles traveled on the City's streets.
- In general, all other factors the same, moving from an open competition collection system to a districted collection system (or a City-wide contract for services) would be expected to reduce the number of vehicle miles traveled with a corresponding decrease in the associated street maintenance impacts.
- Potential residential street maintenance savings associated with a districted collection system are estimated to be on the order of +/- $170,000 annually.
- Requiring that haulers not load vehicles in excess of manufacturer recommendations and legal load weights would also help to control street maintenance impacts.

  Priority Options/Recommendations

  - ✓ ***Require that haulers not load vehicles in excess of manufacturer's recommendations or limitations imposed by state or local vehicle weight restrictions. Require haulers to implement an ongoing monitoring program to assure compliance with that requirement.***
  - ✓ ***Require 2 fixed rear axles on all new vehicles. Require full time use of pusher or tag axle on any existing vehicles with a single fixed rear axle.***
  - ✓ ***Implement a Districted Collection System or City-Wide Contract for Services to reduce the***

number of residential trash truck miles traveled and the associated street maintenance impacts.

Air Quality / Vehicle Emissions

- It is estimated that residential trash trucks operating in the City generated as much as 200 to 300 tons per year of carbon dioxide (CO2) emissions, in addition to nitrogen oxide and particulates.
- The most significant step the City can take over the short and medium term planning period to reduce vehicle emissions is to require haulers to comply with the EPA's 2010 diesel engine emission standards. With those standards, emissions from diesel engines will be a fraction of what they were less than 10 years ago.
- Natural gas and electric hybrid vehicles, bio-diesel fuel, operate-at-idle technology, automatic engine shut-off systems and other options may also provide additional emission benefits and should be considered, as applicable.
- Implementing districted collection (or a City-wide contract for services) would reduce the number of trash collection vehicle miles travelled and the associated vehicle emissions.
- Potential CO2 reductions associated with a districted collection system are estimated to be on the order of +/- 140 tons annually.

Priority Options/Recommendations

- ✓ ***Work with the haulers to develop a schedule for fleet compliance with the 2010 EPA Emission Standards.***
- ✓ ***Implement a Districted Collection System or City-Wide Contract for Services to reduce the number of residential trash truck miles traveled and the associated vehicle emissions:***
  - ***Require EPA 2010 Emission Standard compliant vehicles as a condition of the award of districts.***

Neighborhood Aesthetics

- Establishing license standards related to vehicle appearance (e.g., washing, and painting), maintenance (e.g., control of fluid leaks) and operational standards (e.g., controlling litter) would support improve neighborhood aesthetics.
- Implementing a districted collection system (or a City-wide contract for services) would reduce the number of trash

trucks traveling on residential streets. It would also reduce the number of days per week collection service occurs in a neighborhood and allow for standardizing trash containers, all of which would improve neighborhood aesthetics.

Priority Options/Recommendations

- ✓ ***Establish vehicle cleaning and painting requirements as a condition of the required license.***
- ✓ ***Implement districted collection to reduce the number of trash trucks on residential streets, the number of days per week collection service occurs and allow for standardizing trash containers:***
  - o ***Roll-out City-owned standardized wheeled trash containers with City logo.***

Noise

- As a first step in its efforts to reduce noise associated with trash collection services, the City should establish noise standards for all haulers as a condition of their license and require the haulers to verify compliance with those standards.
- Converting to natural gas vehicles and using operate-at-idle technology would significantly reduce vehicle engine noise. Without the necessary fueling infrastructure, however, natural gas vehicles are not a viable option in the City at this time. Operate-at-idle systems, however, are generally standard on all new side-loading vehicles and existing side-loaders can be retrofitted with the technology. Manufacturers are also starting to test this technology on rear- and front-loading vehicles.
- "Smart" back-up alarms that sense the level of ambient noise and adjust their volume accordingly can be used to reduce back-up alarm noise.
- Placing time limits on commercial collection activities near residential neighborhoods can help address noise related to commercial collection activities.
- Using plastic lids or plastic dumpsters, treating containers, lid supports and truck forks with sound-deadening materials and encouraging "best practices" training for drivers would reduce noise from commercial collection activities.
- Implementing districted collection (or a City-wide contract for services) would reduce the noise produced by trash trucks in transit from point-to-point due to fewer vehicles operating on residential streets. The noise associated with collection operations would also be limited to a single day and time in each neighborhood. The noise at the point of collection (i.e.,

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emptying containers) would not be reduced, however, since there would be no change in the number of pickups.

Priority Options/Recommendations

- ✓ ***Establish noise standards that are to be met by all haulers as a condition of their license and require haulers to verify and report on compliance with those standards.***
- ✓ ***Implement districted collection to reduce the number of trash trucks on a typical residential street and vehicle miles traveled.***

Safety

- Requiring haulers not to overload vehicles and assuring that all vehicles are specified with certain safety equipment (e.g., ABS breaking systems, rear and side strobe lights, reverse motion sensors, exception based video recorders) would support improved safety.
- The City should consider working with the haulers to sponsor a *"Slow Down to Get Around"* safety campaign. This industry sponsored campaign is designed to encourage the public to use the same amount of caution when passing a trash truck as they do when passing a school bus, emergency vehicle or road construction crew.
- Implementing a districted collection system (or a City-wide contract for services) would reduce trash truck miles traveled and support improved safety.

Priority Options/Recommendations

- ✓ ***Require that haulers not load vehicles in excess of manufacturer's recommendations or limitations imposed by state or local vehicle weight restrictions. Require haulers to implement an ongoing monitoring program to assure compliance with that requirement.***
- ✓ ***Implement a Districted Collection System or City-Wide Contract for Services to minimize residential trash truck miles traveled.***

Review of Diversion Issues

Diversion Metrics

- There is a limitation to the City's ability to accurately calculate its diversion rate. The Larimer County Landfill, and other neighboring landfills used by the licensed haulers do not have, or do not routinely use scales for weighing incoming loads. Tonnage is estimated by

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multiplying the volume of the collection vehicle by density factors established by each hauler, which vary significantly (from 500 to 900 pounds per cubic yard).

- The lack of scales at the landfills places a (potentially high) degree of uncertainty on the City's current estimated disposal data and the associated calculated diversion rate.
- While the licensed haulers are required to provide certain data, that data is not sufficient to provide the City with the ability to effectively evaluate individual hauler or program performance. If the City is to make effective progress towards its established diversion goal additional information needs to be provided by the haulers and that data needs to be accurate.

Priority Options/Recommendations

- ✓ ***Track and report the following diversion rates:***
  - o ***Overall for the City;***
  - o ***By waste stream (residential, commercial, roll-off);***
  - o ***By program type (e.g., residential curbside recycling program, yard waste program);***
  - o ***By account, by program (e.g., the average pounds per week of curbside recyclables collected per solid waste account); and***
  - o ***By individual licensed hauler by program and waste stream as a percentage of the material that they collect (control).***

In support of the above recommendations we further recommend that the licensed haulers be required to:[2]

- ✓ ***Report the number of residential solid waste accounts by service level (e.g., 30-, 60-, 90-gallon)***[3]***;***
- ✓ ***Report the number of commercial accounts by service level and collection frequency for both solid waste and recyclables (service volume/collection frequency matrix);***

[2] The recommended information should be readily available or easily calculated based on available data.

[3] The City may also wish to obtain the total number of HOA and HOA contract accounts and specific HOAs serviced to enable it to more effectively analyze trash truck street maintenance impacts. This information may also be necessary if the City decides to implement a Districted Collection System or City-Wide Contract for Services.

- ✓ ***Provide calculated curbside recycling and yard waste diversion rates on a pounds per residential solid waste account per week basis;***
- ✓ ***Provide calculated diversion rates for the material they control for each waste stream as part of their regular reporting requirements;***
- ✓ ***Provide an accounting of total reported disposal and diverted volume/tonnage by individual facility (e.g., Larimer County Landfill, North Weld Landfill, Earth Cycle etc.);***
- ✓ ***Include historical data for each required data set as part of the regular reporting process so that trends can be tracked and are clear to all parties;***
- ✓ ***Review reporting forms to confirm that haulers are providing required information in a complete and accurate form. Revise / reinforce required reporting requirements if necessary; and***
- ✓ ***Require that haulers provide complete and accurate data as a condition of their license. Provide the City with the right to audit required information to verify its accuracy and/or require the haulers to have their data audited by an approved independent third party on periodic basis to verify its accuracy.***

<u>Current Policies Practices and Programs</u>

- The City has in place a number of key policy and program components in support of its efforts to increase diversion including the City's Pay-As-You-Throw Ordinance and Recycling Ordinance.
- While the City's Recycling Ordinance requires haulers to provide recycling service to residential and commercial customers it lacks a mechanism to hold the haulers accountable for their performance related to diversion.
- The City needs to more actively regulate diversion activities, and more specifically, hauler diversion performance (e.g., establish minimum required hauler diversion requirements) if it is to significantly increase diversion.

Priority Options/Recommendations

- ✓ ***Establish minimum diversion requirements for the licensed haulers for the material streams that they control, either as part of the Recycling***

Ordinance or as a condition of the license or a district agreement (e.g., Require residential haulers to divert a minimum average of 10 pounds of curbside recyclables per solid waste account per week).

- ✓ ***Amend the City's residential PAYT Ordinance so that "rate design" further enhances waste reduction efforts per the Strategic Plan Phase 1 staff recommendation.***
- ✓ ***Roll-out any changes to the residential PAYT program in conjunction with comprehensive strategy to increase residential recycling (e.g., universal roll-out of City-owned single stream curbside recycling containers, universal roll-out of residential yard waste (organics) program with City-owned yard waste containers).***

Current Recycling Efforts

- The City has set a diversion goal of 50% by 2010.
- Significant additional diversion potential exists within the City's residential, commercial and roll-off waste streams.
- The licensed haulers are currently diverting approximately 7% of the material that they collect/control (14% of the residential waste stream, 2% of the commercial waste stream and 7% of the uncompacted roll-off waste stream).[4]
- If the City is to significantly increase diversion, the licensed haulers will need to significantly increase the amount of material they divert and/or other diversion options will need to be developed (e.g., a City-wide contract for residential recycling services; post-collection residential and commercial mixed waste processing capacity; construction & demolition debris processing capacity).

Priority Options/Recommendations

- ✓ ***Establish minimum curbside recycling program diversion requirements for the haulers (e.g., 10 pounds per solid waste account per week) as a condition of the residential license.***
- ✓ ***Provide universal roll-out of City owned single stream recycling containers.***

[4] These diversion rates are based on the licensed haulers reported disposal and diversion data for January – June 2007. The City's calculated diversion rate of 27% is based on the haulers' reported diversion as well as diversion associated with various other sources including recycling companies, the City's Climate Wise partners, recycling by large businesses not accounted for elsewhere and projected source reduction.

- ✓ ***Revise residential PAYT rate structure per the Strategic Plan Phase 1 staff recommendation. Provide recycling and yard waste services as part of a "bundled" residential rate (i.e., no additional cost for recycling and yard waste service).***

Review of Collection System Structures

Our review of Collection System Structures considered the following options:

- Current Open Competition System without any Changes;
- Open Competition System with Increased Licensing Requirements;
- Districted Collection System; and
- City-Wide Contract for Services.

Current Open Competition System without any Changes

- This option would maintain the current open competition system as regulated without any changes.
- Existing hauler interests would be protected and customers would maintain their ability to select their hauler.
- This option would do nothing to reduce trash collection service impacts or increase diversion.

Open Competition System with Increased Licensing Requirements

- This option would maintain the current open competition system, but add additional licensing requirements in support of the City's objectives to reduce trash collection impacts and increase diversion.
- Existing hauler interests would be protected and customers would maintain their ability to select their hauler.
- This option would not provide the reduced impacts that would result from the reduction in residential trash truck miles traveled associated with a districted collection system (or City-wide contract for services).

Districted Collection System

- This option would break the City up into districts with the City awarding separate contracts for each district to one hauler. To effectively district it will be necessary for the City to first determine which accounts are to be included (e.g., HOAs) and then obtain accurate account information by geographic region of the City.

- This option would provide for reducing overall residential trash collection impacts largely in relationship to the reduction in the number of vehicle miles traveled.
- This option would provide the opportunity to take other actions to decrease residential trash collection impacts that are not possible or may not be as easily implemented under an open competition system (e.g., requiring certain types of vehicle or vehicle specifications as a condition of a district agreement).
- This option would provide a more effective structure for establishing minimum diversion requirements and/or incentives for haulers to increase diversion than an open competition system.
- The option may provide for lower rates due to greater collection efficiencies and a "guaranteed" customer base.
- Under this option the City may be required to take over customer billing to allow it to establish a uniform City-wide rate structure.
- This option would not protect the existing haulers market share since they would be required to compete for the right to provide service within a district with no guarantee that they would be awarded a district.
- This option would not provide residents with the ability to select their hauler.
- This option would increase City administrative requirements.

<u>City-Wide Contract for Services</u>

- This option is similar to the districted collection system option above; however, rather than break the City up into districts a City-wide contract would be awarded to a single hauler.
- The benefits of this system are similar to the districted collection system. In addition, this option has several benefits over a districted collection system:
    - It may generate increased competition by the haulers given the larger associated market share;
    - Administrative requirements are less since they are specific to one hauler rather than multiple haulers;
    - It is not necessary for the City to control the billing process to provide a uniform City-wide rate; and
    - It offers the potential for the lowest possible rates due to economies of scale.

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- This option could be incorporated into a hybrid approach with either a districted or an open competition system for trash collection services and a City-wide contract for residential recycling services. In the case of an open competition system for trash collection, however, this would result in different collection days for trash and recycling for many customers. We are not aware of any jurisdictions that have such a system.

  Alternatively the City could maintain the open competition system but specify the day that service is to be provided in the various areas of the City. This would provide for same day trash and recycling service, but require the haulers to reconfigure their collection routes to be consistent with the specified service days.

- This option would not protect the existing haulers market share since they would be required to compete for the right to provide service within a district with no guarantee that they would be awarded a district.
- This option would not provide residents with the ability to select their hauler.
- This option would increase City administrative requirements.

Priority Options/Recommendations

- ✓ ***Implement a Districted Collection System or City-Wide Contract for Services to reduce the overall impacts associated with residential trash collection services and support a more effective system for increasing diversion from the residential waste stream.***

This recommendation is based entirely on the consideration of the best collection system structure to meet the City's stated project objectives of:

- Reducing trash collection service impacts; and
- Increasing diversion.

The recommendation does not consider other factors, including the impact on haulers and the associated loss of the ability of customers to choose their hauler.

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Introduction

Project Objectives

The overall project objective was to prepare a comprehensive study that answers the following problem statement/question:

> ***In what ways can the City reduce the impacts of trash collection services in Fort Collins, addressing issues of street wear, air quality, neighborhood aesthetics, noise and other neighborhood impacts?***
>
> ***Are there ways the City might also improve diversion rates for recyclables?***

A major related question is whether there would be a net benefit from switching from the current open competition residential collection system to some form of districted collection. As specified in the City's Request for Proposals (RFP), the review of options to address the above project objectives, as well as potential changes to the existing open competition system, was to include consideration of:

> ***Alternatives that make improvements to the system without harming existing haulers.***

Project Focus

The primary focus of this study was on the City's residential collection system and a review of options to reduce residential trash collection service impacts and increase residential diversion. Many of the issues reviewed and options considered, however, also apply to the commercial and roll-off collection systems. In fact, due to the nature of the commercial collection system (e.g., 10 licensed haulers), the benefits resulting from certain options may be greater within the commercial collection system than the residential collection system. As such, if the City is to realize the full potential of options to reduce trash collection service impacts and increase diversion it cannot limit itself to the residential sector. This includes consideration of potential changes to the collection system structure and/or regulatory requirements associated with the commercial and roll-off collection systems as well as the residential collection system. With that said, we believe that an initial focus on the residential collection system represents a reasonable starting point.

As appropriate, we recommend that the City work with the licensed haulers and seek their input related to the various options/recommendations presented in this report. The objective of any such collaboration would be to implement meaningful improvements to the City's trash collection system that support the

City's objectives without being unnecessarily burdensome on the haulers.

Report Organization

The report is organized into the following three major sections and key subsections:

Review of Trash Collection Impacts:

- Street Maintenance Impacts;
- Air Quality / Vehicle Emissions;
- Neighborhood Aesthetics;
- Noise; and
- Safety.

Review of Diversion Issues:

- Evaluation of Diversion Rate Metrics and Measurements;
- Evaluation of Current Policies, Practices and Programs; and
- Evaluation of Current Recycling Efforts.

Collection System Structure Alternatives:

- Current Open Competition System without any Changes;
- Open Competition System with Increased Licensing Requirements;
- Districted Collection System; and
- City-Wide Contract for Services.

For both the Review of Trash Collection Impacts and Review of Diversion Issues, background information is provided followed by an analysis of related issues, as applicable. Various options/recommendations are then presented for the City's consideration. Those options/recommendations listed in ***Bold Italics*** represent our suggested priority items.

Background

Current Collection System Structure

Residential, commercial and roll-off solid waste collection services in the City are provided through an open competition system in which licensed haulers compete for accounts throughout the City. All licenses are valid from the date of issuance and expire on the 31st of December of each year.

Article XV of the City's Municipal Code establishes certain license requirements including:

- Proof of general comprehensive liability/automobile insurance of not less than $500,000;
- Recordkeeping and report requirements;
- The provision of curbside recycling services to residential customers and the availability of recycling services to multi-family and commercial customers;
- The provision of volume-based rates; and
- Various performance standards including hours of operation and vehicle identification requirements.

There are currently three (3) licensed haulers providing residential collection services in the City:

- Gallegos Sanitation, Inc. (Gallegos/Dicks);
- Ram Waste Systems, Inc. (Ram); and
- Waste Management, Inc. (WMI).

Under the current open competition system multiple haulers may provide service on the same street on the same or different days of the week. This creates the potential for six different trucks using any neighborhood street in one week (3 trash and 3 recycling vehicles)[5]. The number of trash trucks traveling on residential streets has been limited in certain neighborhoods where homeowners associations (HOAs) have contracted with a single hauler or where residents have voluntarily agreed to use one hauler. As a result, the City has been able to achieve some of the benefits of a formal trash districting system without implementing a districting system. Most new HOAs voluntarily make one of these two arrangements with trash haulers.

History of Trash Districting Policy

In 1995, the City Council adopted a policy to reduce the average number of trash trucks per week on residential streets from six to two on at least 80% - 85% of the residential streets. The purpose of this policy was intended to respond to complaints from citizens about trash truck traffic and to reduce street maintenance impacts. Subsequently, the City engaged a consulting firm to perform an initial districting feasibility analysis and another firm to identify the costs associated with implementing districting. In 1998, the City engaged Hilton, Farnkopf & Hobson to perform a more detailed feasibility analysis of creating a districted trash collection system for residential customers. The purpose of that analysis was to

[5] Gallegos Sanitation also operates a yard waste route that provides service to a limited number of residential accounts.

provide a greater understanding of what would happen if the City were to award residential trash hauling contracts for specified geographic districts in the City. That analysis found various benefits to the City and customers from districting, including:

- Districting would result in a reduction to the number of trash and recycling trucks traveling on City streets and this reduced number of trucks would reasonably be expected to also reduce traffic congestion, noise and air pollution and street maintenance costs;
- A districted system comprised of five or less districts would likely result in savings as much as $500,000 annually (based on 1998 study conditions) from the current open competition system's current residential rates; and
- Other benefits such as improved aesthetics, comparability of services and rates and reduced City liability may accrue from districting.

However, the analysis also identified certain disadvantages to the City, customers and collection companies:

- Districting requires increased attention by the City Council and staff both during the implementation stage and thereafter;
- Customers lose their ability to choose their collector;
- Districting may result in changes that will adversely affect customers such as transitioning to a different hauler, adjusting to new services and even increased rates in some particular cases; and
- It is unlikely that all current haulers will continue to provide residential service in the City and those remaining may be operating at lower levels of profitability.

The outcome of the 1998-99 Council discussion of the trash districting concept was direction from Council to postpone the districting concept and to instead fund new waste reduction projects and to promote voluntary trash consolidation in neighborhoods. Concerns that lead Council to defer any action on trash districting included the impact of their decision on local trash haulers who might not be awarded a district in a competitive process, and citizen concerns about the possibility of reduced quality of service and the lack of choice in their trash hauler.

Since the Council's 1999 direction to defer the possible implementation of a districted trash system, a number of changes have occurred including:

- The number of licensed residential haulers has decreased from six in 1998 to three in 2008;

- HOAs have been urged to contract with a single hauler or encourage all residents to voluntarily agree to use one hauler. Most new HOAs voluntarily make one of these two arrangements with trash haulers; and
- In recent years, funding for street maintenance has been subject to budget reductions. A 2007 study of the Pavement Management Program found that the current street system funding levels are inadequate to maintain the streets to their adopted standards.

Diversion

The City of Fort Collins is currently diverting approximately 27 percent of its waste stream from disposal and has established a goal of diverting 50 percent by the year 2010. Findings of the 2005 Garbage and Recycling Survey conducted by Corona Research confirmed that residents are eager to recycle, with 98 percent of respondents expressing the belief that recycling is “good for the City of Fort Collins”. They are supportive of new measures to divert waste and willing to pay some part of the costs that may be incurred to develop new programs.

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Section 2

Review of Trash Collection Impacts

Review of Trash Collection Impacts

This section provides an analysis of the following trash collection service impacts:

- Street Maintenance Impacts;
- Air Quality / Vehicle Emissions;
- Neighborhood Aesthetics;
- Noise; and
- Safety.

Street Maintenance Impacts

Background / Overview

Road maintenance is designed to address deterioration. While roads will eventually deteriorate if simply left unused, most deterioration is associated with use; and the damage caused by vehicles goes up much more than proportionately with size and weight. Hence, costs associated with maintenance are greater for trips made by heavy vehicles. A single large truck can cause as much damage as thousands of automobiles, and the configuration of the truck can affect the amount of damage as well. If the load is spread over more axles, so there is less weight on each wheel, then the damage is reduced.[6]

Trash trucks are typically the heaviest vehicles regularly operating on residential (local) streets. As a result, they are a major contributor to the wear and tear on those streets. While trash trucks also contribute to the wear and tear on collector and arterial streets, those streets are designed to a higher standard and experience significantly more vehicle trips and large truck trips than local streets. As such, the relative impact of a trash truck on collector and arterial streets is significantly less than that on local streets. Commercial solid waste collection in the City, however, is provided through an open competition license system, with approximately 10 licensed commercial haulers currently operating in the City. This large number of commercial haulers increases the impact of trash trucks on the City's collector and arterial streets compared to a system in which there are fewer licensed haulers or a single service provider (e.g., a municipal or contracted system).

The pavement condition index (PCI) is a common unit of measure used to rate the condition of pavements. The PCI rates pavements on a score of 0 to 100 with a higher value indicating better pavement condition. Rapid deterioration of pavement typically

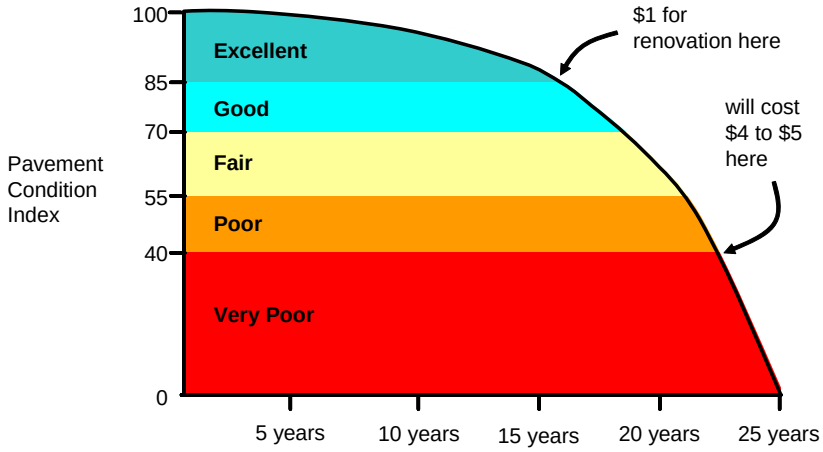
[6] A. Rufolo, *Cost-Based Road Taxation*, Cascade Policy Institute, November 1995.

occurs after roadways drop to a PCI score of 60 or lower. Studies have shown that every dollar spent performing preventative maintenance on a roadway with a PCI of 70 or higher saves $4 in future costs – it would otherwise cost about $5 to rehabilitate the same roadway once rapid deterioration occurs[7] (as shown in Figure 1). Ensuring adequate funding for an effective pavement management system is, therefore, critical to achieving a cost effective pavement management system.

Figure 1

Good Roads Cost Less to Maintain

Pavement Condition Index Goal 70+



The goal of a pavement management program is to bring all roads up to a "good" to "excellent" condition where they can be maintained most cost effectively. The strategy often recommended is referred to as the "Best First Approach", which concentrates spending initially on routine and preventative maintenance on those roads that are currently in "fair" to "good" condition. This extends the useful life of those roads, preventing rapid deterioration. Spending money on routine maintenance now prevents additional spending in the future on more expensive repairs.

The City's goal is to maintain a PCI of greater than 70 which falls within the "Good" range. The City has been able to maintain its streets at or near this target which has allowed it to provide cost effective maintenance. The 2008 and 2009 approved budgets, however, do not provide sufficient funding to maintain streets at their current level. The 2008 budget is more than $1.0 million less than that required to maintain streets at their current level while the 2009 budget is more than $2.5 million less than required. If

[7] J. Gerbracht, *Bay Area Roads Close to "Tipping Point"*, Metropolitan Transportation Commission, Street Talk, March 2006.

funding continues to be less than that required to maintain the streets at their current condition the quality of the City's streets will decrease over time and maintenance costs will increase. This is a negative cycle and one that should be avoided if at all possible.

Analysis

Open Competition vs. Districted Collection Impacts

In general, all other factors the same, moving from an open competition collection system to a districted collection system would be expected to reduce the number of vehicle miles traveled with a corresponding decrease in the associated street maintenance impacts. However, when considering trash truck street maintenance impacts and the potential effect of districted collection on those impacts it is important to consider that:

- Both the size of the collection vehicles and the average number of passes each vehicle makes down each residential street segment may change under a districted system. As a result the impact per vehicle may be more or less than under the current open competition system.
- At least one hauler provides both residential and commercial service with the same vehicle. If that hauler was not awarded a residential district its vehicles would continue to impact those residential streets it uses to access commercial accounts, assuming it continued to provide commercial service.
- If a hauler(s) not currently providing residential or commercial service in the City was awarded a district under a competitive procurement, that hauler might also compete for commercial accounts with a resulting increase in commercial trash truck impacts.

Our approach to projecting trash truck street maintenance impacts is based on common principles of pavement design and vehicle loading. The basic premise is that all vehicles, including trash trucks, exert an impact on streets that can be quantified. That impact or "vehicle loading" can be expressed as an Equivalent Single Axle Load (ESAL), which is a function of the vehicle's weight and the distribution of that weight over the vehicles axles. By projecting the number and type of vehicles (e.g., cars, trucks, trash trucks) that travel on a street over its design life, and the average ESAL associated with each vehicle type, the total ESALs that street will experience can be calculated. The relative impact associated with a specific type of vehicle (e.g., trash trucks) can then be determined based on the percentage of the total ESALs attributed to that vehicle type.

For purposes of our analysis, we requested information on the types of residential trash and recycling trucks used by the licensed haulers and their average load weights. We also obtained

manufacturer axle weight profiles for the same or similar truck types and reviewed traffic count data and street maintenance expense and funding information provided by the City. Information provided was used to develop residential trash and recycling truck axle weight profiles. This information was then used to project the impacts of trash and recycling trucks on the City's residential streets, which was expressed as percentage of the total vehicle impacts experienced by those streets.

In developing the projections it is important to note that the calculated impacts are based in part on various assumptions including:

- The average number of vehicle trips per residential street;
- The percentage of total vehicle trips made by trucks other than trash and recycling trucks and the average axle weights of those vehicles; and
- The average number of trash and recycling truck trips per week on a typical residential street.

Reasonable changes to those assumptions can have a material impact on the calculated impacts.

Note: *One hauler uses vehicles with a single fixed rear axle and a pusher axle[8]. The impact of those vehicles increases significantly if the pusher axle is not used during collection operations. Also pusher and tag axles generally have two tires per axle rather than four, which also increases the impacts relative to a fixed rear axle with four tires.*

Table 1 below provides a comparison of the calculated combined trash and recycling truck impacts on residential streets as a percentage of the total vehicle impacts. The table presents the results for various assumptions regarding the average number of passes trash and recycling trucks make each week on residential streets.

The table also provides:

- The allocation of the annual cost required to maintain the residential streets at their current condition to trash and recycling trucks in proportion to their calculated vehicle impacts; and
- The projected annual carbon dioxide (CO2) emissions associated with each scenario.

[8] A dead axle, also called lazy axle, is not part of the drive train but is instead free-rotating. Many trucks and trailers use dead axles for strictly load-bearing purposes. A dead axle located immediately in front of a drive axle is called a pusher axle. A tag axle is a dead axle situated behind a drive axle (Source: Wikipedia).

Table 1

RESIDENTIAL TRASH & RECYCLING VEHICLE IMPACTS						
Average Vehicle Passes / Week / Residential Street			Percent of Total Vehicle Impacts	Allocated Portion of Total Annual Cost to Maintain Residential Streets at Current Condition ($2008)	Annual CO2 Emissions [1]	
Trash Truck Passes	Recycling Truck Passes	Total Passes			Pounds	Tons
6.0	6.0	12.0	20.1%	$ 506,000	813,000	407
5.0	5.0	10.0	17.1%	$ 432,000	678,000	339
4.0	4.0	8.0	14.0%	$ 354,000	542,000	271
3.0	3.0	6.0	10.8%	$ 272,000	407,000	204
2.0	2.0	4.0	7.4%	$ 186,000	271,000	136
1.0	1.0	2.0	3.8%	$ 96,000	136,000	68

[1] EPA Emission Facts: Average Carbon Dioxide Emissions Resulting from Gasoline and Diesel Fuel

For purposes of a base case analysis of the effects of changing from the current open competition system to a districted collection system we assumed that:

- There are an average of 4 residential trash truck and 4 recycling truck passes on each residential street segment each week for the open competition system (e.g., 2 trash trucks and 2 recycling vehicles making two passes down each residential street each week); and
- There will be an average of 2 residential trash truck and 2 recycling truck passes each week for a districted collection system.

Table 2 below provides a comparison of the trash and recycling truck impacts and the allocated street maintenance cost for the current open competition system and a districted collection system based on these assumptions. As shown, the associated impacts and allocated pavement maintenance costs for a districted system are essentially half that for the current open competition system based on the noted assumptions.

The effect of changes to the assumed number of vehicle passes for the open competition system and/or a districted collection system listed above can be determined using the information

Review of Trash Collection Impacts

presented in Table 1 above. As an example, if we assume an average of 6 rather than 8 total trash and recycling trips per week for the current open competition system, the associated "Percent of Total Vehicle Impacts" is 10.8% rather than the 14.0% for the base case shown in Table 2. The associated reduction in the "Percent of Total Vehicle Impacts" in this case is 3.4% (10.8% - 7.4%) rather than 6.7%. The corresponding reduction in the "Allocated Portion of Total Annual Cost to Maintain Residential Streets at Current Condition" would be approximately $86,000 ($272,000 - $186,000) rather than the $168,000 for the base case ($354,000 - $186,000) shown in Table 2.

Table 2

COMPARISON OF OPEN COMPETITION AND DISTRICTED COLLECTION TRASH & RECYCLING VEHICLE IMPACTS					
Collection System	**Total Trash & Recycling Vehicle Passes / Week / Residential Street**	**Percent of Total Vehicle Impacts**	**Allocated Portion of Total Annual Cost to Maintain Residential Streets at Current Condition** ($2008)	**Annual CO2 Emissions**	
				Pounds	**Tons**
Open Competition	8.0	14.0%	$ 354,000	542,000	271
Districted Collection	4.0	7.4%	$ 186,000	271,000	136
Reduction (Districted vs. Open)[(1)]	**4.0**	**6.7%**	**$ 168,000**	**271,000**	**136**

[(1)] The Districted Collection "Percent of Total Vehicle Impacts" and "Annual Cost to Maintain Residential Streets at Current Condition" is greater than half the calculated impacts for the Open Competition System due to the methodology used, which assumes a constant number of vehicle trips for each scenario.

While the estimated impacts are subject to changes in the various underlying assumptions, we believe that the analysis provides a reasonable projection of the magnitude of trash truck impacts on the City's residential streets, which is supported by various independent third-party estimates. Appendix C (Comparative Trash Truck Load Factors) provides a comparison of the estimated passenger car equivalents estimated for the residential trash and recycling trucks operating in the City to independent references in support of the reasonableness of the estimates used in our analysis.

Change in Street Design Standards

The City adopted new design standards for streets in 1999 that are expected to increase the available vehicle loads streets can handle over their lifetime. These new standards do not affect the calculated percentage impacts of trash and recycling trucks on residential streets, since that calculation is not based on street design standards. Those standards would, however, be expected to reduce annual maintenance costs over time. As a result, the

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allocated street maintenance costs attributed to trash and recycling trucks would be reduced accordingly.

Options / Recommendations

- ✓ ***Require that haulers not load vehicles in excess of manufacturer's recommendations or limitations imposed by state or local vehicle weight restrictions (see Appendix A for sample language). Require haulers to implement an ongoing monitoring program to assure compliance with that requirement;***
- ✓ ***Require 2 fixed rear axles on all new vehicles. Require full time use of pusher or tag axle on any existing vehicles with a single fixed rear axle;***
- ✓ Encourage the Police Department to more aggressively monitor and enforce vehicle weight limits;
- ✓ Establish a street maintenance impact fee to provide funding to offset pavement maintenance cost impacts associated with trash collection services (see Appendix A for sample contract language);
- ✓ Require co-collection vehicles[9]; and
- ✓ ***Implement a Districted Collection System or City-Wide Contract for Services to reduce the number of residential trash truck miles traveled and the associated street maintenance impacts.***

Air Quality / Vehicle Emissions

Background / Overview

The nation's trash truck fleet is huge, more than three times the size of urban bus fleets, and nearly 100% dependent on diesel fuel. That diesel fuel is often burned in old engines that operate without state-of-the-art pollution controls. Trash trucks are also one of the most fuel inefficient vehicles on the roads today, with an average fuel efficiency of approximately 2.8 miles per gallon. As a result, trash trucks are a major cause of air pollution in cities across the country. Diesel engines have, however, gotten cleaner since the late 1980's. In fact, with new federal emissions standards diesel engines manufactured in the United States starting with the 2007 model year are the cleanest in the world.

EPA Standards

In 2000, the EPA established stringent standards designed to reduce emissions from on-road heavy-duty trucks and buses by up to 95 percent and to cut the allowable levels of sulfur in diesel

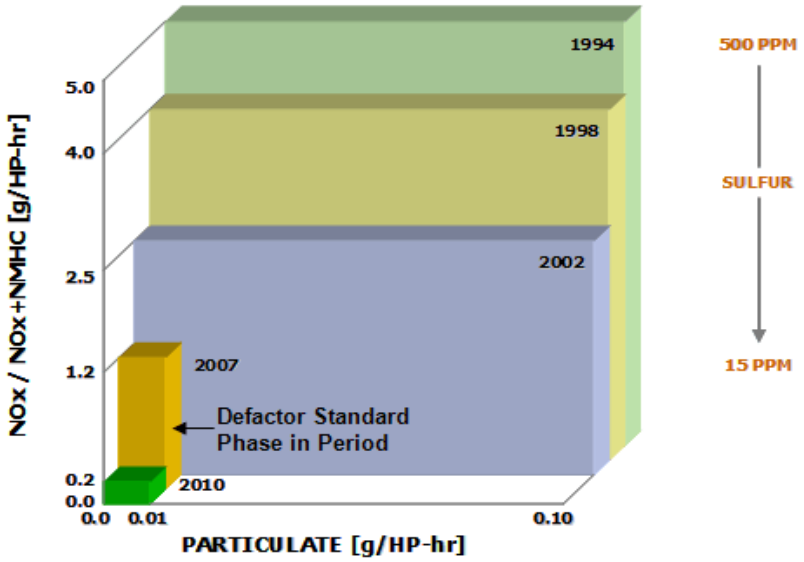
[9] Co-Collection vehicles have split bodies that allow for collection of two materials (e.g., trash and recyclables) in the same vehicle thereby reducing the number of vehicle trips per street segment.

fuel by 97 percent[10]. The EPA rule was the most significant mobile source initiative since the 1970 Clean Air Act Amendments establishing the U.S. Mobile Source Emission Control Program. Beginning with the 2007 model year, 100 percent of the on-road diesel heavy duty engines (HDEs) are required to use a diesel particulate filter and 50 percent of the engines are required to use nitrogen oxide (NOx) exhaust control technology. Beginning with the 2010 model year, 100 percent of the on-road heavy-duty diesel engines will require NOx exhaust technology.

Figure 2 below provides an illustration of the improvements in engine emissions that have occurred over the last 25 years. With the 2010 standards the emissions from model year 2010 HDE's will be a small fraction of what they were less than 10 years ago.

Figure 2

Emission Standards Time Line



Source: http://www.cumminswestport.com/products/emissions.php

It is important to understand, however, is that these standards apply to engine manufacturers and not to fleet operators. There are no requirements that fleet operators, including trash haulers, comply with the standards within any specific time period. Relying

[10] As of 2006, refiners and importers nationwide are required to ensure that at least 80% of the volume of the highway diesel fuel they produce or import is ultra low sulfur diesel (ULSD) compliant. By 2009 95% of diesel fuel will have a sulfur limit of 15 parts per million (ppm). By December 1, 2010 100% of the diesel fuel sold will need to meet that limit. ULSD fuel enables the use of cleaner technology diesel engines and vehicles with advanced emission control devices, resulting in significant improved air quality.

solely on fleet turnover to achieve the full benefits of the new engine standards could take up to 20 years due to the reliability of diesel engines. In the meantime many of the older dirtier diesel engines will continue to remain in service.

Natural Gas Vehicles

Natural gas engines offer the potential for significant reductions in trash truck emissions. Natural gas is also a secure, domestically produced fuel that reduces the demand for petroleum-based fuels and imported oil. Replacing 50% of the estimated 136,000 diesel trash trucks operating in the country with natural gas trucks would annually displace approximately 600 million gallons of diesel fuel, the equivalent of 14.3 million barrels of oil – a meaningful step toward energy security[11]. An added benefit is that natural gas engines are significantly quieter than diesel engines.

In the past four years the number of natural gas trucks in the United States has more than doubled, and nearly 700 natural gas garbage trucks are in operation today. By 2010 it is projected that over 2,200 natural gas garbage trucks will be operating in the US[12]. Two-thirds of the estimated 700 natural gas garbage trucks in operation in the US operate on liquid natural gas (LNG), while the rest use compressed natural gas (CNG).

Natural gas engines have already shown that they can meet the 2010 EPA emission requirements while also generating half the NOx emissions of 2010 compliant diesel engines. Natural gas trucks, however, produce lower torque (power), are heavier and take longer to fuel than diesel vehicles. While natural gas vehicles can cost substantially more than diesel, the new emission requirements and rising diesel fuel costs could erase the cost advantage that diesel trucks have had over natural gas.

A major impediment to natural gas trash trucks in the City is the lack of fueling infrastructure.

Biodiesel

Biodiesel is clean burning alternative fuel, produced from domestic, renewable resources. Biodiesel contains no petroleum, but it can be blended at any level with petroleum diesel to create a biodiesel blend. It can also be used in compression-ignition (diesel) engines with little or no modifications. Biodiesel is biodegradable, nontoxic, and essentially free of sulfur and aromatics. Each of the licensed residential haulers reported that they have experimented with Biodiesel with mixed results. Problems with clogging of filters, jelling, cost and warranty issues were cited.

[11] INFORM; Greening Garbage Trucks: Trends in Alternative Fuel Use, 2002-2005.
[12] Ibid.

Operate-at-idle Technology

Operate-at-idle technology can also reduce emissions. Operate-at-idle systems allow an engine to run at much lower revolutions per minute (RPM) and thus conserve diesel when compared with collection vehicles that do not have the technology. Operate-in-gear-at-idle systems save fuel by using a larger hydraulic pump that produces the extra flow of fluid needed for a trash collection vehicle to load and compact garbage at standard speeds while the engine remains at idle. Without the systems, truck operators must shift the transmission and throttle the engine to power the hydraulic system every time they make a route stop or want to pack the load. There is minimal effect on truck performance and fuel savings of as much as 20% have been attributed to operate-at-idle systems.[13] Operate-at-idle technology is generally standard on all new side loading equipment. Retrofitting existing vehicles can be done at a cost of from $1,500 to $10,000. Truck manufacturers are just starting to test operate-at-idle technology on rear- and front-loading vehicles.

An added advantage of operate-at-idle technology is that it significantly reduces engine noise. Most of the loud engine noise associated with garbage trucks comes from revving the engine to pack the load. With an operate-at-idle trash truck the hydraulic system is capable of packing without revving the engine and generating the associated engine noise.

Automatic Engine Shut-Off Systems

Idling engines can burn up to one (1) gallon of fuel per hour. On-board engine controls can be installed that automatically cut off the engine after a set time period if a driver leaves it idling. Waste Connections, a national solid waste management firm, has installed automatic engine shut off devices on some of their vehicles that shut the engine down after five minutes of idling. This five minute standard is consistent with the proposed time frame in EPA's Model State Idling Law.

Other Options

On the horizon, several other fuel and technologies are being tested in prototype vehicles including:

- Hybrid-electric drive trains
- Bio-methane (biofuels)

While these technologies may offer future benefits they have yet to be proven in a large scale commercial environment. Volvo, however, recently introduced the first hybrid garbage truck in Sweden. If testing goes well, Volvo plans to begin producing the

[13] Ideal Idle Idea; K. Simpson, Waste Age, Sep 1, 2006 12:00 PM

hybrid trucks in 2009. Volvo's hybrid technology consists of a 320 horsepower diesel engine which shuts down at rest combined with an electric motor that powers the truck at speeds up to 12 miles per hour. Regenerative braking is used as a means to recapture energy to recharge the lithium ion batteries. Besides being much quieter, gas savings and CO2 emission reductions on the order of 20-30 percent are expected.[14]

Waste Management Inc. has reported that it is exploring using waste methane (bio-methane) from its landfills as a fuel for trash trucks. The Orange County Transportation Authority in southern California is currently using methane from the county's landfills in a portion of its LNG fleet.

Reducing engine idle speeds, maintaining proper tire pressure, maintaining air filters and other steps can also be taken to improve fuel efficiency and minimize engine emissions.

Analysis

As discussed above, with the 2010 EPA standards emissions from new diesel engines will be a fraction of what they were less than 10 years ago. When all trash trucks achieve compliance with those standards there will be a significant improvement in the emissions from trash trucks operating in the City. The most significant step the City can take to reduce trash truck emissions is, therefore, to establish a specific timeline for licensed haulers (residential and commercial) to bring their fleets into compliance with EPA's 2010 emission requirements. The State of California established such a timeline requiring fleet operators to bring their fleets into compliance with specific standards within a relatively short time frame). At a minimum the City could ban the registration of any truck prior to 1994, in order to remove some of the dirtiest, most polluting engines from the road. Idle-in-gear technology and automatic engine shut-off systems would also provide for additional emission reductions[15].

While natural gas engines already meet the 2010 requirements the lack of local fueling infrastructure and other factors likely preclude this as a viable short- to medium-term option in the City. Also, while Biodiesel may offer some emission benefits, operational problems cited by some of the haulers will need to be addressed for this to represent a reliable long term option.

Implementing a Districted Collection System or City-Wide Contract for Services would also be expected to reduce overall vehicle

[14] Volvo introduces first hybrid garbage truck, works on DME fuel, *Posted Apr 8th 2008 11:41AM by Jeremy Korzeniewski; www.autobloggreen.com.*

[15] This could then be followed by an ongoing graduated compliance schedule that would ban vehicles prior to 1998, 2002 and 2007 over some reasonable time frame.

emissions as a result of the reduction in the number of residential trash collection vehicle miles traveled. As illustrated in Table 1 above, it is estimated that residential trash trucks operating in the City generated as much as 200 to 300 tons per year of CO2 emissions annually, in addition to nitrogen oxide and particulates. These emissions might be reduced by as much as half with a Districted Collection System or City-Wide Contract for Services.

Options / Recommendations

- ✓ ***Work with the haulers to develop a schedule for fleet compliance with the 2010 EPA Emission Standards;***
- ✓ Prohibit the use of any truck with an engine older than model year 1994 in the City;
- ✓ Require operate-at-idle technology on all new vehicles; require existing vehicles to be retrofitted;
- ✓ Require installation of automatic engine shut-offs and mandate shut down after a set number of minutes of idling (e.g., 5 minutes consistent with EPA's Model State Idling Law);
- ✓ Encourage hauler use of synthetic oils, effective tire maintenance programs and other fuel saving measures;
- ✓ Limit the number of residential and commercial licenses (e.g., issue no more than the current number);
- ✓ Require natural gas vehicles if the necessary fueling infrastructure can be developed;
- ✓ Evaluate opportunities for other alternate fuel / alternate technology vehicles (e.g., hybrid electric drive trains) as they become commercially viable; and
- ✓ ***Implement a Districted Collection System or City-Wide Contract for Services to reduce the number of residential trash collection vehicle miles traveled and the associated vehicle emissions:***
  - o ***Require EPA 2010 Emission Standard compliant vehicles as a condition of the award of districts;***
  - o Require operate-at-idle technology on residential vehicles as a condition of the award of the districts; and
  - o Require use of County Landfill to reduce vehicle miles traveled.

Neighborhood Aesthetics

Background / Overview

The appearance of a neighborhood is impacted by trash collection services both with respect to the presence of containers and the vehicles providing collection services. Under an open competition

system adjacent residents collection schedules may vary resulting in containers placed at the curbside for collection on multiple days of the week. Additionally, containers currently come in all shapes and sizes and differing colors and bags are also used. Under a districted system, all services would typically be provided on the same day in a given neighborhood so streets are free of trash and recycling containers six days out of the week. Containers can also be standardized to provide a more uniform appearance.

The City currently has few if any permit requirements related to the appearance and condition of trash collection vehicles. Standards can be established regardless of the collection system structure related to, among other things:

- Cleaning and maintaining vehicles so that they present a "clean, professional and new-like appearance";
- Minimizing vehicle oil, fuel and other fluid spills; and
- Controlling litter.

Analysis

Collection Days

Unless the City were to pursue a districted collection system or require that all collection operations under the current open competition system occur on a specific day in each neighborhood (i.e., districted service days) it is likely that many neighborhoods will continue to have multiple trash service days. Should the City implement districted collection, however, collection services could be limited to one day per week.

Standardizing Containers

Districted collection would also allow for standardizing residential trash collection containers. In which case the City could own the containers and have the City logo rather than the haulers logo on the containers. Regardless of the collection system structure the City could provide for the universal roll-out[16] of City-owned standardized single stream recycling containers.

Cleaning and Painting Trucks

The City's municipal code does not specify any requirements for cleaning and painting trash trucks or commercial containers or any other requirements related to aesthetics including controlling litter and vehicle spills. Such requirements are standard in many franchise agreements and contracts and to lesser degrees license requirements. The City of Lone Tree's recent residential solid waste collection agreement with Pro Disposal specifies, among other things that the contractor shall use *"vehicles that are*

[16] All residential accounts would be provided with a recycling container rather than needing to request one. Any customer not wishing to participate would need to specifically request to "opt-out".

maintained in a clean, first-class manner" and that vehicles *"shall be thoroughly washed not less than once each week and shall be repainted as necessary."*

Options / Recommendations

- ✓ ***Establish vehicle cleaning and painting requirements as a condition of the required license (see Appendix A for sample language);***
- ✓ Establish performance standards related to controlling litter, spills etc. (see Appendix A for sample language);
- ✓ Provide universal roll-out of City-owned standardized single stream recycling containers with City logo (see Appendix A for sample contract language); and
- ✓ ***Implement a Districted Collection System or City-Wide Contract for Services to reduce the number of trash trucks on residential streets, the number of days per week collection service occurs and allow for standardizing trash containers:***
  - ***Roll-out City-owned standardized wheeled trash containers with City logo.***

Noise

Background / Overview

Noise from trash trucks can be related to a number of factors including:

- Engine noise;
- Backing alarms;
- Noise at Point of Collection (Dumping of material such as glass in curbside recycling systems); and
- Dumping commercial bins.

The specific strategies and options to reduce those noise impacts depend in large part on the source of the noise. Some jurisdictions have established specific noise standards (e.g., decibel ratings within a specified distance from the vehicle) that haulers must comply with during collection operations.

Analysis

Engine Noise

Engine noise associated with residential trash trucks is largely related to revving of the engine when the vehicle is packing. Diesel garbage trucks can generate noise levels of up to 100 decibels. Two of the most significant options available to reduce trash truck engine noise are:

- Converting to either a compressed natural gas (CNG) or liquefied natural gas (LNG) engine; and
- Using "operate-at-idle" technology[17].

In addition to the above options, a well built, tight fitting, well maintained vehicle can also help reduce noise.

A study in the Netherlands found there were noise reductions with natural gas vehicles of 90% inside the truck, 98% beside the truck and 50% behind the truck compared to diesel powered vehicles.[18] As mentioned above, a major impediment to the use of natural gas trash trucks in Fort Collins is the lack of required fueling infrastructure.

As discussed previously, in addition to fuel savings operate-at-idle technology also significantly reduces engine noise. Most of the loud engine noise associated with garbage trucks comes from revving the engine to pack the load. With an operate-at-idle trash truck there is a separate hydraulic system on the truck body. This separate hydraulic system provides the pressure needed to pack the load without revving the engine and generating the associated engine noise.

Backing Alarms (Beepers)

Vehicle backing and noise associated with vehicle backing alarms are most often associated with commercial collection activities. Placing limits on commercial collection activities near residential neighborhoods can help address related noise issues. "Smart" back-up alarms can also be used. These alarms sense the level of ambient noise and adjust accordingly. In quiet conditions the alarm beeps at a much quieter level.

Noise at Point of Collection

Noise at the point of collection (i.e., emptying containers) can be reduced by taking various actions to reduce engine noise, as discussed above. In addition, efforts to reduce noise associated with the dumping of materials, particularly glass recovered through the curbside program can also be taken. These include commingling of glass with other recyclable materials, reducing dump heights and potentially eliminating glass from the curbside program.

Overall noise associated with residential collection operations at the point of collection would not be reduced under a districted collection system since it does not reduce the number of pickups,

[17] With non operate-at-idle vehicles the engines need to rev when the body is packing. With an operate at idle vehicle there is an hydraulic system on the body which is capable of providing the hydraulic pressures need to pack without revving the engine, which creates noise.

[18] Ahhhh…the Peaceful Sounds of Garbage Trucks; N. Stiles; MSW Management May/June 2007.

only the number of vehicles making those pickups. The noise produced in transit from point-to-point would be reduced however due to fewer vehicles. The noise associated with collection operations would also be limited to a specific day and time in each neighborhood.

Dumping Commercial Bins

Dumping of commercial bins can be very noisy and particularly noticeable in the early morning hours. A number of options are available to reduce the noise associated with commercial collection activities including[19]:

- Treating lid supports with sound-deadening material - Lid supports are small metal arms that are anchored on one end which can be rotated to support the lid in an open position. During dumping the arm swings freely and can strike other metal objects;
- Treating the containers with sound-deadening materials - The reverberation of the sides of metal containers creates loud noises;
- Treating the forks of trucks with sound-deadening material - A great deal of noise is generated by the metal forks used to pick up the containers within the sleeves on the container;
- Using plastic lids or plastic dumpsters where the Fire Marshall will allow their use;
- Promoting the use of larger storage containers and reduced collection frequency; and
- Encouraging "Best Practices" training for drivers - Driver behavior is one of the single most important factors affecting noise generation.

Time of Collection

Section 15.421 of the City's Municipal Code states that, "*No collector shall operate any vehicle for the purpose of collection of solid waste or recyclable materials on any street designated by the City as "local residential" or "local collector" between the hours of 7:00 p.m. and 7:00 a.m. (the "Nighttime Hours")*". Time restrictions placed on residential collection activities are common. Some jurisdictions also limit the time of commercial collection activities, which by their nature are noisy, within a specified distance of residential neighborhoods (e.g., not before 7:00 a.m.

[19] Report and Recommendations of the Noise Review Board on Reducing Nighttime Noise from Garbage and Recycling Collection; September 8, 2005, City of Portland Noise Review Board Subcommittee on Garbage Collection.

within 200 feet of a residential area). The City's municipal code does not place any limits on the time of commercial collection.

Vehicle Maintenance

Effective vehicle maintenance can also reduce noise. Assuring that vehicles are well built, tight-fitting and well maintained will help reduce vehicle noise.

Options / Recommendations

- ✓ ***Establish noise standards that are to be met by all haulers as a condition of their license and require haulers to verify and report on compliance with those standards. (see Appendix A for sample language);***
- ✓ Require operate-at-idle technology on all new vehicles; require existing vehicles to be retrofitted;
- ✓ Require natural gas vehicles if the necessary infrastructure can be developed;
- ✓ Require "Smart" back-up alarms;
- ✓ Remove glass from the curbside recycling program;
- ✓ Require various steps to be taken to reduce the noise generated by the collection of commercial containers near residential areas (e.g., treating containers, lid supports and truck forks with sound deadening materials; using plastic lids or dumpsters);
- ✓ Limit the time commercial collection activities can occur within a specified distance of residential areas (see Appendix A for sample contract language);
- ✓ Require vehicles to be well maintained; and
- ✓ ***Implement a Districted Collection System or City-Wide Contract for Services to reduce the number of trash trucks on a typical residential street and vehicle miles traveled:***
  - o ***Require operate-at-idle technology on residential vehicles as a condition of the award of the districts.***

Safety

Background / Overview

Solid waste operations can pose safety risks to employees and the general public. The consideration of "Safety First" is central to an effective solid waste management operation as safe operations enhance productivity and profitability.

According to the Department of Labor Statistics, Refuse and Recyclable Material Collectors have the one of the most dangerous job in the country with a fatality rate approximately 10

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times the national average. A University of Miami study found that the leading cause of on-the-job fatalities for refuse and recyclable material collectors is impatient motorists who try to pass the garbage truck and hit the collector.

Trash collection activities also result in interaction with the general public and as such generate the potential for public safety issues. Efforts to reduce those interactions (e.g., districted collection), make the public more aware of collection vehicles and drivers (e.g., signage, lights) and provide drivers with additional training and tools to provide for safer collection operations (e.g., video recorders) all contribute to increasing public safety as it relates to trash collection services.

Industry Safety Initiatives

Waste Management Inc., the largest solid waste services provider in the country, has a model "Mission to Zero" plan and has significantly reduced worker injuries since the model was implemented. Allied Waste Industries, the second largest solid waste provider in the country, has paid particular attention to vehicle safety, including adding or replacing all incandescent lights with LED's and additional LED strobe lights on each side and the front of the vehicles. As a result of these and other actions Allied's accident rate declined approximately 20 percent in each of the first three years following implementation and driver feedback has been very positive.

Slow Down to Get Around Safety Campaign

Jurisdictions throughout the country have adopted the "Slow Down to get Around" safety campaign to enhance the visibility of the collection vehicles and have dramatically reduced rear-ending accidents.[20] The program is designed to raise safety awareness when passing utility, waste and service vehicles. The aim is to encourage drivers to use the same amount of caution as when passing a school bus, emergency vehicle or road construction crew.

Fully Automated Vehicles

The use of fully-automated vehicles can greatly contribute to worker safety. Automated collection eliminates the constant manual lifting of cans and bags associated with manual collection systems and is more efficient than semi-automated collection. Automated collection uses wheeled carts that are lifted by a mechanical arm on the side of the truck. The driver controls the entire collection process without leaving the drivers seat. Automated systems have been shown to result in decreased workers compensation costs and allow experienced older (often

[20] See http://www.rumpke.com/Our_Commitment/Safety.asp for more information on the Slow Down to get Around safety campaign.

safer) workers and others who might not be able to effectively function in a manual system to remain on the job.

DriveCam

DriveCam is an exception based video event recorder that is mounted on the windshield behind the rearview mirror and captures sights and sounds inside and outside the vehicle. Exceptional forces such as hard braking, swerving, collision, etc. cause the recorder to save critical seconds of audio and video footage immediately before and after the triggered event. DriveCam reports that its video system and safety program has reduced vehicle damages, workers' compensation and personal injury costs by 30 to 90 percent in more than 70,000 commercial and government vehicles around the world. Waste Connections, the nation's fourth largest collection company recently announced that it has begun implementing the DriveCam solution nationally across all major business lines in all four geographic regions.[21] GPS systems can also be used to identify risky driver behavior and other activities to improve safety and is becoming more widely used in many parts of the solid waste industry.

Analysis

It is in the interest of the haulers to operate safely and it is assumed that they are dedicating appropriate care and attention to safety and safety related issues. The City may, however, be able to enhance overall hauler safety by establishing certain safety related requirements as a condition of the hauler license. This could include requiring haulers not to overload vehicles and assuring that all vehicles are specified with certain safety equipment (e.g., ABS breaking systems, strobe lights, reverse motion sensors). Appendix B contains a list of various trash truck safety devices that the City may wish to consider encouraging/requiring the haulers to use. It is suggested that any consideration of requiring certain vehicle specifications related to safety be done in conjunction with the haulers to assure that any such requirements are reasonable, appropriate and provide meaningful benefit.

Options / Recommendations

- ✓ ***Require that haulers not load vehicles in excess of manufacturer's recommendations or limitations imposed by state or local vehicle weight restrictions. Require haulers to implement an ongoing monitoring program to assure compliance with that requirement (see Appendix A for sample contract language);***

[21] http://www.drivecam.com

- ✓ Work with haulers to develop appropriate and effective safety specifications for all new vehicles (e.g., rear and side strobe lights) and a timeline for retrofitting existing vehicles as a condition of the hauler license (see Appendix A for sample contract language);
- ✓ Require haulers to participate in City sponsored/initiated "Slow Down to Get Around" safety campaign; and
- ✓ ***Implement a Districted Collection System or City-Wide Contract for Services to minimize vehicle miles traveled:***
  - o Require fully-automated vehicles;
  - o Require vehicles to have appropriate optional safety equipment; and
  - o Establish safety incentives (e.g., sliding scale profit ratio based on safety record).

Other Vehicle Street Maintenance Impacts

As part of the analysis of trash truck impacts we evaluated the impacts of trash trucks relative to other types of vehicles, including delivery trucks and buses. Table 3 below provides a comparison of the average ESAL's for the various vehicle types noted[22] to the estimated ESAL's of residential trash and recycling trucks operating in the City. The impacts are also presented in Passenger Car Equivalents.

Table 3

COMPARISON OF TRASH AND OTHER VEHICLE IMPACTS				
Vehicle Type		**Number of Axles**	**ESAL Factor** (1)	**Passenger Car Equivalents**
General Classification	AASHTO Classification			
Cars	Passenger Cars	2	0.0008	1
Vans/Pickups	Other 2-Axle/4-Tire Trucks	2	0.0052	7
Large Pickups / Delivery Vans	Panel and Pickup Trucks	3	0.0122	15
Large Delivery Trucks	3 or More Axle Trucks	3	0.1303	163
Local Delivery Trucks	2-Axle/6-Tire Trucks	2	0.1890	236
Residential Recycling Trucks		**2**	**0.2190**	**274**
Buses	Buses	2 or 3	0.6806	851
Residential Trash Trucks		**3**	**1.0230**	**1,279**
Long Haul Semi-Trailers	Various Classifications	3 - 5+	1.1264	1,408

[22] Based on sample data reported by American Association of State Highway and Transportation Officials (AASHTO) Guide for Design of Pavement Structures.

As shown, residential trash trucks have an estimated impact equivalent to approximately 1,300 passenger cars. This is comparable to the findings of other studies that we have conducted as well as that reported by various independent third parties (Appendix C). The impact of recycling trucks is much less but still significant, and roughly equivalent to the impact of local delivery trucks[23]. One point to note is that the impact of large delivery trucks (3 or more axles) is approximately two-thirds that of local delivery trucks (2-axle / 6 Tire Trucks) based on the sample population. This tends to support the positive benefit additional axles can have on lowering overall vehicle impacts.

In reviewing this comparison it is important to note that the impacts shown are based on a random sampling of vehicles. There can be wide variability of impacts within the general vehicle types noted. As an example a larger local delivery truck hauling construction materials, heavy furniture or food supplies may have a significantly greater impact than a smaller local delivery truck hauling overnight packages.

Impact of Overloaded Vehicles

Background / Overview

The impact that a vehicle exerts on a section of pavement is related to the vehicle's axle weights. As axle weight increases the impact increases at a rate much greater than proportionally. As such, overweight vehicles exert a significantly greater pavement maintenance impact than that same vehicle at or below its legal weight, in addition to presenting a potential safety hazard.

Analysis

A trash truck operating at one (1) ton over a legal payload of 10 tons (10% overweight) exerts an impact approximately 50% more than a vehicle loaded to its legal weight. That same vehicle operating at two (2) tons (20% overweight) over its legal payload exerts an impact approximately 100% higher than when loaded to its legal weight[24].

The fact that the Larimer County Landfill, and certain other neighboring landfills, do not have scales and charge haulers based on volume presents a potential incentive for haulers to maximize vehicle payloads. This may foster the overloading of vehicles. While this potential may exist, it does not necessarily

[23] Our projection of recycling truck impacts is based on the smaller non-compacting vehicles that two of the haulers are currently using. It is certainly conceivable that larger compacting vehicles could be used for collection of single stream recyclables in the future with a much larger associated impact.

[24] Source: AASHTO Guide for Design of Pavement Structures.

mean that haulers are overloading their vehicles, which can cause increased vehicle wear-and-tear. One of the haulers reported having recently completed a route audit that included weighing vehicles and modifying routes in an effort to ensure legal payloads.

Review of Diversion Issues

This section provides an evaluation of the following diversion issues:

- Diversion Rate Metrics and Measurements;
- Current Policies, Practices and Programs; and
- Current Recycling Efforts.

Evaluation of Diversion Rate Metrics and Measurements

Background / Overview

Fort Collins is one of the leaders in recycling in the State of Colorado. The City's current diversion rate is estimated at 27% and it has adopted a diversion goal of 50% by 2010. The City has undertaken a range of programs and policies in support of its recycling efforts including a Pay-As-You-Throw (rate structure) ordinance and the requirement that licensed haulers provide recycling services to residential accounts upon request. The City completed a *5-Year Strategic Plan: Strategies to Reach 50% Diversion from Landfill Disposal* (Strategic Plan) in 2006. That Plan evaluated a wide range of options to increase diversion resulting in Phase 1 and Phase II Strategic Plan Staff recommendations, which are provided in Appendix D.

While the City currently tracks an overall Citywide diversion rate, it does not regularly track and report diversion by waste stream (residential, commercial, roll-off), program (e.g., curbside recycling) or by licensed hauler.

Analysis

Diversion Calculation Limitations

An important component of the City's efforts to increase diversion is the availability of complete and accurate data to allow it to accurately track tonnages diverted and disposed. There is, however, a limitation to the City's ability to accurately calculate its diversion rate. The Larimer County Landfill, and other neighboring landfills used by the licensed haulers do not have scales. Tonnage is estimated by multiplying the volume of the vehicle by a density factor established by each licensed hauler. In recent Tonnage Summary Reports the three licensed residential haulers reported density factors of 500, 750 and 900 pounds per cubic yard. Changes to those estimates would materially impact the calculated disposal tonnages and the City's calculated diversion rate. The lack of scales at the landfills places a relatively high degree of uncertainty on the City's disposal data and the associated calculated diversion rates.

Review of Diversion Issues

In addition to the limitations associated with the lack of actual disposal weight data, the City's diversion rate calculation does not account for processing residue[25] manufacturer "out-throws" [26], or distinguish between recovered material that is processed as manufacturing feed stock and material that is used as landfill alternative daily cover[27]. While the City's methods for calculating diversion are not unreasonable we believe it would benefit from further tracking and reporting of material diverted from the waste stream to provide it with a more complete understanding of the final disposition of that material.

Additional Data Needs

Accurate data is an important component of the City's efforts to track, effectively plan for and achieve additional cost effective diversion. While the licensed haulers are required to provide certain data, that data is not sufficient to provide the City with the ability to effectively evaluate individual hauler or program performance. For the City to most effectively manage its solid waste collection system additional accurate information needs to be provided by the haulers.

The City should also review the information the haulers are currently providing and confirm that it is consistent with the license requirements. Our review raised a number of questions / concerns related to the accuracy of the data provided:

- One hauler reported the same volume of Solid Waste Collected as Recycled Materials Collected; and
- One hauler reported that recycling figures for wood waste, Construction and Demolition (C&D) material and metal scrap were "Unavailable".

Also, it was not clear if reported Construction & Demolition, Yard and Wood Wastes Recycled reflect the total volume delivered to a processing facility or if those figures are adjusted for portions of those loads that are not recovered. If they are not adjusted for non-recoverable portions then they should be.

Expanded Diversion Goals / Targets

In addition to requiring additional data from the haulers to support effective solid waste management planning we suggest that the City establish specific diversion targets for each program and

[25] Processing residue is material that is collected through a recycling program but is removed during processing and includes contaminants and fines. Processing residue from single stream recycling programs can often exceed 10% of incoming material.

[26] Contaminants to paper are known as out-throws and prohibitive materials. Out-throws are usually paper of a different type, a small percentage of which may be acceptable.

[27] Material used in place of dirt to cover landfilled material at the end of each day.

waste stream. These targets should be based on an objective analysis of the associated diversion potential. Progress should then be tracked against those specific targets.

Options / Recommendations

- ✓ ***Track and report the following diversion rates:***
  - ***Overall for the City;***
  - ***By waste stream (residential, commercial, roll-off);***
  - ***By program type (e.g., residential curbside recycling program, yard waste program);***
  - ***By account, by program (e.g., the average pounds per week of curbside recyclables collected per solid waste account);***
  - ***By individual licensed hauler by program and waste stream as a percentage of the material that they collect (control); and***
  - City disposal and diversion data in support of its Action Plan for Sustainability to reduce or divert trash production by 50 percent by 2010 (i.e., how much of the waste City municipal operations generate is diverted).

In support of the above recommendations we further recommend that the licensed haulers be required to:[28]

- ✓ ***Report the number of residential solid waste accounts by service level (e.g., 30-, 60-, 90-gallon)[29];***
- ✓ ***Report the number of commercial accounts by service level and collection frequency for both solid waste and recyclables (service volume/collection frequency matrix);***
- ✓ ***Provide calculated curbside recycling and yard waste diversion rates on a pounds per residential solid waste account per week basis;***
- ✓ ***Provide calculated diversion rates for the material they control for each waste stream as part of their regular reporting requirements;***
- ✓ ***Provide an accounting of total reported disposal and diverted volume/tonnage by individual facility (e.g.,***

[28] The recommended information should be readily available or easily calculated based on available data.

[29] The City may also wish to obtain the total number of HOA accounts and HOA contract accounts and the specific HOAs serviced to enable it to more effectively analyze trash truck street maintenance impacts. This information may also be necessary if the City decides to implement a Districted Collection System or City-Wide Contract for Services.

Larimer County Landfill, North Weld Landfill, Earth Cycle etc.);

- ✓ ***Include historical data for each required data set as part of the regular reporting process so that trends can be tracked and are clear to all parties;***
- ✓ ***Review reporting forms to confirm that haulers are providing required information in a complete and accurate form. Revise / reinforce required reporting requirements if necessary;***
- ✓ ***Require that haulers provide complete and accurate data as a condition of their license. Provide the City with the right to audit required information to verify its accuracy and/or require the haulers to have their data audited by an approved independent third party on periodic basis to verify its accuracy;***
- ✓ Establish specific diversion targets for each program and waste stream based on an objective analysis of the available potential and track progress against those targets; and
- ✓ Encourage the County to install scales at the Larimer County Landfill.

Evaluation of Current Policies, Practices, and Programs

Background / Overview

Ordinances

The City has established the following ordinances and incentive programs in support of increased diversion:

Recycling Ordinance - Requires haulers to provide curbside recycling at no extra charge upon customer's request. The collection of materials from multi-family and/or commercial customers is not required if the collector determines that there is not sufficient space available to allow the placement of recycling containers.

Pay-As-You-Throw (PAYT) Ordinance – Requires haulers to provide a variable rate structure (volume-based or pay-as-you-throw) for all single and two-family residences, including those participating in group trash service accounts such as HOAs. Trash companies may elect to charge a small monthly service charge, in addition to the volume charges, to cover their fixed operational costs.

E-Waste Ordinance - Prohibits disposal of electronic equipment (as defined by the State of Colorado Hazardous Waste Regulations 1007-3, Section 260.10) in the waste stream.

Enclosure Ordinance - Requires recycling areas to be built along with trash enclosures for all new commercial or multi-family housing construction).

Current Recycling Programs

Residents of the City currently have access to the following recycling programs and services:

- Single stream curbside recycling (without wheeled containers);
- Limited yard waste collection (provided by one of the licensed haulers at an additional cost);
- Drop-off recycling center; and
- Miscellaneous third-party programs (e.g., e-waste recycling).

Analysis

While the City has in place some key policy and program components in support of its efforts to increase diversion, it needs to more actively regulate solid waste management activities in the City if it is to significantly increase diversion. This holds true regardless of the collection system structure (e.g., open competition, districted collection, etc.).

Recycling Ordinance – The City's recycling ordinance establishes a good framework for the provision of recycling services by the licensed haulers. However, without accompanying hauler performance standards (i.e., minimum diversion rates) it is unlikely that the City will come close to realizing the diversion potential that exists in either the residential or commercial waste streams.

PAYT Ordinance – PAYT systems have been shown to be one of the most effective steps a jurisdiction can take to increase recycling. The Strategic Plan that the City has developed includes Phase 1 Strategies. Those strategies included amending the City's residential PAYT Ordinance so that "rate design" further enhances waste reduction efforts. It was also recommended that the City's PAYT Ordinance be amended to include all commercial customers, require a recycling fee embedded in the rates and charge volume-based pricing. We support both of these efforts. We suggest, however, that any changes to the commercial rate structure also consider the potential for collection frequency based incentives. Charging commercial accounts based purely on volume without consideration for frequency (e.g., charging the same for a 4-yard container one-time per week as a 1-yard container four-times per week) provides no incentive for accounts to reduce collection frequency. Increasing storage volume and decreasing collection frequency would result in reduced vehicle miles traveled and reduced trash collection impacts.

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E-Waste Ordinance – The City has found that the private sector has the capacity to meet the public's demand for reuse and recycling opportunities for electronic equipment. At least two of Fort Collins's trash haulers have also reported that they plan to offer a special recycling collection program for customers' E-waste. The City should support these efforts and/or consider alternative means for providing convenient E-waste collection opportunities for the City's residents. One option is to integrate E-Waste (and potentially Universal Waste (U-Waste)[30] and Household Hazardous Waste collection) into a bulky waste collection program. On-call bulky waste programs that include E-waste collection and diversion requirements are becoming relatively common in parts of Northern California.

Enclosure Ordinance – The City's Enclosure Ordinance appears to adequately address new development requiring the provision of "adequate space for the collection and storage of refuse and recyclable materials." The related Trash and Recycling Enclosures Design Considerations recommend that the amount of space provided for the collection and storage of recyclable materials be at least as large as the amount of space provided for the collection and storage of refuse materials.

The Ordinance pertains to all new commercial and multi-family structures and all existing commercial and multi-family structures proposed to be enlarged by more than 25 percent or where a change of use is proposed. What it does not cover are existing multi-family and commercial properties. In many cases these properties have limited space available for recycling containers which we understand is a major issue and one that needs to be addressed as part of the City's efforts to expand commercial recycling. Finding an effective approach for providing diversion opportunities for these and all commercial accounts should be a priority.

Options / Recommendations

Recycling Ordinance

- ✓ ***Establish minimum diversion requirements for the licensed haulers for the material streams that they control, either as part of the Recycling Ordinance or as a condition of the license or a district agreement (e.g., Require residential haulers to divert a minimum average of 10 pounds of curbside recyclables per solid waste account per week); and***
- ✓ Establish a compensation system that would reward haulers for achieving diversion in excess of the required

[30] Universal wastes are hazardous wastes that contain mercury, lead, cadmium, copper and other substances. Examples of these wastes are batteries, fluorescent tubes, and some electronic devices.

minimum diversion level along with penalties for failing to achieve the required minimum).

PAYT Ordinance - Residential

- ✓ ***Amend the City's residential PAYT Ordinance so that "rate design" further enhances waste reduction efforts per the Strategic Plan Phase 1 staff recommendation;***
- ✓ ***Roll-out any changes to the residential PAYT program in conjunction with comprehensive strategy to increase residential recycling (e.g., universal roll-out of City-owned single stream curbside recycling containers, universal roll-out of residential yard waste (organics) program with City-owned yard waste containers); and***
- ✓ Provide any future residential yard waste or organics program as part of a bundled residential rate with no additional cost to participate in that service.

PAYT Ordinance - Commercial

- ✓ Amend the City's PAYT ordinance to include all commercial customers; require recycling fees to be embedded in rates and charge volume-based pricing per the Strategic Plan Phase 1 staff recommendation;
- ✓ Roll-out any commercial PAYT system in conjunction with comprehensive strategy to increase commercial recycling (e.g., establishing minimum commercial diversion rates; contract for a commercial recycling, provide commercial organics program at reduced rate); and
- ✓ Consider rate design that provides not only for volume based incentives but also frequency premiums to encourage increased storage volume and decreased service frequency to reduce vehicle miles traveled and other trash collection impacts.

E-waste Ordinance

Evaluate residential hauler proposed E-waste collection programs and determine if they will provide an effective means for capturing these materials. If so, support those efforts and consider requiring all residential haulers to provide comparable services. If not, consider requiring provisions for an effective residential E-waste collection (potentially as part of bulky waste collection service) as a condition of the license or districted collection agreement, or as a separate contracted service with fee embedded in the rates.

Evaluation of Current Recycling Efforts

Background / Overview

City staff has recommended the following five (5) Strategic Plan Phase 1 Strategies:

- Increase / enhance the City's education program (in one-year increments) regarding specific measures to be initially implemented;
- Provide customers, upon request to their trash haulers, with optional curbside yard waste collection services on a weekly basis. This measure will require that yard waste does not cost more than equivalent costs for trash by volume (consistent with PAYT rates);
- Create a refundable construction & demolition (C&D) deposit system based on square footage of project (or comparable criterion), with total deposit to be refunded upon certification that the appropriate level of recycling was accomplished;
- Amend the City's PAYT ordinance to include all commercial customers; require recycling fee to be embedded in rates and charge volume-based pricing; and
- Amend the City's PAYT residential trash rates ordinance so that "rate design" further enhances waste reduction effort.

Our review of opportunities for the City to increase diversion was not intended to be a comprehensive review of all options and alternatives. Instead we focused our efforts on building upon the significant and thoughtful analysis that the City has already conducted as presented in the Strategic Plan and more specifically the Phase 1 Strategies.

Analysis

While we support the general recommendations presented in the City's Strategic Plan and the five (5) Phase 1 Strategies the City needs to take more aggressive steps if it wishes to significantly increase diversion. This is particularly true with respect to the haulers roles and responsibilities related to increased diversion given that they control the majority of the waste being currently disposed.

Additional Diversion Potential

Appendix E contains waste composition data based on the recent Larimer County waste composition study. Assuming this information reasonably represents the City's waste stream it is clear that significant additional diversion potential exists. As reported in Table E-2:

- 19.1% of the residential waste stream consists of mixed recyclable paper, newspaper and cardboard that could be recovered through the existing curbside recycling program while 25.4% consists of food waste (17.4%) and yard waste (8.0%) that could be recovered through a new residential organics program, for a total of 44.5%; and

- 21.3% of the commercial waste stream consists of mixed recyclable paper, newspaper and cardboard while 22.2% consists of food waste (15.9%) and yard waste (6.3%), for a total of 43.5%.

Licensed Hauler Diversion Rates

Table 4 below provides a summary of 2006 disposal tonnage by waste stream for the licensed haulers and the total tons diverted.

Table 4

LICENSED HAULER DISPOSAL AND DIVERSION DATA			
Method of Collection	**2006**		
	Cubic Yds	Tons	% of Total
Compacted Residential	131,619	49,357	23%
Compacted Commercial	208,756	78,284	37%
Roll-off Compacted	110,178	41,317	20%
Roll-off Loose	182,764	41,122	20%
Total Disposed	**633,317**	**210,079**	**100%**
Total Recycled		**16,120**	
Total Hauler Controlled		**226,199**	
Hauler Controlled Diversion Rate		**7.1%**	

As shown, the associated diversion rate for the total material controlled by the haulers (Hauler Controlled Diversion Rate) was calculated at 7.1%. Analysis of the hauler *Tonnage Summary Reports* for January through June 2007 resulted in a calculated hauler controlled diversion rate of 7.2%, which is generally consistent with the 7.1% shown in Table 4.[31] On an individual waste stream basis the licensed haulers realized a diversion rate of 13.6% for the residential waste stream (13.3% curbside recycling program + 0.3% Gallegos yard waste program), 2.3% for the commercial waste stream (*Compacted Commercial* + *Roll-off Compacted*), and 7.3% for the uncompacted waste stream (*Roll-off Loose*).

As a point of comparison we offer the South Bayside Waste Management Agency (SBWMA) in San Mateo County California (San Francisco Bay Area) which has what we consider to be an effective mix of residential and commercial programs and

[31] It should be noted that one hauler reported "Unavailable" for certain diversion information which may mean that actual diversion is higher than calculated. If such is the case, however, it supports the need for complete and accurate data to allow the City to effectively analyze, plan for and realize available cost effective diversion.

supporting contractual requirements and rate incentives[32]. The SBWMA's franchised hauler has averaged a residential hauler controlled diversion rate of 46% through its weekly curbside recycling (two-sort) and yard waste programs for the five year period ending in 2005. The hauler controlled commercial diversion rate has averaged 20% over that same time period. The combined hauler controlled residential and commercial diversion rate has averaged 32%. While the SBWMA has more comprehensive diversion programs than the City it is by no means what we consider to be state-of-the-art. The SBMWA is aggressively pursuing additional diversion opportunities including single stream recycling and adding food waste to its residential organics collection program.

The fact that 35% of the City's waste stream is estimated to be Commercial Compacted with an additional 17% *Roll-off Compacted* (52% combined total) points out the need for the development of an effective plan for commercial diversion. This is particularly necessary given that it is estimated that less than 3% of the commercial waste controlled by the haulers is currently diverted.

The *Roll-off Loose* waste stream accounts for approximately one-quarter of the City's waste stream. As reported above, the diversion rate for this waste stream is estimated at 7.3%. Uncompacted roll-off loads as well as self haul loads are generally highly recoverable. From a total tonnage and recoverability standpoint these waste streams may offer the greatest single opportunity for the City to cost effectively increase diversion, provided there is the necessary processing capacity and markets for recovered materials.

General Findings

- If the City is to significantly increase diversion, the licensed haulers will need to significantly increase the amount of material they divert and/or other diversion options need to be developed (e.g., residential and commercial recycling

[32] The SBWMA is comprised of 13 member agencies with approximately 90,000 residential accounts and 10,000 commercial accounts. It is currently in the process of contracting for a new franchise that will include single stream recycling and the addition of food waste to the residential yard waste program. Residential customers are provided with weekly residential curbside and yard waste collection services at no additional charge. Commercial customers are also provided with recycling services at no additional charge by the franchised hauler. Other recyclers have the right to pay for or collect recyclables for free. Commercial organic waste collection is provided at a reduced rate. While the rates and rate structures for the 11 member agencies vary, the residential rates are generally volume based with the cost of a second container two times that of the first.

contracts; comprehensive post-collection mixed waste processing capacity);

- Recycling is a net cost to the haulers and there is currently no financial incentive (or regulatory requirement) for the haulers to aggressively pursue diversion. The pursuit of aggressive diversion by any given hauler may put it at a competitive disadvantage relative to any other hauler who is not putting forth a similar level of effort and realizing similar results;
- Rates may need to be increased to significantly increase diversion;
- Local landfill costs are relatively low compared to many areas of the country, which impacts the cost effectiveness of recycling. The Larimer County Landfill currently charges $5.81 per cubic yard for compacted waste. This is equivalent to between $11.62 and $23.24 per ton for densities of 1,000 and 500 pounds per cubic year respectively;
- Recovery of source separated materials from commercial accounts may be limited by space constraints which preclude placing additional recycling containers onsite; and
- The County Landfill provides a good centralized location for the development of C&D, composting and/or other processing capacity in support of the City's efforts to increase diversion.

Options / Recommendations

The Strategic Plan provides a good framework for the City's efforts to increase diversion. As a next step we suggest that the City focus on further refining its Strategic Plan Strategies to divert material from the residential, commercial and uncompacted waste streams (Roll-off Loose). That effort should include supporting available processing capacity and markets for recoverable materials. We offer the following suggestions in support of that effort.

<u>Residential Waste Stream</u>

- ✓ ***Establish minimum curbside recycling program diversion requirements for the haulers (e.g., 10 pounds per solid waste account per week) as a condition of the residential license;***
- ✓ Establish a compensation system that would award haulers for achieving diversion in excess of the required minimum diversion level along with penalties for failing to achieve the required minimum (see Appendix A for sample language);

- ✓ If districted collection is pursued, have the haulers propose minimum diversion levels they would be willing to guarantee (i.e., lbs/solid waste account/week). Consider the level of guarantee in determining the award of the district. Establish a system that would award haulers for achieving diversion in excess of their proposed minimum diversion level along with penalties for failing to achieve the proposed minimum;
- ✓ ***Provide universal roll-out of City owned single stream recycling containers;***
- ✓ Provide universal (not optional) roll-out of weekly yard waste services with City owned containers (with the ability to expand to food waste if/when processing capacity is available);
- ✓ ***Revise residential PAYT rate structure per the Strategic Plan Phase 1 staff recommendation. Provide recycling and yard waste services as part of a "bundled" residential rate (i.e., no additional cost for recycling and yard waste service);***
- ✓ Support the development/viability of private sector composting capacity (e.g., Earth Cycle) and/ or pursue the development of public sector (e.g., City and Larimer County) or public / private partnership for the development of residential and commercial organics processing capacity; and
- ✓ Develop public or private sector capacity for food waste composting.

<u>Commercial Waste Stream</u>

- ✓ Require licensed haulers to divert a minimum amount of the material they control as a condition of their license;
- ✓ Establish a commercial recycling contract with the cost embedded in the commercial rate structure (i.e., no additional cost for recycling). Charge haulers a "recycling fee" to pay for the commercial recycling contract cost (unless they can demonstrate that they have achieved a required minimum level of diversion);
- ✓ Explore the need/potential for some level of mixed commercial waste recovery capacity (i.e., Dirty MRF with selective routing) if space constraints preclude effective source separation programs;
- ✓ Develop a commercial food waste collection program; and
- ✓ Develop public or private sector capacity for food waste composting.

Uncompacted Roll-Off

- ✓ Create refundable C&D deposit system per the Phase 1 Strategic Plan staff recommendation;
- ✓ Support the development of private sector C&D processing capacity or pursue the development of public sector (e.g., City and Larimer County) or public / private partnership for the development of necessary C&D processing capacity; and
- ✓ Consider establishing specific C&D licensing standards with minimum diversion requirements.

Coordinating Diversion and Sustainability Planning

The City's RFP requested that the consultant "Consider applying concepts from Industrial Ecology (i.e., Materials Flow Analysis) to pull together data in context of achieving community goals and optimizing efficiencies." Industrial Ecology is the shifting of industrial processes from linear (open loop) systems, in which resource and capital investments move through the system to become waste, to a closed loop system where wastes become inputs for new processes. Industrial Ecology draws on the fact that natural systems do not have waste in them and that we should model our systems after natural ones if we want them to be sustainable[33].

The concept of Industrial Ecology is similar to the concept of Zero Waste that is becoming the driving force behind solid waste management planning in many progressive jurisdictions.

Zero Waste can be defined as:

- Zero Waste of Energy, Materials and Human Resources;
- Zero Solid Waste;
- Zero Hazardous Waste;
- Zero Emissions to Air, Water or Soil;
- Zero Waste in Production Activities;
- Zero Waste in Product Life Cycle; and
- Zero Toxics.

Zero Waste, like Industrial Ecology supports the development of a more sustainable closed loop solid waste management system in which waste streams from one process become raw products for other. While it is beyond the scope of this engagement to undertake a mass balance of the City's solid waste stream, we support the integration of Industrial Ecology and Zero Waste planning concepts into the City's overall sustainability planning efforts.

[33] Wikipedia

Review of Diversion Issues

Review of Collection System Structures

Collection System Structure Alternatives

Background / Overview

The City's residential collection system is an open competition system in which licensed haulers compete for accounts. While the haulers are regulated through the City's licensing process, Municipal Code requirements and applicable ordinances (i.e., Pay-As-You-Throw and Recycling Ordinances), that regulation is limited. There are few regulatory requirements specific to minimizing the impact of trash collection services with respect to air quality, noise, and the cost of street wear or improving neighborhood aesthetics and safety. In addition, while haulers must offer recycling services to residents and businesses, there are no associated diversion levels that the haulers must achieve as a condition of their license.

Alternatives Considered

Our review of Collection System Structures considered the following alternatives:

1. **Current Open Competition System without any Changes**

   This option would maintain the current open competition system as regulated without any changes.

2. **Open Competition System with Increased Licensing Requirements**

   This option would maintain the current open competition system however additional licensing requirements would be established in support of the City's objectives to reduce trash collection service impacts and increased diversion. It should be noted that the City currently has some of the most aggressive licensing requirements in the State. There are, however, a number of additional hauler requirements that the City could establish to reduce trash collection service impacts and increase diversion as discussed elsewhere in this report. These include:

   - Additional hauler reporting requirements;
   - Vehicle emission standards;
   - Vehicle cleaning and painting requirements;
   - Noise standards and noise reducing vehicle and container specifications;
   - Vehicle safety specifications;

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- Required management of overloaded vehicles; and
- Establishing minimum hauler diversion requirements.

3. **Districted Collection System**
   This option would require that the City be divided into two or more geographic districts. A competitive procurement process would then be undertaken through the issuance of an RFP (Request for Proposals). The City would then award a contract to a single hauler to provide service within each district. Specific terms and conditions related to reducing vehicle impacts, increasing diversion and other desired terms and conditions would be specified in the contract.[34]

   To effectively district it will be necessary for the City to determine which residential accounts are to be included (e.g., single family, multi-family, HOAs) and obtain accurate account information by geographic region of the City.

4. **City-Wide Contract for Services**

   This option is similar to Option 3 above. However, rather than break the City up into districts, a City-wide contract would be awarded to a single hauler.

   This option could potentially be incorporated into a hybrid approach with either a districted or open competition system for trash collection services and a City-wide contract for recycling services. In the case of the open competition system, however, this hybrid approach may result in different collection days for trash and recycling services for many accounts. We are not aware of any jurisdictions that have such a system.

   Alternatively the City could maintain the open competition system but specify the day that service is to be provided in the various areas of the City. This would provide for same day trash and recycling service, but require the haulers to reconfigure their collection routes to be consistent with the specified service days.

Analysis of Collection System Structure Alternatives

An analysis of each the four collection system options is provided below. Appendix F provides a matrix that compares these options with respect to criteria developed with City staff.

[34] The contract could be issued with the RFP. Haulers could then be required to state any exceptions to the proposed contract terms and conditions and offer acceptable replacement language as part of their proposal. Any subsequent contract negotiations could then be limited to the stated exceptions.

Current Open Competition System without any Changes

Benefits of Current Open Competition System

Major benefits of maintaining the current open competition system as regulated include the freedom residents have to choose a hauler and the relatively limited City administrative requirements. In addition, there would be no impact on the existing haulers. Unlike a districted or contracted system the City does not have to manage a procurement process or regulate rates, and residents would not be required to transition to a new hauler. Also, the City is not involved in the billing process. Under a districted system the City may need to take over the billing function if it wants to establish a uniform city-wide rate.

Issues / Concerns of Current Open Competition System

One of the major issues related to an open competition system is the increased impacts that result from multiple vehicles providing collection services in the same area. In addition, while the limited administrative requirements of an open competition system can be considered a benefit on one hand, it also presents a major constraint. As discussed above, under the current open competition system there are few regulatory requirements related to minimizing trash collection service impacts. Also, while haulers must offer recycling services to residents and businesses, there are no associated diversion levels that the haulers must achieve as a condition of their license.

Open Competition System with Increased Licensing Requirements

Benefits of Increased Licensing Requirements

Maintaining the existing open competition system with increased licensing requirements would provide many of the same benefits as the current open competition system, while providing the City with greater control over trash collection services. Decreased trash collection service impacts and increased diversion would both be potential benefits that could be realized.

Issues / Concerns of Increased Licensing Requirements

While increased licensing requirements would allow the City to take certain actions to reduce trash collection service impacts and increase diversion, it does not reduce the number of trash collection vehicles operating in any given area of the City. As such, the City would not realize the associated reduction in trash collection service impacts that would result from a districted collection system or a city-wide contract for services. Also, while the City could establish certain additional licensing requirements to reduce trash collection service impacts and increase diversion, certain options that would be available under a districted or City-

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wide collection system are not possible or may not be as easily implemented.

Districted Collection

Benefits of Districted Collection

During our discussions with the haulers, the question was raised as to what districting could accomplish that could not be accomplished through the existing open competition system. The answer is that a districted collection system provides:

A means for reducing overall trash collection impacts largely in relationship to the reduction in the number of vehicles and vehicle miles traveled.

> *All other factors the same, districted collection would be expected to reduce vehicle emissions, trash truck noise and pavement maintenance impacts, increase safety and improve neighborhood aesthetics.*

The opportunity to take other specific actions to decrease residential trash collection impacts that are not possible or may not be as easily implemented under an open competition system.

> *As an example, the City could require certain types of vehicles or vehicle specifications that would support its goal of reducing trash collection service impacts as a condition of a hauler being awarded a district (e.g., vehicles that comply with EPA 2010 emission standards with operate-at-idle technology). All haulers would be able to develop their proposals based on the specified requirements knowing that they could capitalize their investment over the term of the agreement (e.g., 7-years) with a guaranteed revenue base. While similar requirements could be placed on an open competition system it is likely to be a more difficult and contentious process given the lack of a guaranteed contract term and revenue base.*

A more effective structure for establishing minimum diversion requirements and/or incentives for haulers to increase diversion.

> *The City could establish diversion as a major criterion for award of the districts and select a hauler in part based on their willingness to guarantee a higher diversion rate. Hauler compensation could then be tied to the actual diversion level achieved relative to the guarantee (i.e., additional compensation for exceeding, and penalties for failing to achieve the guarantee).*

The potential for lower rates for the City's residents.

> *Districted collection would result in more efficient collection services and should reduce collection costs. The cities of*

Lafayette and Superior, which both recently shifted from an open competition residential collection system to a contracted system, reported significant reductions in rates.

Issues / Concerns of Districted Collection

While a districted collection system offers potential advantages over an open competition system it is not the "be all and end all" solution. For example, there are various options that the City can undertake to reduce certain trash truck impacts regardless of the collection system structure. Some of these options may have a greater impact than that which might be realized through districted collection alone. Also, the loss of "customer choice" is a very real and potentially significant downside of a districted collection system. In addition, the City may need to take over customer billing to allow it to implement a uniform rate city-wide.

Districted collection also presents a significant challenge (as well as opportunity) for the existing haulers. Under a process in which haulers compete for the right to provide service within a district (i.e., a competitive procurement) it is likely that there will be winners and losers. Some haulers may acquire a larger market share while others are likely to lose some or their entire residential market share.

Should the City decide to move forward with a districted collection system, it should be prepared for opposition from both haulers and some residents. A staff member of jurisdiction in Colorado that recently switched from open competition system to a contract with a single hauler reported that it was a very difficult process for staff and the city council. There were harsh accusations, threats of legal action and many calls from angry residents. That same staff member also stated that once the system had been changed they received calls from some of the same people that had been opposed to the change that were now in support of the new system. Should the City decide to move forward with a districted collection system we recommend that staff speak with representatives of other jurisdictions that have switched from an open competition to a contracted system to solicit their insights and recommendations.

Potential Options to Protect Existing Haulers

City staff provided the following guidelines related to steps that might be taken as part of a districted collection system procurement process to protect the interests of the existing haulers:

- The City cannot limit the pool of potential proposers. It can however, require that a proposer be a licensed hauler, although haulers not currently licensed would have to be

given the opportunity to apply for and receive a license if they qualified;

- The City can structure the process to limited the number of districts that can be awarded to a single hauler; and
- The City can give some level of preference to local haulers.

City-Wide Contract for Services

Benefits of City-Wide Contract for Services

The benefits of an exclusive city-wide contract are similar to a districted collection system. In addition, administrative requirements are specific to one-hauler rather than multiple haulers and it is not necessary for the City to control the billing process to provide a uniform city-wide rate.

Issues / Concerns of City-Wide Contract for Services

The issues/concerns of a city-wide contract are also similar to a districted system. In addition, limiting services to only one hauler could result in reduced competition on a long term basis, if existing haulers go out of business or decide not to compete for the contract in the future.

Options / Recommendations

- ✓ ***Implement a Districted Collection System or City-Wide Contract for Services to reduce the overall impacts associated with residential trash collection services and support a more effective system for increasing diversion from the residential waste stream.***

This recommendation is based entirely on the consideration of the best collection system structure to meet the City's stated project objectives of:

- Reducing trash collection service impacts; and
- Increasing diversion.

The recommendation does not consider other factors, including the impact on haulers and the associated loss of the ability of customers to choose their hauler.

Survey of Collection System Structures

State of Colorado

Trash Collection

The Colorado Municipal League and Colorado Recycles conducted a survey involving 271 jurisdictions in the State in 2006 to determine the methods used to provide trash collection in their communities. The survey focused on residential trash services and was not designed to gather data about commercial, industrial

or other services. Of the 222 jurisdictions that responded, 47 (21%) reported that they provide municipal trash service and 44 (20%) reported that they provide service through contracts with one or more private trash haulers. The majority, 131 (59%) of jurisdictions that responded (including the City of Fort Collins), reported that they rely on the private market place to bring residents and trash haulers together in some type of contractual arrangement. In this regard the City's current open competition system is similar to that of most other jurisdictions in the State. The results of the survey are summarized in Table 5 below. Appendix G includes more detailed trash collection survey results.

Table 5

TRASH SERVICES SURVEY SUMMARY RESULTS						
Category of Response	**Number of Municipalities Responding**	**Percent of All Municipalities in Survey**	**Percent of Responding Municipalities**	**Population Served**	**Percent of Population of All Municipalities in Survey**	**Percent of Population of Responding Municipalities**
Trash Service is a Municipal Service	47	17%	21%	1,076,484	32%	33%
Trash Service is a Municipal Service Through Contract	44	16%	20%	126,133	4%	4%
Trash Service is Provided Through Private Contracts	131	48%	59%	2,104,955	62%	64%
Subtotal	**222**	**82%**	**100%**	**3,307,572**	**98%**	**100%**
Did not Respond	49	18%		65,740	2%	
Total	**271**	**100%**		**3,373,312**	**100%**	

Based on analysis of the survey results it was reported that: "*…there is no observable predictor as to which communities are likely to fall into any one of the three categories. There are very large cities, medium size cities and very small cities represented in each category. Moreover, there is no observable geographic preference for one category over another. Communities that provide contract service or rely on private entities to arrange the service exist either side-by-side or in close driving proximity to cities that provide municipal service.*" [35]

Since that survey was conducted we understand that the following jurisdictions have or are planning to switch to a contract with a single hauler for residential trash collection services:

- Firestone

[35] www.coloradocurbside.com/discussion papers.collection.html

- Fruita
- Georgetown
- Lafayette
- Minturn
- Ouray
- Superior

Recycling Survey

The survey also gathered information about the methods used by jurisdictions to provide residential curbside and drop-off recycling services. The results of the survey are summarized in Table 6 below.

Table 6

RECYCLING SERVICES SURVEY SUMMARY RESULTS						
Category of Response	**# of Municipalities Responding**	**% of All Municipalities in Survey**	**% of Municipalities with Curbside Service**	**Population Served**	**% Population of All Municipalities in Survey**	**% Population of Municipalities with Curbside Service**
Curbside Recycling Service is a Municipal Service	8	3%	8%	840,540	25%	28%
Curbside Recycling Service is a Municipal Service Through Contract	21	8%	22%	123,670	4%	4%
Curbside Recycling Service is Provided Through Private Contracts Under a Mandate to ***Provide***	6	2%	6%	349,698	10%	12%
Curbside Recycling Service is Provided Through Private Contracts Under a Mandate to ***Offer***	5	2%	5%	131,614	4%	4%
Curbside Recycling is a Private Contract Arrangement Between Consumer and Hauler	55	20%	58%	1,593,332	47%	52%
Subtotal	**95**	**35%**	**100%**	**3,038,854**	**90%**	**100%**
No Curbside Recycling but Drop Off Recycling is Available	74	27%	NA	216,648	6%	6%
No Verification That Curbside or Drop Off is Available	104	38%	NA	106,734	3%	3%
Total	**271**	**100%**	**100%**	**3,373,312**	**100%**	**100%**

The majority of the jurisdictions reported *No Curbside Recycling but Drop Off Recycling is Available* (27%) or there was *No Verification that Curbside or Drop Off is Available* (38%). However, these jurisdictions comprise less than 10% of the total population of the municipalities in the survey.

Of those jurisdictions with curbside service, the majority (58%) reported that *Curbside Recycling is a Private Contract Arrangement between the Consumer and Hauler*. Fort Collins reported that "*Curbside Recycling Service is Provided Through Private Contracts Under a Mandate to* ***Provide***, which is the case in 6% of the jurisdictions with curbside service.

Appendix G includes more detailed recycling survey results. The reader is also referred to www.coloradocurbside.com for additional survey information.

Other Areas

California

In California, where jurisdictions are under a State mandate to achieve 50% diversion, the majority of jurisdictions have exclusive residential collection contracts (franchises). A significant number of jurisdictions also have exclusive commercial contracts, although open competition commercial collection systems are also prevalent, particularly in Southern California. A number of larger cities also have districted residential collection systems including the cities of San Jose and Stockton.

100 Largest Cities

A 1997 survey of residential collection services in the 100 largest cities in the country conducted by HFH Consultants found that exclusive municipal service was provided in 62% of the cities. That survey also found that exclusive private service (under contract or contract agreement) was provided in 18% of the cities, 6% had open competition where several haulers compete for residential customers, and 15% had combinations of the above or other arrangements.

The most common arrangement for commercial collection was open competition among private haulers offered in 60% of the cities, while 12% of the cities reported exclusive municipal service. In 13% of the cities, the municipal collection operation competes with private haulers for commercial customers and another 15% of the cities reported that they had an exclusive private contract.

Market Impacts of Districted Collection

Switching from an open competition system to a districted collection system (or City-wide contract) will impact the existing licensed haulers residential market share. It is possible that some of the haulers will increase market share while others will lose some or their entire residential market share. Licensed haulers not currently providing residential services may also participate in the procurement process and gain market share.

New Haulers Bidding on Contracts

The ability of a new hauler not currently operating in or near the City to effectively compete for districted collection services depends in part on the ability of that hauler to secure a local corporation yard from which it can operate. This can be a significant hurdle for market entry for many haulers, particularly smaller haulers that do not have the resources of larger regional

or national haulers. While larger regional or national haulers may be in a better position to secure a local corporation yard the effort involved can still represent a significant hurdle for market entry. In our experience it is not common for haulers that do not have established local operations to attempt to establish a base of operations to compete for a new contract. Any such decision to do so is likely to be based on the potential value of the contract as well as the potential for securing additional market share from that base of operations. In the case of the City, it may be more likely that one of the licensed haulers that is not currently providing residential services may attempt to enter the residential market through the competitive procurement process. Should a hauler not currently licensed or operating in the City successfully compete for a collection district, it is certainly possible, if not likely, that hauler would also pursue commercial and roll-off accounts in the City.

Local Haulers Discontinuing Business

Whether or not a licensed residential hauler may be forced out of business if it is not awarded a district likely depends on what portion of that hauler's revenue is derived from residential services within the City. Losing its share of the City's residential market would be expected to negatively impact a hauler's bottom line. If, however, the hauler has other operations either within or outside of the City, those operations may be sufficient to provide for its ongoing viability. In such a case that hauler could compete for the City's residential districts in the future as they come up for bid.

In our experience it is not uncommon for haulers to lose contracts (districts) but still maintain local operations servicing other markets and compete for those contracts in the future. Should the City decide to pursue a districted collection system it can do a number of things to "level the playing field" and support competition for future procurements. These actions include owning the residential solid waste and recycling containers and requiring all new vehicles as part of the contracts. This would remove some of the major advantages the current service provider would have over other haulers interested in proposing on the contract.

Appendices

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Appendix A

Best Management Practices – Sample Contract Language

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Appendix A

Best Management Practices – Sample Contract Language

1.0 Trash Collection Service Impacts

1.1 Emissions

1.2 Neighborhood Aesthetics

General Provisions

General Provisions. All collection equipment used by CONTRACTOR in the performance of services under this Agreement shall be of high quality. The vehicles shall be designed and operated so as to prevent collected materials from escaping from the vehicles. All hoppers shall be closed on top and on all sides with screening material to prevent collected materials from leaking, blowing or falling from the vehicles. All trucks and containers shall be watertight and shall be operated so that liquids do not spill during collection or in transit.

All collection vehicles utilized by CONTRACTOR pursuant to this Agreement shall provide automated or semi-automated collection except where such service is not feasible because of topographic or other physical factors. The determination that automated or semi-automated collection vehicles are not feasible shall be made by the City Representative after consultation with CONTRACTOR. Where automated or semi-automated services are not feasible, CONTRACTOR shall consult with the City Representative regarding the collection equipment to be utilized. (San Jose, CA)

Vehicle Cleaning

Cleaning. Collection vehicles shall be thoroughly washed and thoroughly steam cleaned regularly, to present a clean appearance of the exterior and interior compartment of the vehicle. City may inspect vehicles at any time to determine compliance with sanitation requirements. Contractor shall make vehicles available to the Alameda County Health Department for inspection, at any frequency it requests. (City of Union City, CA)

Cleaning. Vehicles used in the collection shall be thoroughly washed at a minimum of once per week, and thoroughly steam cleaned on a regular basis so as to present a clean appearance and minimize odors. All vehicles shall be painted on a regular schedule to maintain a clean, professional, new-like appearance, although the City Representative may require the painting of any vehicle that does not present a satisfactory appearance at any time. The vehicles shall be

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painted in a uniform manner; although refuse, recycling, and green waste vehicles may have different painting schemes. All graffiti shall be removed immediately. City may inspect vehicles at any time to determine compliance with sanitation requirements. Contractor shall make vehicles available to the County Health Department for inspection at any frequency it requests. (City of Salinas, CA)

City of Brighton, CO. The City of Brighton's Municipal Code Article 8-12 Garbage Collection states, among other things that *"vehicles shall be equipped with a tight box or tank so that no garbage or liquids shall escape therefrom and shall be kept thoroughly clean…"*

Litter / Vehicle Spills

Minimization of Spills. Contractor shall use due care to prevent vehicle oil, vehicle fuel, or other liquids from being spilled during Collection or Transportation operations. If any Solid Waste, Recyclable, or Organic Materials are spilled or scattered during Collection or Transportation operations, the Contractor shall promptly clean up all spilled and scattered materials.

Contractor shall not transfer loads from one vehicle to another on any public street, unless it is necessary to do so because of mechanical failure, emergency (e.g., combustion of material in the truck), accidental damage to a vehicle, or unless approved by the City.

If Contractor fails to perform some or all of the requirements described in this Section, the Contractor shall pay the City Liquidated Damages as described in Section 13.5. (Union City, CA)

Clean-Up. During Collection, the Contractor shall clean-up litter in the immediate vicinity of any Container storage area (including the areas where Containers are delivered for Collection) whether or not Contractor has caused the litter. Each Collection vehicle shall carry protective gloves, a broom, and shovel at all times for cleaning up litter. Cat-litter or similar absorbent material shall be used by Contractor for cleaning up liquid spills. The Contractor shall discuss instances of repeated spillage not caused by it with the Customer of the Premise where spillage occurs, and Contractor shall report such instances to City. If the Contractor has attempted to have a Customer stop creating spillage but is unsuccessful, the City will attempt to rectify such situation with the Customer. (Union City, CA)

Covering of Loads. Contractor shall cover all open Drop Boxes, with a City-approved cover, at the pickup location before Transporting materials to the Designated Disposal Location or Processing Sites. (Union City, CA)

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Minimization of Spills. Contractor shall use due care to prevent materials placed in the collection containers from being spilled or scattered during the collection or transportation process. If any material is spilled during collection, the Contractor shall promptly clean up all spilled materials. Each collection vehicle shall carry a broom and a shovel at all times for this purpose. Contractor shall not transfer loads from one vehicle to another on any public street, unless it is necessary to do so because of mechanical failure or accidental damage to a vehicle. (City of Salinas, CA)

City Ownership of Carts

Ownership of Carts. Ownership of carts shall rest with the CONTRACTOR, except that ownership of carts in the possession of a Service Recipient at the end of this Agreement shall rest with the CITY. At its sole discretion, CITY may elect not to exercise its rights with regards to this Article and in such case the carts shall remain the property of the CONTRACTOR upon termination of this Agreement. In this event, CONTRACTOR shall be responsible for removing all carts in service from the Service Area and reusing or recycling such carts. (City of Piedmont, CA)

1.3 Noise

Vehicle Noise Level. All Collection operations shall be conducted as quietly as possible and must comply with U.S. EPA noise emission regulations currently codified at 40 CFR Part 205, and other applicable State, County and City noise control regulations. (City of Piedmont, CA)

Collection Vehicle Noise Level. The noise level generated by collection vehicles using compaction mechanisms during the stationary compaction process shall not exceed seventy-five (75) decibels at a distance of twenty-five (25) feet from the collection vehicle measured at an elevation of five (5) feet above ground level using the "A" scale of the standard sound level meter at slow response. CONTRACTOR shall cause each collection vehicle to be tested no less than once every three (3) years during the months of March and April, beginning March of 2008. CONTRACTOR shall maintain copies of certificates of testing showing the results of the vehicle testing and shall make such certificates available for inspection upon request by the City Representative. CONTRACTOR shall not use any collection vehicle that does not meet the noise level limitations of this Section. (City of San Jose, CA)

Noise - All Collection operations shall be conducted as quietly as possible and shall conform to applicable Federal, state,

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county, and City noise level regulations. Contractor shall promptly resolve any Complaints of noise during the morning or evening hours of the day to the satisfaction of the City. (Union City, CA)

Schedules - Residential Solid Waste, Residential Recyclable Materials and Plant Materials shall be collected on weekdays between 6:00 AM and 6:00 PM. To preserve peace and quiet, no Solid Waste, Recyclable Materials or Plant Materials shall be Collected from or within two-hundred (200) feet of residential Premises between 6:00 P.M. and 6:00 A.M. on any day. Contractor shall notify Agency and service recipients in writing at least two (2) weeks before an alternate Collection day is scheduled when the regularly scheduled Collection day falls on a Holiday when no Collections are scheduled. Collection of Solid Waste from Commercial, industrial and institutional Properties shall be scheduled at the direction of the Agency. (SBWMA)

1.4 Safety

Vehicle Loading. Contractor shall not load collection vehicles in excess of the manufacturer's recommendations or limitations imposed by state or local weight restrictions on vehicles. (Salinas, CA)

Collection Vehicles. CONTRACTOR shall not use any collection vehicle older than model year 2001, and shall not use any collection vehicle that is more that six (6) years old or has more than 250,000 miles unless such vehicle is a Rebuilt Vehicle. (San Jose, CA)

Safety Markings and Devices. All collection equipment used by CONTRACTOR in providing collection services under this Agreement shall have appropriate safety markings including, but not limited to, highway lighting, flashing and warning lights, and clearance lights. All such safety markings and devices shall be in accordance with the requirements of the California Vehicle Code, as may be amended from time to time, and shall be subject to the approval of the City Representative. (San Jose, CA)

Vehicles Safety Features and Equipment. All of CONTRACTOR's collection vehicles will be equipped with the following items to assure both public and employee safety during all on-route and off-route operations:

- ABS braking system
- Rear vision camera- Smart Light safety systems
- Hopper Camera
- Back-up alarm warning
- Reverse motions sensor alarm
- Battery disconnect

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- Safety triangles
- Fire extinguisher
- Dual air horn
- Prutsman 7” x 16” West Coast Mirrors
- Dual convex safety mirror
- Body hoist, rear door warning alarm
- Rear working strobe warning light

The back-up cameras, back-up lights, audible warning devices, and yellow hazard lights are activated when CONTRACTOR’s vehicle is forced to maneuver in safety sensitive areas, ensuring the highest level of safety on city streets. In addition, each vehicle is equipped with a broom, shovel, absorbent materials, and other approved clean-up devices and materials for emergencies or any spillage or leaks that may occur (Spill Kit). Each vehicle has two-way radio communication with CONTRACTOR’s office, dispatcher, customer service representatives, and operations supervisors to maintain the highest level of access and communication. (Piedmont, CA (Exhibit 11 based on hauler proposal))

1.5 Street Maintenance Impacts

Vehicle Impact Fee. Initially, Contractor shall pay a Vehicle Impact Fee to the City each month equal to $0.33 per Residential unit that receives Collection services by the Contractor. Thereafter, the Vehicle Impact Fee shall be adjusted annually based on the change in the All Urban Consumers Index (CPI-U) all items, for the San Francisco, Oakland-San Jose, CA, Base Period 1982-1984 = 100, not seasonally adjusted, compiled and published by the U.S. Department of Labor, Bureau of Labor Statistics. (Union City, CA).

2.0 Diversion Requirements/ Incentives

2.1 Minimum Diversion Requirements

Minimum Requirements. The CITY requires the CONTRACTOR to use its best efforts to achieve a minimum annual diversion rate of sixty five percent (65%) for Single family dwelling Collection Services, Multi-family dwelling Collection Services, Commercial Collection Services, City Collection Services, and Debris Box Collection Services, or such other amount as may be set in accordance with the provisions of Article 25 of this Agreement during each Calendar Year beginning January 1, 2009. The annual diversion rate will be calculated as

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"the tons of materials collected by CONTRACTOR from the provision of Collection Services that are sold, processed, or shipped to a recycler or re-user and net of any residue amounts, as required by this Agreement, divided by the total tons of materials collected by CONTRACTOR in each Calendar Year." (City of Piedmont, CA)

Failure to Meet Minimum Requirements. CONTRACTOR'S failure to meet the minimum diversion requirements set forth above in Article 5.01 may result in the termination of this Agreement or the imposition of liquidated damages. In determining whether or not to assess liquidated damages or terminate the Agreement, the CITY will consider the good faith efforts put forth by the CONTRACTOR to meet the minimum diversion requirements. This consideration will include the methods and level of effort of the CONTRACTOR to fully implement the public education and diversion plans attached to and included in this Agreement as Exhibits 8 and 9, respectively. (City of Piedmont, CA)

2.2 Diversion Incentives

Operating Ratio and Allowed Profit. The Contractor shall be entitled to a profit on its Operating Costs, to be determined by use of an Operating Ratio[1].

The Operating Ratio number will be determined using a sliding scale, under which the Operating Ratio number will decrease (and, thus, the Contractor's profit margin will increase) the more Recyclable Materials collected by Contractor are diverted by Contractor from landfilling (i.e., "Recovered Materials" as defined in this Agreement). The percentage of Recovered Materials diverted from landfilling by Contractor shall be measured by determining the percentage by weight (in tons) of Recovered Materials diverted by Contractor from landfilling out of: (a) all Solid Waste collected by Contractor in the South Lake Tahoe Basin Waste Management Authority Franchise Area from collection routes; (b) all Solid Waste received by Contractor at the Materials Recovery Facility from haulers other than Contractor's collection trucks; and (c) all Recyclable Materials collected at Contractor's buyback centers and through other recycling programs operated by Contractor (hereinafter the "Recovery Percentage"). Contractor shall not receive diversion credit for the recovery of Recyclable Materials collected outside of the Authority Franchise Area or from recycling programs operated by third parties. The

[1] Profit based on an Operating Ratio is calculated by dividing the total Allowable Costs by the Operating Ratio (e.g., 90%) and then subtracting the Allowable Costs. (e.g., Profit on $1,000,000 Allowable Costs with a 90% Operating Ratio = ($1,000,000 /.90) - $1,000,000 = $111,111 or 11.1% profit).

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Recovery Percentage shall be rounded to the nearest whole number.

The Operating Ratio number shall vary with Contractor's Recovery Percentage in accordance with the following sliding scale:

Operating Ratio Number	Recovery Percentage
94.34	0-15%
93.90	16
93.46	17
93.02	18
92.59	19
92.17	20
91.74	21
91.32	22
90.90	23
90.50	24
89	25-28
88	29-32
87	33-100

The amount of profit ("Allowed Profit") to be received by Contractor for a given period shall be determined by multiplying the total projected Operating Costs for the period by a fraction, in which the numerator shall be one hundred (100) and the denominator shall be the Operating Ratio number applicable to the period as determined by using the foregoing sliding scale. The Allowed Profit shall then be determined by subtracting the projected Operating Costs from the product of the aforesaid multiplication. For example, if projected Operating Costs for a year were $5,000,000 and the Operating Ratio number to be used was 90, the Allowed Profit would be calculated as follows:

100/90 = 1.11 (rounded off to one one-hundredths)

$5,000,000 x 1.11 = $5,550,000

$5,550,000 - 5,000,000 = $550,000

Allowed Profit = $550,000

Recycling Revenue Bonus for Extraordinary Diversion. In addition to the foregoing calculation of Allowed Profit, Contractor shall be entitled to receive as and for additional profit, twenty-five percent (25%) of Contractor's gross revenues from the sale of Recyclable Materials diverted from landfilling by Contractor pursuant to this Agreement for those rate periods in which Contractor's Recovery Percentage is equal to or greater than thirty-seven percent (37%), and a total of fifty percent (50%) of Contractor's gross revenues from the sale of Recyclable Materials diverted from landfilling by Contractor pursuant to this Agreement for those rate periods in which Contractor's Recovery Percentage

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Appendix A

Best Management Practices – Sample Contract Language

is equal to or greater than forty percent (40%). (El Dorado County, CA)

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Appendix B

Trash Truck Safety Devices

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Appendix B
TRASH TRUCK SAFETY DEVICES

Optional Equipment[1]			
Item	**Description**	**Vehicle Specification**	**Source**
Reverse Motion Sensors	Audible sound system in the cab of vehicle that senses objects (cars, people, poles, etc.) in the reverse path of the vehicle and provides an audible alert in the cab for the driver.	Optional	Norcal/SBWMA Proposal
Battery Disconnect	A mechanical switch that will disengage energy from battery to vehicle. This is used to prevent dead batteries from electrical items left on or potential electrical issues related to loose wires.	Optional	Norcal/SBWMA Proposal
Rear/Side Strobe Warning Lights	Automatic flashing light mounted on the rear of the vehicle and activated during collection operation. Used to alert people that the vehicle is operating in the area.	Optional	Norcal/SBWMA Proposal
Spill Kits	Emergency kits comprised of various absorbent material to help control and limit exposure caused by a vehicle fluid spill including (oil, fuel, hydraulic fluid, anti-freeze, etc.)	Optional	Norcal/SBWMA Proposal
Rear, Side, Hopper Cameras & Video	Camera and video system used to assist driver with viewing the activity behind, along side, or in the hopper of the vehicle.	Optional	BEST/SBWMA Proposal
Driver Camera Systems	Truck mounted camera systems that record truck and driver activity. These are used to help improve driver performance and record events throughout the day.	Optional	Waste Age
GPS	Used for operational monitoring functions including monitoring vehicle travel paths, speed, hard stops and starts, and time the vehicle was in the area.	Optional	Waste Age
Lane Position Monitors	Used to detect out-of-lane drift and driver fatigue.	Optional	Waste Age

[1] - Items that are available to be installed on new or used equipment with the buyer paying an additional cost for the item, installation, and ongoing maintenance.

Appendix B
TRASH TRUCK SAFETY DEVICES

Optional Equipment[1]			
Item	**Description**	**Vehicle Specification**	**Source**
Infrared Night Vision	In cab display system that shows a temperature-based view of objects beyond headlights.	Optional	Waste Age
Tire Pressure Warning System	Used to monitor tire pressure with an audible alert to the driver of a potential tire pressure issue to help prevent blow outs, flat tires, and breakdowns.	Optional	FMCSA.dot.gov
Electronic Stability Controls	Monitors vehicle side ways movement and balance and automatically reduces speed to reduce roll over hazards.	Optional	FMCSA.dot.gov
Electronic System Monitoring	Automatic systems to monitor and alert driver of potential hazards caused by wear or vibration to brakes, wheels, or drives line.	Optional	Waste Age

Appendix B
TRASH TRUCK SAFETY DEVICES

Standard Equipment[2]			
Item	**Description**	**Vehicle Specification**	**Source**
ABS Braking Systems	Control system to assist braking to avoid wheels from locking up and skidding.	Standard	Norcal/SBWMA Proposal
Convex Mirror	Used to aid driver to view objects on the sides of the vehicle.	Standard	Norcal/SBWMA Proposal

[2] - Standard – Equipment normally selected by new buyers and installed on most new vehicles.

Appendix B
TRASH TRUCK SAFETY DEVICES

Required Equipment[3]			
Item	**Description**	**Vehicle Specification**	**Source**
Back Up Alarms	Audible sound system that is automatically activated when the vehicle transmission is set in reverse.	Required	DOT Inspection Sheet
Safety Triangles	Emergency reflect devises to be used in the event of a breakdown to warn other drivers of a potential road hazard.	Required	DOT Inspection Sheet
Fire Extinguisher	Portable hand held fire extinguisher to be used in the event of a fire. These can range in size from a small, medium, or large unit (1lb. 5 lb. 10 lb., etc.)	Required	DOT Inspection Sheet
Dual Air Horns	Warning system used to alert people or other drivers of a potential hazard from oncoming vehicle.	Required	DOT Inspection Sheet
Side Mirrors	Used to aid driver to view objects on the sides of the vehicle.	Required	DOT Inspection Sheet
Hoist, Arm, Rear Door Warning Alarms	Audible alert for driver and personnel outside of vehicle that mechanical lifting devises are activated and operational.	Required	DOT Inspection Sheet

[3] - Required items either by DOT, OSHA, or ANSI standards

Appendix C

Comparative Trash Truck Load Factors

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Appendix C
COMPARATIVE TRASH TRUCK LOAD FACTORS

Reference	Jurisdiction / Data Source	Passenger Car Equivalents	
		Trash Trucks	Recycling Trucks
(1)	Bonestroo	830	
(2)	Napa, CA	886	869
(3)	Roseville Public Works	1,000	
(4)	GBB	1,125	525
(2)	**Fort Collins**	**1,279**	**274**
(2)	Long Beach, CA	1,279	1,064
(5)	Metro Council	1,500	
(2)	San Mateo, CA	1,549	263
(6)	Chanhassen	1,650	
(2)	La Habra Heights, CA	1,730	1,347

(1) Memo to Rick Getschow, City Administrator, Lauderdale, from Paul Heuer, Bonestroo Rosene Anderlik & Associates, Engineers & Architects, 4/9/01

(2) R3 Consulting Group

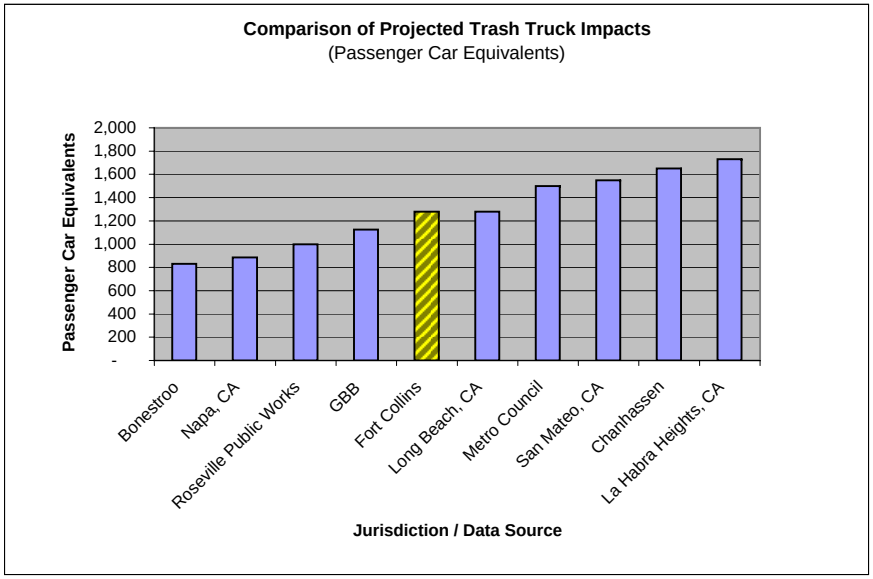
(3) Impact of Heavy Trucks on Low Residential Streets, presented by Duane Schwartz, Roseville Public Works Director, 10/11/01 to Roseville Solid Waste Commission

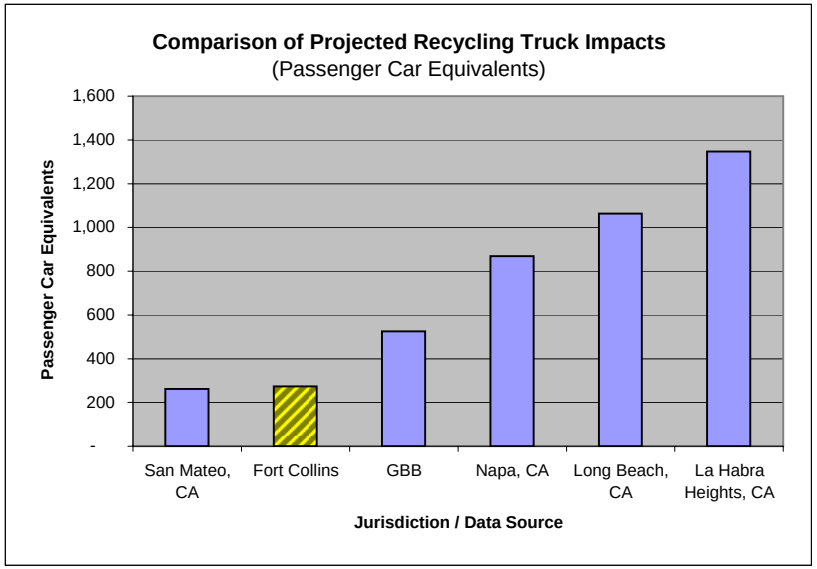
(4) Comparative Economic Analysis of MSW and Recycling Collection in the Twin Cities Metropolitan Areas, prepared for Metro Council by GBB, 9/94; data from late summer through fall, 1993

(5) Study of Organized Collection in the Twin Cities Metropolitan Area, 1985

(6) City of Chanhassen Organized Collection Study, Final Report, 9/93, Resource Strategies Corporation

Appendix C
COMPARATIVE TRASH TRUCK LOAD FACTORS





Appendix D

Draft Strategic Plan for 50% Diversion: Preliminary Staff Recommendations

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Appendix D

DRAFT STRATEGIC PLAN FOR 50% SOLID WASTE DIVERSION PRELIMINARY STAFF RECOMMENDATIONS SUMMARY TABLE	
Plan Element	
Subgoal 1	***Provide Fort Collins residents and the business community with information and education about waste diversion***
1-1 (1)	Increase/enhance the City's education program (in one-year increments) regarding specific measures to be initially implemented.
Subgoal 2	***Target organics to be separated from the waste stream, for collection and delivery in making secondary products such as compost, mulch, or composition construction material.***
2-1(1)	Provide customers, upon request to their trash haulers, with optional curbside yard waste services on a weekly basis. This measure will require that yard waste does not cost more than equivalent costs for trash, by volume (consistent with pay-as-you-throw rates).
2-2	After sufficient infrastructure has been developed to accept large volumes of organic debris to be composted, add requirement for largest candidate firms (e.g., restaurants and grocery stores) to recycle commercial food waste.
2-3	Prevent yard waste from being discarded in Fort Collins' curbside trash collection system.
Subgoal 3	***Target waste material generated by new construction and by demolition activities to be diverted from the waste stream and used in manufacturing secondary products.***
3-1	Establish contract preferences to encourage recycling and waste reduction for City of Fort Collins construction & demolition (C&D) jobs.
3-2 (1)	Create a refundable C&D deposit system based on square footage of project (or comparable criterion), with total deposit to be refunded upon certification that appropriate level of recycling was accomplished.
3-3	In the absence of appropriate private-sector facilities necessary for accepting C&D waste, ultimately create a City sponsored drop-off site.
Subgoal 4	***Divert more of the waste generated by the commercial sector.***
4-1	Offer 3 months recycling free to businesses (City-funded)
4-2	City provides technical assistance / waste audits to businesses
4-3	Adopt ordinance making it mandatory for businesses that dispose of more than $10yd^3$ of trash weekly to install a recycling bin.
4-4	Actively urge smaller / non-recycling businesses to implement singe-stream recycling systems.
4-5	Assist with the formation of recycling cooperatives for small businesses.
4-6	Awards grants, zero-interest loans, and incentives to businesses for waste prevention efforts.
4-7	Adopt City procurement guidelines and/or incentives for recycled content.
4-8	Strengthen the City organization's recycling program; emphasize source reduction.
4-9 (1)	Amend the City's PAYT ordinance to include all commercial customers; require recycling fee to be embedded in rates and charge volume-based pricing.
4-10	Ultimately, make recycling mandatory for all businesses.
Subgoal 5	***Divert more of the waste generated by the residential sources.***
5-1 (1)	Amend Fort Collins' pay-as-you-throw (PAYT) residential trash rates ordinance so that "rate design" further enhances waste reduction efforts.
5-2	Implement ongoing curbside recycling program improvements, including more designated materials and standard options for larger recycling containers, etc.
5-3	Encourage multifamily housing managers/residents to adopt single-stream recycling systems.
5-4	Encourage private partnerships for constructing multiple community drop-offs to collect more recyclables (paper, glass, etc.)
5-5	Prevent discarded computers from being placed in Fort Collins' curbside trash collection system.
5-6	Adopt the requirement for service providers to collect single stream recycling from residential customers as soon as market trends allow.
Subgoal 6	***Create a dedicated city "waste diversion fee" that would be used to fund new recycling opportunities, grants and zero-interest loans for waste diversion innovation, as well as other Strategic Plan activities.***

(1)Recommended Phase 1 Program

March 28, 2006 Council Worksession
Attachment 1: Preliminary Staff Recommendations

DRAFT STRATEGIC PLAN for 50% SOLID WASTE DIVERSION

City of Fort Collins Natural Resources Department
Susie Gordon, Sr. Environmental Planner
John Armstrong, Environmental Planner

Preliminary Staff Recommendations:

DRAFT STRATEGIC PLAN FOR 50% SOLID WASTE DIVERSION

City of Fort Collins Natural Resources Department

INTRODUCTION

Fort Collins' involvement in recycling and waste reduction traces back to 1977 city master planning policies and the introduction of local curbside recycling in the 1980's. Adoption of a pay-as-you-throw (PAYT) trash ordinance followed in 1995. A 1999 resolution adopted by the City Council for increasing waste diversion levels paved the way for more innovations. When an update was made to the Council in February 2005, measurements showed the community was still only half-way to its goal of 50% diversion by 2010; clearly, new and revitalized efforts were necessary to make significant advances.

During a six-month strategic planning process, dozens of new programs[1] were explored for diverting more of the community's waste stream away from landfill disposal. A highly experienced consulting team led by Skumatz Economic Research Associates was hired for the project, and a group of knowledgeable stakeholders was recruited as a steering committee for the project. Extensive community involvement helped ensure that public input was incorporated into the December, 2005 strategic plan report.

This document introduces staff's preliminary proposal for a package of over 20 new measures that will help Fort Collins divert 50% (or more) of its waste stream. The *Strategic Plan for 50% Solid Waste Diversion* has been designed to provide both an appropriate range of actions and the sequence of changes necessary to reach the community's goal in a timely manner. The new measures were chosen for their feasibility, effectiveness, and pro-activeness. They represent staff's recommended approach, which came out of all the ideas that were explored with help from the public, consultants, and Steering Committee members who participated in the planning process.

If Council agrees to adopt a Strategic Plan, staff recommends prioritizing five programs for early implementation. These include: a one-year education campaign about local recycling and waste reduction opportunities; opportunity for all customers to receive weekly yard waste recycling; a construction and demolition (C&D) deposit that refunds the full deposit for projects that recycle; amend the City's pay-as-you-throw (PAYT) ordinance to include commercial customers so that all receive recycling service; restructure Fort Collins' PAYT ordinance with "rate designs" that further enhance waste reduction efforts.

[1] Table 5-2 (pages 40 – 43) of the draft SERA report (*Fort Collins Solid Waste 5-Year Strategic Plan*), available at www.fcgov.com/recycling/talkingtrash .

Background/Context

A number of cities, including Chicago, San Francisco, Portland (OR), and San Diego have been successful at reaching, and surpassing, 50% waste diversion levels by applying innovative policies and programs[2]. However, relatively few communities in this part of the country have made such a high commitment to waste diversion, especially those that do not manage municipal trash collection, and therefore have limited funding (Fort Collins citizens employ the services of a completely privatized trash collection system).

A number of economic variables are critical to consider in a strategic plan. Fort Collins' geographic location increases shipping costs to recycling markets that are predominantly found in coastal transportation centers. Local recycling opportunities that are not fully developed need to be stimulated. However, Colorado has not adopted the legislative mandates that successfully motivate waste reduction in many other states (quite the opposite happens due to the abundance of landfills that have been built in our state); therefore, local ordinances and requirements play an important role. The regional infrastructure necessary to accomplish higher levels of waste diversion (i.e., processing or remanufacturing plants) requires greater levels of investment, so incentives are important to consider. Because the market for recyclable commodities is so susceptible to global influences such as energy prices and international demand, waste reduction and recycling programs adopted for Fort Collins must be as economically sound and solvent as possible.

Key Objectives

Five main objectives were used to evaluate, model, and select "packages" of programs from among the initial list of new ideas that were submitted by the consultant.

1. Target materials that have the most potential to be diverted and those that represent the largest amount of volume that can be diverted [3],
2. Elicit waste reduction contributions from all sectors of the community, including residential, commercial, institutional (*e.g.*, the City), multi-family, and key stakeholder businesses such as trash haulers and recycling companies,
3. Distribute costs so that no single sector is unfairly affected,
4. Optimize positive, intended consequences and interrelationships among potential new programs,
5. Anticipate market forces that will create successful opportunities for our local recycling system, which includes service providers, the business community, recycling professionals, commodity brokers, as well as local citizens and their political representatives, and
6. Address concerns and needs that were expressed by citizens of Fort Collins in a community-wide survey.[4]

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[2] *Waste News* article: Municipal Recycling Survey. February 13, 2006 (www.wastenews.com)
[3] Figure 5-1, 5-2 (pages 32, 33) draft SERA report (*Fort Collins Solid Waste 5-Year Strategic Plan).*
[4] Appendix D, *ibid*

How Recommendations Were Evaluated

The econometric modeling that was used to calculate the costs and effectiveness of new programs for Fort Collins draws from an extensive, proprietary computer program developed by Skumatz Economic Research Associates. (For 25 years, this firm has researched the impacts of solid waste reduction policies and programs in over 1,500 North American communities.) Fort Collins' own measurements of local waste generation and recycling activities provided the baseline data for SERA's Strategic Plan model; the customized tool now belongs to the City for use in future planning.

Public Input

Public involvement was critical to guiding the strategic planning process. Numerous articles and announcements were printed in the media that helped the City obtain comments and ideas. An open house in December 2005 was attended by over 60 citizens and there were a number of "visits" to an interactive website (www.fcgov.talkingtrash).

A group of stakeholders representing a broad cross-section of the community met regularly to assist staff and the consultants with developing and ranking strategies to include in the Plan. The Steering Committee included:

Trash hauling companies
Recyclers – public & private
County landfill staff
Commercial composter
Environmental consultant
Citizen advisory committee members

As part of Fort Collins' strategic planning project, a public opinion survey was conducted by Corona Research, with a margin of error of ~ 4.9 percent and a 95 percent confidence level in the results. (A smaller survey was also administered to poll businesses in Fort Collins about their attitudes and opinions about recycling and waste reduction.) Survey questions were specifically designed to seek information that relates to developing plans for new programs. The responses from the 403 completed telephone interviews indicate an extremely high interest in, and support of, recycling among Fort Collins citizens. In terms of importance, respondents were more likely to state that the ability to recycle conveniently, and the ability to recycle many materials, is more important than having inexpensive trash and recycling services.

There appears to be additional demand for curbside recycling; nearly three-quarters (73 percent) of survey respondents reported that they participate in curbside recycling. While there are many reasons for not recycling, the largest single reason (37 percent of non-recyclers) is that curbside recycling is not available to them; this may be attributed to the fact that curbside recycling is not always provided to residents of multi-family dwellings.

Yard waste appears to be an area of particular potential for recycling**.** A total of 39 percent of respondents report that they put yard waste out with the trash. About 1/3 of respondents report that they would use a community composting facility even if there was a small fee. Demand is greater for curbside pickup of yard waste; over half would be "very likely" or "somewhat likely" to use the service, even if there was a small fee.

There is a belief that recycling has not yet hit its potential. On average, respondents believe that over 40 percent of their own trash could be recycled. A total of 79 percent believe that it is feasible to divert 50 percent of garbage to recycling. Respondents also expressed price flexibility for increased services. A total of 82 percent of households believe that their current charges for trash and recycling are reasonable, and 78 percent would be willing to pay "a bit more" to achieve the City's recycling goal. Half of respondents would pay three dollars more per month, while 93 percent would be willing to pay an additional 50 cents per month.

The findings of the public opinion survey confirm that Fort Collinites are clearly eager to recycle, with 98 percent of respondents expressing the belief that recycling is "good for the city of Fort Collins." They are supportive of new measures to divert waste (89 percent believe that the City should pursue additional means of recycling and diversion) and willing to pay some part of the costs that may be incurred to develop new programs. These findings, and the public comments that were received, were weighed together with our best estimation about costs and impacts in developing the following preliminary Strategic Plan.

Phase-in Schedule

For the purposes of modeling, it was necessary to enter start-dates for the strategies that were evaluated. Staff applied a phased approach with two basic stages. Many strategies were modeled that could essentially be started right away, while several others would be better to initiate in five or eight years, after the infrastructure has grown or intermediates steps have been taken. It is important to plan for a highly flexible implementation schedule in order to respond to changes over time such as adjusted market conditions or innovations in technology.

In the interests of assisting the City Council to provide immediate direction for the community, staff developed a summary list of five new measures to investigate for Phase I implementation.

- Strategy 1-1. Increase/enhance the City's education program (in one-year increments) regarding specific measures to be initially implemented.
- Strategy 2-1. Provide customers, upon request to their trash haulers, with optional curbside yard waste collection services on a weekly basis.
- Strategy 3-2. Create a refundable C&D deposit system based on square footage of project (or comparable criterion), with total deposit to be refunded upon certification that appropriate level of recycling was accomplished.
- Strategy 4-9. Amend the City's PAYT ordinance to include all commercial customers; require recycling fee to be embedded in rates and charge volume-based pricing.
- Strategy 5-1. Amend Fort Collins' pay-as-you-throw (PAYT) residential trash rates ordinance so that "rate design" further enhances waste reduction efforts.

Next Steps

At the March 28, 2006 work session, the City Council's feedback will be sought for the overall package of new measures, and for the concept of adopting a long-term strategic plan. If the Council concurs about a summary list of new measures to begin implementing immediately, staff will begin preparing a business plan for each one, including more detailed benefit / cost analyses, schedule for implantation, and budget estimates. These project outlines will be submitted as soon as possible for Council's formal endorsement.

STRATEGIC PLAN FOR 50% SOLID WASTE DIVERSION

GOAL: The City will strive to divert 50% of the community's waste stream from landfill disposal by 2010.

***Subgoal 1*: Provide Fort Collins residents and the business community with information and education about waste diversion.**

Strategy 1-1. Increase/enhance the City's education program (in one-year increments) regarding specific measures to be initially implemented [5].
Modeled costs: $40 / ton City[6], $.50 / ton community[7]
Modeled diversion: 1.3% (5,000 new tons)
Modeled start-date and ramp-up period: 2007, one year

***Subgoal 2*: Target organics to be separated from the waste stream, for collection and delivery in making secondary products such as compost, mulch, or composition construction material.**

Strategy 2-1. Provide customers, upon request to their trash haulers, with optional curbside yard waste collection services on a weekly basis. This measure will require that yard waste does not cost more than equivalent costs for trash, by volume (consistent with pay-as-you-throw rates).
Modeled costs: $1 / ton City, $120 / ton community
Modeled diversion: 1.9% (7,500 new tons)
Modeled start-date and ramp-up period: 2007, two years

Strategy 2-2. After sufficient infrastructure has been developed to accept large volumes of organic debris to be composted, add requirement for largest candidate firms (e.g., restaurants and grocery stores) to recycle commercial food waste.
Modeled costs: $1 / ton City, $12 / ton community
Modeled diversion: 0.4% (1,700 new tons)
Modeled start-date and ramp-up period: 2011, two years

Strategy 2-3. Prevent yard waste from being discarded in Fort Collins' curbside trash collection system.

[5] Underlined to indicate strategy was included in staff's recommendation for Phase I implementation.
[6] City cost per ton is the estimated cost to city government to divert one ton of new material per year following full implementation of a given program.

[7] User cost per ton is the estimated cost to the community (i.e., residents and businesses) to divert one ton of new material per year following full implementation of a given program.

Modeled costs: $1 / ton City, $30 / ton community
Modeled diversion: 9.0% (34,000 new tons)
Modeled start-date and ramp-up period: 2011, two years

***Subgoal 3*: Target waste material generated by new construction and by demolition activities to be diverted from the waste stream and used in manufacturing secondary products.**

Strategy 3-1. Establish contract preferences to encourage recycling and waste reduction for City of Fort Collins construction & demolition (C&D) jobs.
Modeled costs: not modeled
Modeled diversion: not modeled
Modeled start-date and ramp-up period: 2007, one year

Strategy 3-2. Create a refundable C&D deposit system based on square footage of project (or comparable criterion), with total deposit to be refunded upon certification that appropriate level of recycling was accomplished.
Modeled costs: $1 / ton City, $30 / ton community
Modeled diversion: 12% (46,000 new tons)
Modeled start-date and ramp-up period: 2007, four years

Strategy 3-3. In the absence of appropriate private-sector facilities necessary for accepting C&D waste, ultimately create a City sponsored drop-off site.
Modeled costs: $1 / ton City, $12 / ton community
Modeled diversion: 10.6% (41,000 new tons)
Modeled start-date and ramp-up period: 2011, four years

***Subgoal 4*: Divert more of the waste generated by the commercial sector.**

Strategy 4-1. Offer 3 months recycling free to businesses (City-funded).
Modeled costs: $20 / ton City, $20 / ton community
Modeled diversion: very low
Modeled start-date and ramp-up period: 2007, one year

Strategy 4-2. City provides technical assistance / waste audits to businesses.
Modeled costs: $110 / ton City, $.50 / ton community
Modeled diversion: 0.9% (3,400 new tons)
Modeled start-date and ramp-up period: 2007, two years

Strategy 4-3. Adopt ordinance making it mandatory for businesses that dispose of more than 10 yd^3 of trash weekly to install a recycling bin.
Modeled costs: $1 / ton City, $12 / ton community
Modeled diversion: 2.0% (7,500 new tons)
Modeled start-date and ramp-up period: 2007, two years

Strategy 4-4. Actively urge smaller / non-recycling businesses to implement single-stream recycling systems.
Modeled costs: $.50 / ton City, $7 / ton community
Modeled diversion: 0.9% (3,300 new tons)
Modeled start-date and ramp-up period: 2007, two years

Strategy 4-5. Assist with formation of recycling cooperatives for small businesses.
Modeled costs: $110 / ton City, $.50 ton / community
Modeled diversion: 0.9% (3,300 new tons)
Modeled start-date and ramp-up period: 2007, four years

Strategy 4-6. Awards grants, zero-interest loans, and incentives to businesses for waste prevention efforts.
Modeled costs: $210 / ton City, $.50 / ton community
Modeled diversion: 0.7% (2,700 new tons)
Modeled start-date and ramp-up period: 2007, two years

Strategy 4-7. Adopt City procurement guidelines and/or incentives for recycled content.
Modeled costs: not modeled
Modeled diversion: not modeled
Modeled start-date and ramp-up period: 2007, one year

Strategy 4-8. Strengthen the City organization's recycling program; emphasize source reduction.
Modeled costs: not modeled
Modeled diversion: not modeled
Modeled start-date and ramp-up period: 2007, one year

Strategy 4-9. Amend the City's PAYT ordinance to include all commercial customers; require recycling fee to be embedded in rates and charge volume-based pricing.
Modeled costs: $1 / ton City, $70 / ton community
Modeled diversion: 16.7% (64,000 new tons)
Modeled start-date and ramp-up period: 2007, four years

Strategy 4-10. Ultimately, make recycling mandatory for all businesses.
Modeled costs: $1 / ton City, $70 / ton commercial
Modeled diversion: 1.7% (6,600 new tons)
Modeled start-date and ramp-up period: 2015, one year

***Subgoal 5*: Divert more of the waste generated by residential sources.**

Strategy 5-1. Amend Fort Collins' pay-as-you-throw (PAYT) residential trash rates ordinance so that "rate design" further enhances waste reduction efforts.
Modeled costs: $1 / ton City, $30 / ton community
Modeled diversion: 3.3% Modeled start-date and ramp-up period: 2007, one year

Strategy 5-2. Implement ongoing curbside recycling program improvements, including more designated materials and standard options for larger recycling containers, etc.
Modeled costs: not finalized
Modeled diversion: 0.4% (1,700 new tons)
Modeled start-date and ramp-up period: 2007, one year

Strategy 5-3. Encourage multifamily housing managers / residents to adopt single-stream recycling systems.
Modeled costs: not finalized
Modeled diversion: 0.1 (470 new tons)
Modeled start-date and ramp-up period: 2007, two years

Strategy 5-4. Encourage private partnerships for constructing multiple community drop-offs to collect more recyclables (paper, glass, etc.).
Modeled costs: $1 / ton City, $.50 ton / community
Modeled diversion: 0.8% (3,000 new tons)
Modeled start-date and ramp-up period: 2007, two years

Strategy 5-5. Prevent discarded computers from being placed in Fort Collins' curbside trash collection system.
Modeled costs: $14 / ton City, $120 / ton community
Modeled diversion: 0.4 % (1,700 new tons)
Modeled start-date and ramp-up period: 2007, one year

Strategy 5-6. Adopt the requirement for service providers to collect single stream recycling from residential customers as soon as market trends allow.
Modeled costs: $1 / ton City, $.50 / ton community
Modeled diversion: 2.0% (8,000 new tons)
Modeled start-date and ramp-up period: 2007, three years

***Subgoal 6*. Create a dedicated city "waste diversion fee" that would be used to fund new recycling opportunities, grants and zero-interest loans for waste diversion innovation, as well as other new Strategic Plan activities.**

Appendix E

Waste Composition Data

- Table E-1; Waste Disposal by Generator Sector
- Table E-2; Comparison of Top 10 Most Prevalent Materials by Generator Sector

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Appendix E
WASTE COMPOSITION DATA

Table E-1
WASTE DISPOSAL BY GENERATOR SECTOR

Residential		Commercial		Self-haul		C&D		Total	
Tons Disposed	% of Total	Tons Disposed	% of Total	Tons Disposed	% of Total	Tons Disposed	% of Total	Tons Disposed	% of Total
63,624	41%	55,211	36%	10,211	7%	24,516	16%	153,562	100%

Table E-2
COMPARISON OF TOP 10 MOST PREVALENT MATERIALS BY GENERATOR SECTOR

Rank	Residential		Commercial		Self-haul		C&D	
	Material Type	% of Total	Material Type	% of Total	Material Type	% of Total	Material Type	% of Total
1	Food Waste	17.4%	Food Waste	15.9%	Bulky Items	15.8%	Drywall	15.1%
2	Yard Waste	8.0%	***OCC/Kraft***	***13.6%***	Yard Waste	9.5%	Asphalt Roofing	14.7%
3	Non Recyc Paper	7.7%	Yard Waste	6.3%	Other Inorganics	9.1%	Carpet	11.8%
4	***Mixed Recyc Paper***	***6.6%***	Non Recyc Paper	5.5%	Carpet	8.0%	Block/Brick/Stone	11.2%
5	***Newspaper***	***6.5%***	Film/Bags	4.5%	Clean Wood	7.7%	Clean Wood	10.9%
6	***OCC/Kraft***	***6.0%***	***Newspaper***	***4.1%***	Clean Wood/Block/ Brick/Stone	5.8%	Other Wood	10.3%
7	Diapers/Sanitary Products	4.9%	***Mixed Recyc Paper***	***3.6%***	OCC/Kraft	4.4%	Painted/Stained Wood	6.0%
8	Film/Bags	4.5%	Clean Wood	3.5%	Mixed Recyc Paper	4.1%	Other Inorganics	5.4%
9	Other Rigid Plastic	3.2%	High Grade Paper	3.5%	Painted Stained Wood	3.7%	Other/Broken Glass	3.9%
10	Fines	3.1%	Other Rigid Plastic	3.2%	Asphalt Roofing	3.6%	Other Ferrous Metal	2.4%
Top 10		**68.0%**		**63.9%**		**71.1%**		**91.8%**
Recyclable Materials =		***19.1%***		***21.3%***				
Compostable Materials =		***25.4%***		***22.2%***				
Total =		***44.5%***		***43.5%***				

Numbers may not add due to rounding
Source: Larimer County; Two-Season Waste Composition Study; Final Report, May 2007, Table 4-3

Appendix F

Residential Collection System Structure Options

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Appendix F
RESIDENTIAL COLLECTION SYSTEM STRUCTURE OPTIONS
COMPARATIVE MATRIX

Collection System Structure		Overview	Summary	
			Pros	Cons
1)	Current Open Competition System without any Changes (Status Quo)	Haulers are required to obtain a license to operate within the City	Limited City administrative requirements; Customers free to choose hauler; No impact on existing haulers; No change to Status Quo	Limited City control; Multiple trash collection service impacts; More difficult to implement new / uniform programs and services than Districted Collection System or City-wide Contract for Services
2)	Open Competition System with Increased Licensing Requirements	Haulers would be required to comply with additional licensing requirements established by the City	Provides many of the same benefits as Current Open Competition System while also providing opportunity to reduce trash collection service impacts, increase diversion and establish other desired hauler requirements	Many of the same issues as Current Open Competition System; Additional City administrative requirements
3)	Districted Collection System	The City would Issue a Request for Proposals (RFP) to provide services within a district(s) / City-wide; Specific services, service standards and other terms and conditions would be specified in the district or City-wide contract; Rates would be specified in proposal	Provides effective mechanism (district or city-wide contract) and process (competitive procurement) through which the City can establish desired contract terms and conditions at rates set by the marketplace	Represents significant change for all parties (residents, haulers, City); Lack of customer choice; Existing haulers may lose market share; Increased City administrative requirements; Requires City billing system if uniform rates are to be established
4)	City-wide Contract for Services			Represents significant change for all parties (residents, haulers, City); Lack of customer choice; Existing haulers may lose market share; Increased City administrative requirements;

Appendix F
RESIDENTIAL COLLECTION SYSTEM STRUCTURE OPTIONS
COMPARATIVE MATRIX

Collection System Structure		Regulatory Mechanism	Reference Jurisdictions	Proposer Pool	Impact on Existing Haulers	Trash Collection Impacts
1)	**Current Open Competition System without any Changes** (Status Quo)	**Municipal Code** *(Length can vary depending on level of requirements: Broomfield, Golden 5 pgs; Fort Collins 10 pgs; Calabasas, CA 46 pgs)*	**Fort Collins; Greeley; Windsor; Many Others**	**NA**	**NA**	**No change**
2)	**Open Competition System with Increased Licensing Requirements**			**NA**	**Haulers would be required to adhere to additional license requirements established by City**	**Reduced impacts relative to any new associated licensing requirements established by City**
3)	**Districted Collection System**	**Stand alone District Contract**	**None identified in Colorado** (City of San Jose, CA)	**Any licensed hauler**	**Potential loss of some or all residential market share; Potential for increased market share**	**Reduced impacts relative to reduction in number of trucks on residential streets and number of vehicle miles traveled** (All other factors the same); **Reduced impacts related to any related contract terms and conditions**
4)	**City-wide Contract for Services**	**Stand alone City-wide Contract** (Lafayette, CO 13 pgs; Various CA Jurisdictions (+/- 100 pgs))	**Commerce City; Lafayette; Evans; Greenwood Village; Superior**		**One hauler would be awarded City-wide contract; Existing haulers that are not awarded City-wide contract would lose entire market share**	

Appendix F
RESIDENTIAL COLLECTION SYSTEM STRUCTURE OPTIONS
COMPARATIVE MATRIX

<table>
<tr><th colspan="2" rowspan="2">Collection System Structure</th><th colspan="4">Impact on Customers</th></tr>
<tr><th>Ability to Choose Hauler</th><th>Rate Impact</th><th>Ease of Use</th><th>Quality of Service</th></tr>
<tr><td>1)</td><td>Current Open Competition System without any Changes
(Status Quo)</td><td>Customer may choose any licensed hauler</td><td>NA</td><td>No change</td><td rowspan="2">Customer has ability to choose another licensed hauler if they have a customer service or other issue</td></tr>
<tr><td>2)</td><td>Open Competition System with Increased Licensing Requirements</td><td>Customer may choose any licensed hauler</td><td>None unless additional licensing requirements result in increased costs that are passed along to residents</td><td>No change</td></tr>
<tr><td>3)</td><td>Districted Collection System</td><td rowspan="2">None
(Contracted hauler would provide service to all customers in district / City-wide)</td><td>Potential for obtaining lower rates
(Operational efficiencies should allow for lowering of rates - all other factors the same)</td><td rowspan="2">Will require transition to a new hauler for some or all customers</td><td rowspan="2">Customers do not have ability to switch haulers if customer service issues arise;
City has ability to set customer service standards but no ability to change haulers during term of contract if customer issues arise unless they rise to breach of contract status;
Liquidated damages provision could be included in contract to address service quality and other performance issues that may arise and are not resolved to the City's satisfaction</td></tr>
<tr><td>4)</td><td>City-wide Contract for Services</td><td>Potential for obtaining lowest rates
(Operational efficiencies should allow for lowering of rates - all other factors the same)</td></tr>
</table>

Appendix F
RESIDENTIAL COLLECTION SYSTEM STRUCTURE OPTIONS
COMPARATIVE MATRIX

Collection System Structure		Implementation Issues			
		Ease	**Cost** (if third party is enlisted)	**Lead Time**	**Key Process Considerations**
1)	**Current Open Competition System without any Changes** (Status Quo)	**NA**	**NA**	**NA**	**NA**
2)	**Open Competition System with Increased Licensing Requirements**	**Requires drafting additional licensing requirements and amending Municipal Code**	**$10 - $25K plus City implementation costs and ongoing administrative expenses**	**+/- 6 months** (City may wish to solicit Hauler input related to additional licensing requirements to assure that they result in meaningful benefits without being overly burdensome on the haulers)	**Need to draft additional licensing requirements and amend Municipal Code;**
3)	**Districted Collection System**	**City should anticipate opposition from both residents and haulers; Requires transition period with appropriate City oversight**	**~$50,000 - $150,000 plus City implementation costs and ongoing administrative expenses** (Can have successful proposer(s) cover cost and recover through rates over term of contract) (Rate Impact > $0.10/month/acct) (Billing costs associated with Districted Collection System if uniform rate is to be established)	**12 - 24 months** (City may wish to solicit Hauler input related to District / City-wide Contract terms and conditions to assure that they result in meaningful benefits without being overly burdensome on the haulers)	**Need to establish districts** (Requires accurate account data and determination of which account types to be included (e.g., HOAs?)); **Draft District Contract and RFP; Conduct procurement process and finalize District Contract; Manage transition to new contracted hauler(s); Establish City billing capabilities and ongoing interface with haulers to assure billing is accurate**
4)	**City-wide Contract for Services**				**Need to: Draft City-wide Contract and RFP; Conduct procurement process and finalize contract; Manage transition to new contracted hauler**

Appendix F
RESIDENTIAL COLLECTION SYSTEM STRUCTURE OPTIONS
COMPARATIVE MATRIX

Collection System Structure		Administrative Issues		
		Requirements	Ability to Control Service	Rate Regulation
1)	**Current Open Competition System without any Changes** (Status Quo)	**No change**	**No change**	**NA** (Market sets rates)
2)	**Open Competition System with Increased Licensing Requirements**	**Additional administrative requirements to oversee additional licensing requirements** (0.0 - 0.25 FTE additional administrative staff)	**City can establish higher level of control through additional licensing requirements**	**NA** (Market sets rates)
3)	**Districted Collection System**	**Additional resources necessary to provide ongoing contract management; Annual rate adjustment process; Periodic procurement and/or negotiations required** (0.25 - 0.50 FTE additional administrative staff)	**City would establish desired controls / requirements (services, service levels, rate adjustment process, recordkeeping, insurance, indemnification) though District / City-wide Contract terms and conditions**	**City would regulate rates; Initial rates established based on competitive proposals; Rate regulation mechanism would be specified in District / City-wide Contract (e.g., annual CPI increases); City could establish profit incentives related to performance (e.g., sliding scale profit tied to diversion rate)**
4)	**City-wide Contract for Services**			

Appendix G

Colorado Municipal League and Colorado Recycles - Survey Results

- Trash Services
- Recycling Services

R3

Appendix G
TRASH SERVICES

Number of Cities	City	Population - July, 2004	County	Residential Trash Svc. Is A Municipal Svc.	Residential Trash Svc. Is A City Svc. Provided through Contract with 1 or more haulers	Residential Trash Svc. Is a private sector svc. Through private haulers	Did not Respond
1	Denver	568,913	Denver	X			
2	Thornton	101,763	Adams - Weld	X			
3	Longmont	80,612	Boulder - Weld	X			
4	Loveland	57,485	Larimer	X			
5	Grand Junction	48,141	Mesa	X			
6	Northglenn	35,612	Adams - Weld	X			
7	Durango	15,628	La Plata	X			
8	Montrose	15,351	Montrose	X			
9	Sterling	13,713	Logan	X			
10	Fort Morgan	11,119	Morgan	X			
11	Craig	9,178	Moffat	X			
12	Lamar	8,628	Prowers	X			
13	Fruita	8,507	Mesa	X			
14	Cortez	8,504	Montezuma	X			
15	Alamosa	8,419	Alamosa	X			
16	Delta	8,087	Delta	X		X	
17	Rifle	7,760	Garfield	X			
18	La Junta	7,334	Otero	X			
19	Edgewater	5,351	Jefferson	X		X	
20	Gunnison	5,318	Gunnison	X			
21	Brush	5,282	Morgan	X			
22	Gypsum	4,944	Eagle	X			
23	Rocky Ford	4,182	Otero	X			
24	Eagle	3,816	Eagle	X			
25	Florence	3,795	Fremont	X		X	
26	Yuma	3,362	Yuma	X			
27	Lochbuie	3,091	Weld	X			
28	Las Animas	2,673	Bent	X			
29	Snowmass Village	2,317	Pitkin	X			
30	Wray	2,223	Yuma	X			
31	Limon	2,101	Lincoln	X			
32	Akron	1,854	Washington	X			
33	Olathe	1,675	Montrose	X			
34	Paonia	1,639	Delta	X			
35	Julesburg	1,425	Sedgwick	X			
36	Holly	1,020	Prowers	X			
37	Haxtun	1,008	Phillips	X			
38	Hugo	855	Lincoln	X			
39	Walsh	723	Baca	X			
40	Eads	702	Kiowa	X			
41	Swink	688	Otero	X			
42	Flagler	599	Kit Carson	X			
43	Blanca	399	Costilla	X		X	
44	Larkspur	245	Douglas	X		X	
45	Cheraw	201	Otero	X			
46	Pritchett	130	Baca	X			
47	Black Hawk	112	Gilpin	X			
	Subtotal	**1,076,484**					

Appendix G
TRASH SERVICES

Number of Cities	City	Population - July, 2004	County	Residential Trash Svc. Is A Municipal Svc.	Residential Trash Svc. Is A City Svc. Provided through Contract with 1 or more haulers	Residential Trash Svc. Is a private sector svc. Through private haulers	Did not Respond
1	Commerce City	30,768	Adams		X		
2	Evans	16,280	Weld		X		
3	Greenwood Village	12,586	Arapahoe		X		
4	Lone Tree	7,436	Douglas		X		
5	Johnstown	6,122	Larimer - Weld		X		
6	Milliken	5,214	Weld		X		
7	Burlington	3,838	Kit Carson		X		
8	Eaton	3,825	Weld		X		
9	Dacono	3,309	Weld		X		
10	New Castle	2,949	Garfield		X		
11	Platteville	2,576	Weld		X		
12	Telluride	2,335	San Miguel		X	X	
13	Silt	2,184	Garfield		X		
14	La Salle	1,857	Weld		X		
15	Hayden	1,765	Routt		X		
16	Bayfield	1,705	La Plata		X		
17	Kremmling	1,641	Grand		X		
18	Crested Butte	1,543	Gunnison		X		
19	Kersey	1,433	Weld		X		
20	Ault	1,421	Weld		X		
21	Parachute	1,338	Garfield		X		
22	Ordway	1,188	Crowley		X		
23	Columbine Valley	1,167	Arapahoe		X		
24	Gilcrest	1,161	Weld		X		
25	Mountain Village	1,137	San Miguel		X	X	
26	Hotchkiss	1,024	Delta		X		
27	Oak Creek	914	Routt		X		
28	Pierce	878	Weld		X		
29	Ridgway	812	Ouray		X		
30	Foxfield	765	Arapahoe		X		
31	Ignacio	754	La Plata		X		
32	Mountain View	549	Jefferson		X		
33	Nunn	520	Weld		X		
34	DeBeque	497	Mesa		X		
35	Wiley	463	Prowers		X		
36	Creede	422	Mineral		X		
37	Olney Springs	370	Crowley		X		
38	Ovid	333	Sedgwick		X		
39	Eckley	278	Yuma		X		
40	Peetz	236	Logan		X		
41	Crowley	177	Crowley		X		
42	Grover	154	Weld		X		
43	Ophir	124	San Miguel		X		
44	Branson	85	Las Animas		X		
45	Kim	73	Las Animas		X		
	Subtotal	**126,206**					

Appendix G
TRASH SERVICES

Number of Cities	City	Population - July, 2004	County	Residential Trash Svc. Is A Municipal Svc.	Residential Trash Svc. Is A City Svc. Provided through Contract with 1 or more haulers	Residential Trash Svc. Is a private sector svc. Through private haulers	Did not Respond
1	Colorado Springs	380,073	El Paso			X	
2	Aurora	295,775	Adams - Arapahoe - Douglas			X	
3	Lakewood	143,611	Jefferson			X	
4	**Fort Collins**	**126,903**	**Larimer**			**X**	
5	Westminster	105,177	Adams - Jefferson			X	
6	Pueblo	104,031	Pueblo			X	
7	Arvada	103,004	Adams - Jefferson			X	
8	Centennial	101,049	Arapahoe			X	
9	Boulder	97,467	Boulder			X	
10	Greeley	85,887	Weld			X	
11	Broomfield	44,634	Broomfield			X	
12	Littleton	40,715	Arapahoe - Douglas - Jefferson			X	
13	Parker	37,093	Douglas			X	
14	Englewood	32,491	Arapahoe			X	
15	Castle Rock	32,261	Douglas			X	
16	Wheat Ridge	31,869	Jefferson			X	
17	Brighton	27,131	Adams - Weld			X	
18	Lafayette	23,704	Boulder			X	
19	Fountain	18,334	El Paso			X	
20	Golden	17,731	Jefferson			X	
21	Windsor	12,711	Larimer - Weld			X	
22	Federal Heights	11,698	Adams			X	
23	Steamboat Springs	10,742	Routt			X	
24	Superior	10,267	Boulder - Jefferson			X	
25	Erie	10,216	Boulder - Weld			X	
26	Trinidad	9,344	Las Animas			X	
27	Glenwood Springs	8,517	Garfield			X	
28	Fort Lupton	7,111	Weld			X	
29	Woodland Park	7,081	Teller			X	
30	Avon	6,755	Eagle			X	
31	Aspen	6,368	Pitkin			X	
32	Cherry Hills Village	6,089	Arapahoe			X	
33	Firestone	5,748	Weld			X	
34	Estes Park	5,707	Larimer			X	
35	Carbondale	5,689	Garfield			X	
36	Sheridan	5,457	Arapahoe			X	
37	Manitou Springs	5,225	El Paso			X	
38	Berthoud	4,930	Larimer - Weld			X	
39	Vail	4,806	Eagle			X	
40	Glendale	4,796	Arapahoe			X	
41	Monte Vista	4,747	Rio Grande			X	
42	Monument	4,174	El Paso			X	
43	Walsenburg	3,993	Huerfano			X	
44	Silverthorne	3,806	Summit			X	
45	Wellington	3,718	Larimer			X	
46	Breckenridge	3,296	Summit			X	
47	Orchard City	3,094	Delta			X	
48	Frisco	2,697	Summit			X	
49	Palmer Lake	2,355	El Paso			X	

Appendix G
TRASH SERVICES

Number of Cities	City	Population - July, 2004	County	Residential Trash Svc. Is A Municipal Svc.	Residential Trash Svc. Is A City Svc. Provided through Contract with 1 or more haulers	Residential Trash Svc. Is a private sector svc. Through private haulers	Did not Respond
50	Mead	2,331	Weld			X	
51	Bennett	2,330	Adams - Arapahoe			X	
52	Meeker	2,291	Rio Blanco			X	
53	Buena Vista	2,279	Chaffee			X	
54	Cedaredge	2,190	Delta			X	
55	Rangely	2,099	Rio Blanco			X	
56	Idaho Springs	1,852	Clear Creek			X	
57	Granby	1,746	Grand			X	
58	Watkins	1,645	Adams - Arapahoe			X	
59	Pagosa Springs	1,620	Archuleta			X	
60	Lyons	1,599	Boulder			X	
61	Hudson	1,595	Weld			X	
62	Elizabeth	1,529	Elbert			X	
63	Springfield	1,472	Baca			X	
64	Nederland	1,368	Boulder			X	
65	Mancos	1,201	Montezuma			X	
66	Keenesburg	1,157	Weld			X	
67	Fowler	1,150	Otero			X	
68	Georgetown	1,111	Clear Creek			X	
69	Cripple Creek	1,082	Teller			X	
70	Manassa	1,017	Conejos			X	
71	Cheyenne Wells	985	Cheyenne			X	
72	Green Mountain Falls	907	El Paso - Teller			X	
73	La Veta	901	Huerfano			X	
74	Dolores	899	Montezuma			X	
75	Calhan	898	El Paso			X	
76	La Jara	854	Conejos			X	
77	Antonito	840	Conejos			X	
78	Winter Park	830	Grand			X	
79	Dillon	819	Summit			X	
80	San Luis	755	Costilla			X	
81	Blue River	743	Summit			X	
82	Nucla	736	Montrose			X	
83	Walden	704	Jackson			X	
84	Williamsburg	690	Fremont			X	
85	Fairplay	689	Park			X	
86	South Fork	666	Rio Grande			X	
87	Stratton	643	Kit Carson			X	
88	Collbran	637	Mesa			X	
89	Kiowa	618	Elbert			X	
90	Granada	613	Prowers			X	
91	Hot Sulphur Springs	597	Grand			X	
92	Saguache	577	Saguache			X	
93	Deer Trail	575	Arapahoe			X	
94	Aguilar	554	Las Animas			X	
95	Poncha Springs	552	Chaffee			X	
96	Otis	517	Washington			X	
97	Manzanola	505	Otero			X	
98	Central City	492	Clear Creek - Gilpin			X	

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TRASH SERVICES

Number of Cities	City	Population - July, 2004	County	Residential Trash Svc. Is A Municipal Svc.	Residential Trash Svc. Is A City Svc. Provided through Contract with 1 or more haulers	Residential Trash Svc. Is a private sector svc. Through private haulers	Did not Respond
99	Grand Lake	482	Grand			X	
100	Westcliffe	463	Custer			X	
101	Fleming	445	Logan			X	
102	Victor	438	Teller			X	
103	Morrison	418	Jefferson			X	
104	Rockvale	411	Fremont			X	
105	Romeo	403	Conejos			X	
106	Lake City	398	Hinsdale			X	
107	Crawford	397	Delta			X	
108	Empire	392	Clear Creek			X	
109	Coal Creek	380	Fremont			X	
110	Garden City	348	Weld			X	
111	Dinosaur	334	Moffat			X	
112	Red Cliff	307	Eagle			X	
113	Merino	291	Logan			X	
114	Jamestown	288	Boulder			X	
115	Kit Carson	242	Cheyenne			X	
116	Rico	231	Dolores			X	
117	Brookside	217	Fremont			X	
118	Genoa	203	Lincoln			X	
119	Silver Plume	203	Clear Creek			X	
120	Rye	196	Pueblo			X	
121	Seibert	176	Kit Carson			X	
122	Cokedale	146	Las Animas			X	
123	Crook	129	Logan			X	
124	Hooper	122	Alamosa			X	
125	Ramah	121	El Paso			X	
126	Moffat	113	Saguache			X	
127	Crestone	112	Saguache			X	
128	Vona	89	Kit Carson			X	
129	Sawpit	35	San Miguel			X	
130	Lakeside	20	Jefferson			X	
	Subtotal	**2,093,087**					

Appendix G
TRASH SERVICES

Number of Cities	City	Population - July, 2004	County	Residential Trash Svc. Is A Municipal Svc.	Residential Trash Svc. Is A City Svc. Provided through Contract with 1 or more haulers	Residential Trash Svc. Is a private sector svc. Through private haulers	Did not Respond
1	Louisville	18,545	Boulder				X
2	Canon City	15,683	Fremont				X
3	Frederick	5,905	Weld				X
4	Salida	5,720	Chaffee				X
5	Basalt	3,051	Eagle - Pitkin				X
6	Palisade	2,802	Mesa				X
7	Leadville	2,782	Lake				X
8	Center	2,382	Rio Grande - Saguache				X
9	Holyoke	2,308	Phillips				X
10	Del Norte	1,715	Rio Grande				X
11	Severance	1,563	Weld				X
12	Minturn	1,115	Eagle				X
13	Log Lane Village	1,085	Morgan				X
14	Fraser	1,020	Grand				X
15	Wiggins	975	Morgan				X
16	Ouray	842	Ouray				X
17	Bow Mar	812	Arapahoe - Jefferson				X
18	Sanford	781	Conejos				X
19	Simla	753	Elbert				X
20	Mt. Crested Butte	743	Gunnison				X
21	Dove Creek	683	Dolores				X
22	Naturita	659	Montrose				X
23	Silver Cliff	593	Custer				X
24	Silverton	548	San Juan				X
25	Norwood	483	San Miguel				X
26	Yampa	475	Routt				X
27	Boone	324	Pueblo				X
28	Hillrose	296	Morgan				X
29	Sugar City	266	Crowley				X
30	Alma	234	Park				X
31	Arriba	232	Lincoln				X
32	Timnath	225	Larimer				X
33	Iliff	221	Logan				X
34	Bethune	214	Kit Carson				X
35	Sedgwick	192					X
36	Ward	171	Boulder				X
37	Campo	156	Baca				X
38	Starkville	137	Las Animas				X
39	Pitkin	117	Gunnison				X
40	Hartman	107	Prowers				X
41	Vilas	104	Baca				X
42	Marble	103	Gunnison				X
43	Raymer	97	Weld				X
44	Haswell	80	Kiowa				X
45	Two Buttes	63	Baca				X
46	Sheridan Lake	62	Kiowa				X
47	Paoli	51	Phillips				X
48	Montezuma	46	Summit				X
49	Bonanza City	14	Saguache				X

Appendix G
TRASH SERVICES

Number of Cities	City	Population - July, 2004	County	Residential Trash Svc. Is A Municipal Svc.	Residential Trash Svc. Is A City Svc. Provided through Contract with 1 or more haulers	Residential Trash Svc. Is a private sector svc. Through private haulers	Did not Respond
	Subtotal	**77,535**					
	Total	**3,373,312**					

Appendix G
RECYCLING SERVICES

Number of Cities	City	Population - July, 2004	County	Res. Curbside is a Mun. Service	Res. Curbside is a Mun. Svc. Through contract	Res. Curbside is provided by pvt. Haulers under mun. mandate to provide	Res. Curbside is provided by pvt. Haulers under mun. mandate to offer	Res. Curbside is provided by pvt. Haulers to their cust. As a bus. Decision	DO = Drop off is available - X = no drop off or curbside available
1	Denver	568,913	Denver	X					DO
2	Thornton	101,763	Adams - Weld	X					DO
3	Longmont	80,612	Boulder - Weld	X					DO
4	Loveland	57,485	Larimer	X					DO
5	Durango	15,628	La Plata	X					DO
6	Cortez	8,504	Montezuma	X					DO
7	Gunnison	5,318	Gunnison	X					DO
8	Snowmass Village	2,317	Pitkin	X					DO
	Subtotal	**840,540**							
1	Grand Junction	48,141	Mesa		X				DO
2	Evans	16,280	Weld		X				
3	Greenwood Village	12,586	Arapahoe		X				DO
4	Fruita	8,507	Mesa		X				
5	Lone Tree	7,436	Douglas		X				
6	Milliken	5,214	Weld		X				
7	Eaton	3,825	Weld		X				
8	Dacono	3,309	Weld		X				
9	New Castle	2,949	Garfield		X				DO
10	Telluride	2,335	San Miguel		X		X		DO
11	Silt	2,184	Garfield		X				
12	Hayden	1,765	Routt		X				DO
13	Crested Butte	1,543	Gunnison		X				DO
14	Kersey	1,433	Weld		X				
15	Columbine Valley	1,167	Arapahoe		X				
16	Mountain Village	1,137	San Miguel		X			X	
17	Holly	1,020	Prowers		X				DO
18	Oak Creek	914	Routt		X		X		
19	Ridgway	812	Ouray		X				
20	Foxfield	765	Arapahoe		X				
21	Garden City	348	Weld		X				
	Subtotal	**123,670**							
1	**Fort Collins**	**126,903**	**Larimer**			**X**			**DO**
2	Arvada	103,004	Adams - Jefferson			X			DO
3	Boulder	97,467	Boulder			X			DO
4	Steamboat Springs	10,742	Routt			X			DO
5	Superior	10,267	Boulder - Jefferson			X			DO
6	Aspen	6,368	Pitkin			X			DO
7	Carbondale	5,689	Garfield			X			DO
	Subtotal	**360,440**							
1	Westminster	105,177	Adams - Jefferson				X		DO
2	Golden	17,731	Jefferson				X		DO
3	Sheridan	5,457	Arapahoe				X		DO
	Subtotal	**128,365**							
1	Colorado Springs	380,073	El Paso					X	
2	Aurora	295,775	Adams - Arapahoe - Douglas					X	DO
3	Lakewood	143,611	Jefferson					X	
4	Pueblo	104,031	Pueblo					X	
5	Centennial	101,049	Arapahoe					X	DO
6	Greeley	85,887	Weld					X	DO
7	Broomfield	44,634	Broomfield					X	DO
8	Littleton	40,715	Arapahoe - Douglas - Jefferson					X	
9	Parker	37,093	Douglas					X	
10	Englewood	32,491	Arapahoe					X	
11	Castle Rock	32,261	Douglas					X	
12	Wheat Ridge	31,869	Jefferson					X	
13	Commerce City	30,768	Adams					X	
14	Brighton	27,131	Adams - Weld					X	
15	Lafayette	23,704	Boulder					X	
16	Fountain	18,334	El Paso					X	
17	Montrose	15,351	Montrose					X	
18	Windsor	12,711	Larimer - Weld					X	
19	Federal Heights	11,698	Adams					X	
20	Erie	10,216	Boulder - Weld					X	
21	Glenwood Springs	8,517	Garfield					X	
22	La Junta	7,334	Otero					X	DO
23	Fort Lupton	7,111	Weld					X	
24	Woodland Park	7,081	Teller					X	
25	Johnstown	6,122	Larimer - Weld					X	DO
26	Cherry Hills Village	6,089	Arapahoe					X	

Appendix G
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27	Frederick	5,905	Weld					X	
28	Estes Park	5,707	Larimer					X	DO
29	Edgewater	5,351	Jefferson					X	DO
30	Manitou Springs	5,225	El Paso					X	DO
31	Berthoud	4,930	Larimer - Weld					X	
32	Vail	4,806	Eagle					X	DO
33	Silverthorne	3,806	Summit					X	DO
34	Wellington	3,718	Larimer					X	DO
35	Breckenridge	3,296	Summit					X	DO
36	Lochbuie	3,091	Weld					X	DO
37	Basalt	3,051	Eagle - Pitkin					X	DO
38	Frisco	2,697	Summit					X	DO
39	Elizabeth	1,529	Elbert					X	DO
40	Nederland	1,368	Boulder					X	DO
41	Fraser	1,020	Grand					X	DO
42	Dillon	819	Summit					X	DO
43	Blue River	743	Summit					X	DO
44	Mountain View	549	Jefferson					X	DO
45	Fleming	445	Logan					X	DO
46	Crawford	397	Delta					X	DO
47	Jamestown	288	Boulder					X	DO
48	Larkspur	245	Douglas					X	DO
49	Kit Carson	242	Cheyenne					X	DO
50	Brookside	217	Fremont					X	DO
51	Rye	196	Pueblo					X	DO
52	Ramah	121	El Paso					X	DO
53	Sawpit	35	San Miguel					X	DO
	Subtotal	**1,581,453**							
1	Northglenn	35,612	Adams - Weld						DO
2	Louisville	18,545	Boulder						DO
3	Canon City	15,683	Fremont						DO
4	Fort Morgan	11,119	Morgan						DO
5	Trinidad	9,344	Las Animas						DO
6	Craig	9,178	Moffat						DO
7	Lamar	8,628	Prowers						DO
8	Alamosa	8,419	Alamosa						DO
9	Delta	8,087	Delta						DO
10	Avon	6,755	Eagle						DO
11	Salida	5,720	Chaffee						DO
12	Gypsum	4,944	Eagle						DO
13	Glendale	4,796	Arapahoe						DO
14	Monte Vista	4,747	Rio Grande						DO
15	Walsenburg	3,993	Huerfano						DO
16	Burlington	3,838	Kit Carson						DO
17	Eagle	3,816	Eagle						DO
18	Leadville	2,782	Lake						DO
19	Las Animas	2,673	Bent						DO
20	Center	2,382	Rio Grande - Saguache						DO
21	Bennett	2,330	Adams - Arapahoe						DO
22	Holyoke	2,308	Phillips						DO
23	Buena Vista	2,279	Chaffee						DO
24	Limon	2,101	Lincoln						DO
25	La Salle	1,857	Weld						DO
26	Akron	1,854	Washington						DO
27	Idaho Springs	1,852	Clear Creek						DO
28	Granby	1,746	Grand						DO
29	Del Norte	1,715	Rio Grande						DO
30	Bayfield	1,705	La Plata						DO
31	Kremmling	1,641	Grand						DO
32	Pagosa Springs	1,620	Archuleta						DO
33	Lyons	1,599	Boulder						DO
34	Ault	1,421	Weld						DO
35	Parachute	1,338	Garfield						DO
36	Ordway	1,188	Crowley						DO
37	Minturn	1,115	Eagle						DO
38	Georgetown	1,111	Clear Creek						DO
39	Hotchkiss	1,024	Delta						DO
40	Cheyenne Wells	985	Cheyenne						DO
41	La Veta	901	Huerfano						DO

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42	Hugo	855	Lincoln						DO
43	La Jara	854	Conejos						DO
44	Antonito	840	Conejos						DO
45	Simla	753	Elbert						DO
46	Eads	702	Kiowa						DO
47	Stratton	643	Kit Carson						DO
48	Kiowa	618	Elbert						DO
49	Flagler	599	Kit Carson						DO
50	Hot Sulphur Springs	597	Grand						DO
51	Saguache	577	Saguache						DO
52	Manzanola	505	Otero						DO
53	Central City	492	Clear Creek - Gilpin						DO
54	Norwood	483	San Miguel						DO
55	Grand Lake	482	Grand						DO
56	Wiley	463	Prowers						DO
57	Creede	422	Mineral						DO
58	Empire	392	Clear Creek						DO
59	Red Cliff	307	Eagle						DO
60	Eckley	278	Yuma						DO
61	Arriba	232	Lincoln						DO
62	Bethune	214	Kit Carson						DO
63	Seibert	176	Kit Carson						DO
64	Ward	171	Boulder						DO
65	Pritchett	130	Baca						DO
66	Moffat	113	Saguache						DO
67	Crestone	112	Saguache						DO
68	Black Hawk	112	Gilpin						DO
69	Branson	85	Las Animas						DO
70	Haswell	80	Kiowa						DO
71	Kim	73	Las Animas						DO
	Subtotal	**217,111**							
1	Sterling	13,713	Logan						X
2	Rifle	7,760	Garfield						X
3	Firestone	5,748	Weld						X
4	Brush	5,282	Morgan						X
5	Rocky Ford	4,182	Otero						X
6	Monument	4,174	El Paso						X
7	Florence	3,795	Fremont						X
8	Yuma	3,362	Yuma						X
9	Orchard City	3,094	Delta						X
10	Palisade	2,802	Mesa						X
11	Platteville	2,576	Weld						X
12	Palmer Lake	2,355	El Paso						X
13	Mead	2,331	Weld						X
14	Meeker	2,291	Rio Blanco						X
15	Wray	2,223	Yuma						X
16	Cedaredge	2,190	Delta						X
17	Rangely	2,099	Rio Blanco						X
18	Olathe	1,675	Montrose						X
19	Watkins	1,645	Adams - Arapahoe						X
20	Paonia	1,639	Delta						X
21	Hudson	1,595	Weld						X
22	Severance	1,563	Weld						X
23	Springfield	1,472	Baca						X
24	Julesburg	1,425	Sedgwick						X
25	Mancos	1,201	Montezuma						X
26	Gilcrest	1,161	Weld						X
27	Keenesburg	1,157	Weld						X
28	Fowler	1,150	Otero						X
29	Log Lane Village	1,085	Morgan						X
30	Cripple Creek	1,082	Teller						X
31	Manassa	1,017	Conejos						X
32	Haxtun	1,008	Phillips						X
33	Wiggins	975	Morgan						X
34	Green Mountain Falls	907	El Paso - Teller						X
35	Dolores	899	Montezuma						X
36	Calhan	898	El Paso						X
37	Pierce	878	Weld						X
38	Ouray	842	Ouray						X

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39	Winter Park	830	Grand						X
40	Sanford	781	Conejos						X
41	San Luis	755	Costilla						X
42	Ignacio	754	La Plata						X
43	Mt. Crested Butte	743	Gunnison						X
44	Nucla	736	Montrose						X
45	Walsh	723	Baca						X
46	Walden	704	Jackson						X
47	Williamsburg	690	Fremont						X
48	Fairplay	689	Park						X
49	Swink	688	Otero						X
50	Dove Creek	683	Dolores						X
51	South Fork	666	Rio Grande						X
52	Naturita	659	Montrose						X
53	Collbran	637	Mesa						X
54	Granada	613	Prowers						X
55	Silver Cliff	593	Custer						X
56	Deer Trail	575	Arapahoe						X
57	Aguilar	554	Las Animas						X
58	Poncha Springs	552	Chaffee						X
59	Silverton	548	San Juan						X
60	Nunn	520	Weld						X
61	Otis	517	Washington						X
62	DeBeque	497	Mesa						X
63	Yampa	475	Routt						X
64	Westcliffe	463	Custer						X
65	Victor	438	Teller						X
66	Morrison	418	Jefferson						X
67	Rockvale	411	Fremont						X
68	Romeo	403	Conejos						X
69	Blanca	399	Costilla						X
70	Lake City	398	Hinsdale						X
71	Coal Creek	380	Fremont						X
72	Olney Springs	370	Crowley						X
73	Dinosaur	334	Moffat						X
74	Ovid	333	Sedgwick						X
75	Hillrose	296	Morgan						X
76	Merino	291	Logan						X
77	Sugar City	266	Crowley						X
78	Peetz	236	Logan						X
79	Alma	234	Park						X
80	Rico	231	Dolores						X
81	Timnath	225	Larimer						X
82	Iliff	221	Logan						X
83	Silver Plume	203	Clear Creek						X
84	Genoa	203	Lincoln						X
85	Cheraw	201	Otero						X
86	Sedgwick	192	Sedgwick						X
87	Crowley	177	Crowley						X
88	Grover	154	Weld						X
89	Cokedale	146	Las Animas						X
90	Starkville	137	Las Animas						X
91	Crook	129	Logan						X
92	Ophir	124	San Miguel						X
93	Hooper	122	Alamosa						X
94	Pitkin	117	Gunnison						X
95	Hartman	107	Prowers						X
96	Vilas	104	Baca						X
97	Marble	103	Gunnison						X
98	Raymer	97	Weld						X
99	Vona	89	Kit Carson						X
100	Two Buttes	63	Baca						X
101	Sheridan Lake	62	Kiowa						X
102	Paoli	51	Phillips						X
103	Montezuma	46	Summit						X
104	Lakeside	20	Jefferson						X
	Subtotal	**120,427**							
1	Bow Mar	812	Arapahoe - Jefferson						
2	Boone	324	Pueblo						

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3	Campo	156	Baca						
4	Bonanza City	14	Saguache						
	Subtotal	**1,306**							
		3,373,312							