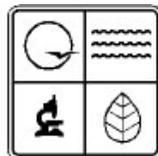


2005 SOLID WASTE MANAGEMENT STUDY

CITY OF WARRENSBURG, JOHNSON COUNTY, CENTRAL MISSOURI STATE UNIVERSITY,
AND WHITEMAN AIR FORCE BASE



Missouri Department
of Natural Resources

Funded by a grant from the Missouri Department of Natural Resources

BARKER LEMAR
ENGINEERING CONSULTANTS

SOLID WASTE MANAGEMENT STUDY

EXECUTIVE SUMMARY

1.0 Project Background

The City of Warrensburg obtained a grant to provide a feasibility study for various solid waste management and recycling options for consideration by the City of Warrensburg. The study encompassed the City of Warrensburg, Johnson County, Whiteman Air Force Base, and Central Missouri State University.

BARKER LEMAR ENGINEERING CONSULTANTS (BARKER LEMAR) was contracted to perform the work through a competitive bid process. **BARKER LEMAR** developed specific solid waste management recommendations for Warrensburg, Johnson County, and Central Missouri State University. Comprehensive analyses of these recommendations can be found in the Recommendations section of this report.

2.0 Scope Of Work

The following primary activities were performed for each of the entities mentioned above:

- Analyze the existing integrated solid waste management systems;
- Perform both focus group meetings and a drop-off recycling survey;
- Research and analyze potential systems;
- Develop recommendations for new solid waste collection, disposal, and recycling options.

The recommendations are summarized in the following pages.

3.0 Warrensburg Integrated Solid Waste Management Recommendations

Recommendation 3.1 – Implement Residential Solid Waste & Recycling Services Contract

BARKER LEMAR recommends the City of Warrensburg implement a single contract for the collection of residential solid waste, yard waste, and recyclables for residential homes including multi-family units with four or less units. The specific type of contracted services being recommended involves:

- Weekly collection of garbage via a unit-based pricing (UBP) system;
- Bi-weekly residential curbside collection of paper and metal food and beverage containers (unlimited volume);
- Weekly collection of yard waste via a system (nine months out of the year);
- Weekly collection of bulky waste via system, and;
- Spring and fall neighborhood clean up services (limited volume).

Implementing a contract for residential garbage collection has multiple advantages.

Advantages of a Solid Waste and Recycling Collection Contract

- A residential contract should lower fees. A citywide contract provides for more dense collection (homes collected per hour) and consequently lowers rates.
- UBP fees are equitable. Unit based garbage services operate more like a utility in that larger generators pay more.
- The City can retain administrative fees from the UBP contract. Warrensburg can retain a small monetary amount of the residential household collection figure to help pay for residential integrated solid waste management (ISWM) services like education and overall management.
- The contractor performs services previously provided by the City or the contractor performs curbside services that residents did not have.
- Contracts create convenient and uniform services enforceable by the City.
- Multi family units, mobile home parks, and neighborhoods in Johnson County can be included in the UBP contract.
- The number of waste collection vehicles operating in overlapping service areas will be reduced.
- Existing mandatory garbage collection ordinances are easier to enforce.

Disadvantages of Solid Waste and Recycling Collection Contract

- Garbage bag limits and yard waste limits and unit based pricing for bulky items may be seen as a hardship for limited income families.
- Some haulers (depending on the type of contract Warrensburg implements) will no longer haul residential solid waste.

- Change from open-subscription to subscription will upset some people that think their costs will go up.
- Initially City resources will be required to implement the UBP contract and all the related systems.
- Enforcement actions are required for non-compliance.
- Recycling toters and/or solid waste toters must be purchased initially and the toters must be managed and replaced periodically.

Recommendation 3.2 – Implement an Integrated Solid Waste Management (ISWM) Coordinator

BARKER LEMAR recommends that the City of Warrensburg create a separate budget for ISWM and education activities and hire an ISWM coordinator. The Coordinator position will monitor contracted revenue (solid waste bag sales, commodity revenue from recyclables, franchise fees, etc.) and other potential revenue sources. The position will also monitor the solid waste contract managing its stipulations and requirements, other drop-off services for recycling, and perform vehicle inspections. Additionally, this position will serve as education coordinator providing presentations and information to adults, civic groups, media outlets, and students. The education coordinator can continue to work with the Warrensburg Citizens for Environmental Excellence (WCEE) to communicate changes in the ISWM systems within Warrensburg and collect information from the public.

Recommendation 3.3 – Implement Licensing & Inspection Program

The current municipal waste service provider licensing system unintentionally causes disparity between waste hauler companies applying for business licenses in Warrensburg. By establishing a separate waste haulers business license, the City can establish service rules by which all the waste haulers (commercial haulers and the contracted residential hauler) are required to follow. These rules can be detailed in the permit/license itself.

Other communities have even required that each waste collection vehicle that operates in their area request and receive an operations permit. The fees collected for the waste collection vehicle permit are used to off-set administration and vehicle inspection costs.

Recommendation 3.4 – Ban Residential Burning of Yard Waste

Current municipal regulations encourage residents to burn their yard waste. This activity may also encourage some to add other materials to the burn pile as a perceived appropriate disposal method. By establishing a yard waste burn ban within the City limits, residents will be required to participate in other more environmentally and health conscious waste management activities including back yard composting or a UBP system. UBP systems for yard waste generally require residents to use double walled kraft paper sacks for yard waste.

The paper sacks are sold in retail stores with a portion of sticker sales being used to pay retailers and the collection company.

Some communities use various sized toters for yard waste; however, high volume weeks require many home owners to supplement their containers capacity with paper bags.

Recommendation 3.5 – Implement a Recycled Content Purchasing Policy

Cooperative purchasing via a state recycling organization, a university, county government, or a collective purchasing cooperative organized within the county could help drive the cost of purchasing recycled content materials down and perhaps reduce existing prices.

Recommendation 3.6 – Supplement the Curbside Recycling Program with a Drop-off Program

BARKER LEMAR is recommending Johnson County and Warrensburg share a drop-off container that will spend a minimum of 7 days in the City limits. Although curbside recycling will be offered, the drop-off programs will provide additional options to manage plastics and other materials. Residents, small businesses, and people living in other larger apartment complexes (greater than four-plex) will have an opportunity to recycle paper, cardboard, metal, aluminum, and plastics. Drop-off recycling must be placed in an area that can provide some oversight, preferably in a place that can physically limit access during certain times of the day/night.

4.0 Johnson County – Countywide Recycling Program Recommendations

Recommendation 4.1 – Design and Implement a Residential Curbside Recycling Program

BARKER LEMAR recommends Johnson County partner with the City of Warrensburg and bid specific neighborhoods/developments within close proximity to the City. It is likely apartment complexes, mobile home parks, and developments that are in the County can participate in recycling at a lower price if they participate with Warrensburg. Partnering also provides efficiencies when developing educational materials, purchasing totes, purchasing media air time, or ad space.

Advantages of Residential Curbside Recycling Program

- Provides county residents with convenient curbside recycling services.
- Provides residents located adjacent to the Warrensburg city limits with uniform services.
- Takes advantage of pricing synergies by working with City of Warrensburg.

Disadvantages of Residential Curbside Recycling Program

- Some county residents may resist paying for additional services.
- Purchase of recycling bins by the County is typically required.
- The program requires oversight and management including bin replacement, education, etc.

Recommendation 4.2 – Implement a Mobile Drop-Off Recycling Program for Outlying Areas of Johnson Co.

BARKER LEMAR recommends implementation of a mobile drop-off recycling program for outlying areas of Johnson County. A mobile drop-off program provides a means for rural county residents to recycle plastic containers, metal containers, cardboard, and mixed papers.

Advantages of Mobile Rural Drop-off Service

- Provides outlying County residents with access to recycling services.

- Provides a more economically favorable recycling option for rural residents based on population densities.
- Costs may decrease if the service is shared with Warrensburg.

Disadvantages of Mobile Rural Drop-off Service

- Some County residents may not view drop off recycling as a convenient option.
- Contamination problems at un-staffed drop-off programs require extensive annual education and outreach.
- The County will be required to pay for disposal costs associated with non-recyclable items.

5.0 Central Missouri State University Integrated Solid Waste Management Recommendations

Recommendation 5.1 – Communicate, Train, and Institutionalize Waste Reduction and Recycling

BARKER LEMAR recommends CMSU train and institutionalize waste reduction as a core function of the University's responsibilities. **BARKER LEMAR** recommends that CMSU identify one or two individuals that have an interest and passion for waste reduction and recycling and provide resources allowing these individuals to develop skills necessary for implementing institutionalized solid waste reduction and recycling systems.

BARKER LEMAR recommends University administrators and staff open communication with other universities with exceptional recycling and waste reduction operations. This communication may be quickly facilitated via the National Recycling Coalition's College and University Recycling Coalition.

Asking people to change behavior is not always easy, **BARKER LEMAR** recommends the University develop a communication budget and communication plan to assist in the success of new recycling programs.

The advantage to the University to implement resource recovery programs for solid wastes, beyond proper resource management, involves leadership. Universities are in a position to be a leader both in the community and in the lives of students. Many other Universities have exceptional programs and they “show the way” to students, faculty and their host community. The greatest disadvantage is an increase in administrative duties and expenses to implement and manage new programs.

Recommendation 5.2 – Implement Pilot Projects to Collect Recyclable Materials

BARKER LEMAR recommends the University establish pilot collection and recycling programs for newspaper, cardboard, and beverage containers.

Newspapers were identified as a significant recyclable material being disposed of at the University. These materials are generally easy to collect and contamination levels are fairly low. Two locations were identified during the visual waste sort as major generation sources for this material. The Union and Library both contained large amounts of clean newspaper materials in the waste containers.

Currently, the University has five (5) corrugated cardboard recycling containers for University usage. These five corrugated cardboard container locations may be adequate for the collection of the cardboard but the existing education and outreach program could be improved

The Union was identified as the largest generator of PET plastic beverage containers. Requiring the beverage distributor to provide services for product management could be determined and enforced through the existing contract. The agreement would provide details on how the beverage distributor is to provide product management assistance.

In this case it may be appropriate for the beverage distributor to provide funds for the University to purchase beverage container recycling collection stations and funds for the management of these stations.

Recommendation 5.3 – Implement Pilot Projects to Collect Various Recyclable Materials During Move-In and Move-Out Weeks

Students, University staff, and waste haulers identified the beginning and ending of the school years as significant waste generation periods. Students indicated that numerous corrugated cardboard boxes are disposed of during these periods for lack of disposal alternatives. The garbage containers available during these periods quickly overflow and students then place waste materials on the ground. **BARKER LEMAR** recommends the University observe other Universities and work with local processors/vendors and identify key materials that could be recovered. Several materials are available for recycling during move-out periods including materials available for direct re-use in Warrensburg like clothing, shoes, electronics, furniture, school supplies, and other materials.

Recommendation 5.4 – Determine a Baseline Waste Generation Rate with Objective Data

BARKER LEMAR recommends CMSU perform a more detailed study to collect objective baseline data. Objective data provides insight into waste management inefficiencies, need for further education, and/or needs to develop alternative management practices. Baseline data would assist the University in developing specific goals. Another type of study is a “Capture Study”. This type of study sorts and weighs material from both recycling bins and solid waste bins. Ultimately this type of study provides a tool to measure how successful a specific program is in removing various waste components.

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SOLID WASTE MANAGEMENT STUDY

INTRODUCTION

1.0 Project Background:

The City of Warrensburg obtained a grant from the Solid Waste District F for the purpose of studying the feasibility and options for solid waste management in Johnson County and the City of Warrensburg. The main objective of the project was to provide a feasibility study for various solid waste management and recycling options for consideration by the citizens and City Council. The study encompassed the City of Warrensburg, Johnson County, the Whiteman Air Force Base, and Central Missouri State University.

BARKER LEMAR ENGINEERING CONSULTANTS (BARKER LEMAR) was selected through a competitive bid process by a selection committee consisting of representatives from each area the project was to encompass.

2.0 Scope Of Work:

BARKER LEMAR outlined the scope of work in the accepted proposal and initiated activities immediately upon notice of selection. The following are the highlighted activities from the scope of work:

- Analyze Existing Integrated Solid Waste Management Systems of Project Participants.
 - Residential Garbage Services
 - Residential Curbside Recycling Services
 - Existing Warrensburg Drop-Off Recycling Program
 - Processing and Marketing Recyclables Materials
 - Existing Waste Reduction and Recycling Education Outreach Efforts
 - Existing Illegal Dumping Activity Including Enforcement
 - Existing Landfill Capacity and Landfill Recycling Potential
 - Existing Activity and Whiteman Air Force Base and Central Missouri State University
 - Existing Solid Waste Management and Recycling Activity in Other Communities in Iowa and Missouri

- Focus Group Meetings/Drop-Off Recycling Survey.
 - One Saturday Survey for Drop-Off Recycling Participants
 - Three Residential/Student Focus Groups

- Research and Analyze Potential Integrated Solid Waste Management and Recycling Systems for Warrensburg, Johnson County, and the University.
 - Research and Analyze Options for Municipally Operated Residential Solid Waste Collection and Curbside Recycling Services Compared to Privately Operated Services
 - Analysis of Options for Drop-Off Recycling in the City limits and in the County
 - Identify Other Integrated Solid Waste Management Components from other Communities in Iowa and Missouri with an Emphasis on Commercial Waste Streams and Multi-Family Unit Recycling
 - Work with Central Missouri State University to Develop an Integrated Recycling Plan

- Develop Summary and Recommendations for New Solid Waste Management and recycling Options for the City, County, and University.

3.0 Integrated Solid Waste Management (ISWMS):

Integrated Solid Waste Management is the practice of using several alternative waste management techniques to manage and dispose of specific components of the municipal solid waste stream. Waste management alternatives include source reduction, recycling, composting, energy recovery, and landfilling.¹ Without management strategies or control functionality, services may be decentralized, inefficient, and not cost effective.

Integrated solid waste management is based upon several layers of functional management tools or systems. Individual management tools or systems may not be able to function in the intended manner on their own without the support of the other tools. These tools are developed to support the integrated solid waste management service foundation.

¹ EPA Decision Makers Guide to Solid Waste Management, Volume II, 1995.

Figure 1 illustrates an example of an integrated solid waste management system that might work in Warrensburg and Johnson County.

Figure 1 – Integrated Solid Waste Management System Example



It is important to understand the significance of integrated solid waste management and how the review of these systems can provide for various solid waste management and recycling options for consideration by the citizens and City Council.

KEY INTEGRATED SOLID WASTE MANAGEMENT SYSTEMS TERMS AND DEFINITONS

1.0 Key ISWMS Terms and Definitions¹:

Bulky Items:

Large items of refuse including, but not limited to, appliances, furniture, large auto parts, non-hazardous construction and demolition materials (drywall, concrete, dimensional lumber), rolls of carpet, etc. and other material that can not be handled by normal curbside solid waste collection methods.

Commercial Waste:

Waste materials originating in wholesale, retail, institutional, or service establishments, such as office buildings, some apartment complexes, stores, schools, hotels, and churches.

Commingled Recyclables:

Two or more recyclable materials collected together (i.e. not separated). In some types of collection programs, recyclable materials may be commingled, as long as they do not contaminate each other.

Composting:

The controlled biological decomposition of organic solid materials under aerobic conditions.

Construction and Demolition Waste:

Materials resulting from the construction, remodeling, repair, or demolition of buildings, bridges, pavements, and other structures.

Curbside Collection:

Programs in which recyclable materials are collected at the curb, often from special containers, and then taken to various processing facilities.

¹ EPA Decision Makers Guide to Solid Waste Management, Volume II, 1995.

Drop-Off Collection:

A method of collecting recyclable or compostable materials in which the materials are taken by individuals to collection sites, where they deposit the materials into designated containers.

Enterprise Fund:

A fund for a specific purpose that is self-supporting from the revenue it generates. Some municipalities operate solid waste collection and recycling departments as an enterprise fund.

Household Hazardous Materials:

Hazardous products used and disposed of by residential as opposed to industrial customers. Includes oil based paints, stains, varnishes, solvents, pesticides, drain cleaner, flammable liquids, and other materials or products containing volatile chemicals that can catch fire, react or explode, or that are corrosive or toxic.

Inorganic Waste:

Waste composed of matter other than material derived from a plant or animal. Plastics, metals, and glass are considered inorganic material.

Integrated Solid Waste Management:

A practice using several alternative waste management techniques to manage and dispose of specific components of the municipal waste stream. Waste management alternatives include source reduction, recycling, composting, energy recovery, and landfilling.

Municipal Solid Waste (MSW):

MSW means household waste, commercial solid waste, institutional waste, non-hazardous sludge, and industrial solid waste.

Organic Material:

Materials composed of matter derived from a plant or animal. Organics may be processed such as refined sugar or waste from a bakery; or organics may be in a more natural form like vegetable waste from vegetable canning operation.

Pilot Program:

A trial run of the planned program conducted on a small scale to forecast the workability of the planned program and make changes before the program is implemented on a larger scale. Depending on the results of the pilot program, major changes may be required in communication, education, etc.

Recycling:

The processes by which materials otherwise destined for disposal are collected, reprocessed, or remanufactured, and reused.

Refuse:

See Solid Waste below.

Solid Waste:

Any organic or inorganic garbage or refuse from residential, industrial, commercial, mining, and agricultural operations including food wastes, plastic and paper packaging, and durable goods. Solid waste can also be sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid or semi-solid material resulting from industrial, commercial, mining, and agricultural operations.

Source Reduction:

The design, manufacture, acquisition, and reuse of materials so as to reduce the quantity and/or toxicity of waste produced. Source reduction prevents waste either by redesigning products or by otherwise changing societal patterns of consumption, use, and waste generation.

Source Separation:

The segregation of specific materials at the point of generation for separate collection. Residential generators may source separate various recyclables like newspapers, milk jugs, and cardboard as part of curbside recycling programs.

Tipping Fee:

A fee charged for the unloading or dumping of material at a landfill, transfer station, recycling center, or waste-to-energy facility, usually stated in dollars per ton.

White Goods/Appliances:

Large household appliances such as refrigerators, stoves, air conditioners, microwaves, and washing machines.

CITY OF WARRENSBURG, MISSOURI

EXISTING SOLID WASTE SYSTEMS REPORT

1.0 General Warrensburg Demographics:

1.1 Population and Housing Characteristics:

The U.S. Census Bureau reported a population for Warrensburg of 16,424 in 2000. The median age for Warrensburg was determined to be 23.5 years.

The following charts review the number of housing structures, population within housing structures, and number of units per housing structure for the City of Warrensburg in 2000.



CHART I – Occupied Housing Structure Totals in 2000

Category	Total	Percentage of Total
Occupied housing structures	5,969	
Owner occupied structures	2,539	43%
Renter occupied structures	3,430	57%

This chart illustrates that a majority of the occupied housings structures in Warrensburg are comprised of structures that were being rented in 2000.

CHART II – Population of Occupied Housing Structures in 2000

Category	Total	Percentage of Total
Population in occupied housing structures	13,684	
Population of owner occupied housing structures	6,562	48%
Population of renter occupied housing structures	7,122	52%

This chart re-enforces that a majority of the population lived in rental units in 2000.

CHART III – Occupied Housing Structure Unit Totals in 2000

Category	Total	Percentage of Total
Occupied housing structures with 1 unit	3,514	59%
Occupied housing structures with 2 - 4 units	1,313	22%
Occupied housing structures with 5+ units	1,142	19%
Total occupied housing structures	5,969	100%

This chart illustrates that 41% of the housing structures in Warrensburg contain more than one unit.

1.2 Transient Populations:

Central Missouri State University (CMSU) is located within the Warrensburg City limits. The University states that approximately 9,000 students (undergraduate and graduate) attend classes at the campus. Of these, approximately 3,000 students live on campus. A majority of this population lives in Warrensburg when attending classes.

Both the CMSU students and renter occupied housing units are typically considered a transient population. This provides an additional challenge to educate and promote proper participation in solid waste services to these populations.

2.0 Management of Generated Residential Waste Materials:

2.1 Residential Solid Waste Management:

Per Sec.11-21 (a) of the Code of City Ordinances, residents and businesses are required to obtain waste disposal services from a licensed waste hauling company.

It is assumed that residents that do not contract with a licensed waste hauling company either take their garbage to the landfill on their own, illegally dump their waste in a container that they do not own (either residential or commercial container), dispose of their waste at their place of employment, illegally dump materials in ditches, or burn their waste. Waste haulers estimated that between 5% - 10% of residents in Warrensburg did

not have established waste services. This equates to over 250 single housing structure units without waste services.¹

Residential Services:

Currently residents of Warrensburg establish individual contracts for solid waste collection services with private companies. These contracts range in price from \$10 to \$15 per month per household.² The average contract cost is \$12.50 per month per household. The costs of disposal are included in this monthly fee. Assuming an average monthly waste collection fee of \$12.50, residents are paying \$150 annually for waste collection and disposal services.

The residential collection services provided are generally the same. For a majority of residential subscribers waste is collected once a week on a pre-determined waste collection day. Haulers have indicated that they have elderly customers that have requested bi-monthly collection as they generate small amounts of waste. Waste haulers establish a separate price for these bi-monthly customers. City and private waste hauling company staff indicated that residential waste collection routes are operated in Warrensburg Monday through Saturday or six (6) days a week.

Residential Waste Generation:

Waste haulers indicated a maximum waste setout limit of approximately eight (8) to ten (10) 18-gallon garbage bags per household. However, City staff and waste hauling company staff indicated the average residence sets out three (3) garbage bags per week. Assuming this average bag per household setout (including multi-plex units to estimate residential waste generation), the City of Warrensburg generates approximately 18,000 bags of residential waste per week³. The typical residential garbage bag weighs approximately 18 pounds⁴. Thus, the total tons of residential waste setout per week, is estimated to be 160 tons⁵. The estimated annual bags setout totals 940,000 and the estimated tons equals 8,460 of residential waste per year.

¹ This assumes an average of 7.5% of the 3,514 single unit housing units do not have established waste services.

² Results of Hauler Survey

³ Three Garbage bags for every occupied housing structure (5,969) = 17,907 bags

⁴ City of Dubuque, Iowa Garbage Setout Rate Analysis

⁵ 18,000 garbage bags * 18 pounds / 2,000 pounds = 160 tons

The average annual tons of waste generated per person in Warrensburg is 0.5 tons per person⁶. However, this average annual tons per person does not account for commercial wastes. These figures were unavailable due to different hauling companies providing commercial and residential waste collection services in the same area as well as outside of Warrensburg during the single collection routes.

The national average waste generated annually per person (including commercial waste) is 0.8 tons⁷.

Residential Waste Disposal Costs:

Assuming 8,460 tons of residential waste is generated each year, Warrensburg residents are paying annual disposal costs of \$346,860⁸ (This does not account for the costs of waste collection services). This equates to approximately \$58 per household per year⁹ just for disposal. Currently the City does not incur these expenditures as residents establish individual contracts with service providers. Typically waste haulers establish long-term disposal contracts with landfills, thus reducing their disposal costs.

Residential Waste Hauling Service Provider Requirements:

Haulers are required to request and receive a business license from the City before waste hauling services may be provided within City limits (either commercial or residential). Currently there are two separate business licenses available for haulers (Drayage and General Business License). Each license allows the license holder to perform the same types of waste collection services within City limits. However, the Drayage license cost is \$5.50 per year while the General business license cost ranges between \$20.50 and \$100.50 depending on total gross amount of volume of business. City staff estimated that most hauling companies with a general business license are required to pay \$100.50 annually. Informed haulers purchase the Drayage license avoiding the more costly General business license. The funds from these license application fees are placed in the City's general fund.

⁶ 8,460 tons (Annual estimated residential waste) / 16,424 (Census 2000 Population)

⁷ Environmental Protection Agency 2001 Total Waste Generation Report

⁸ 8,460 tons (Annual estimated residential waste) * \$41 (Landfill tonnage fee)

⁹ \$346,860 (Annual estimated residential waste disposal costs) / 5,969 (Census 2000 Housing units)

Currently there are seven (7) hauling companies offering residential waste collection/disposal services in the City of Warrensburg. These companies are listed below:

- Brooks Disposal
- Collins Sanitation
- Heartland Waste
- Ryan's Hauling Service
- Steve Haller Disposal
- Vic's Disposal
- Waste Corporation of America

Two companies have General Business licenses and the other five have Drayage licenses. This totals \$228.50¹⁰ in licensing fees paid to the City. Each hauling company establishes their own routes and waste collection schedule. Thus, it is possible to have seven (7) different company waste collection vehicles providing services on the same street on one day.

2.2 City Solid Waste:

The City has established a service agreement with Steve Haller Disposal for the weekly collection of wastes and recyclables generated at City owned facilities. Facilities that receive collection services are listed below:

- Animal Shelter
- Warrensburg Fire Station #2
- Sunset Cemetery
- City Maintenance
- City Hall
- Northeast Sewer Plant
- Southeast Sewer Plant
- 102 South Holden Street
- City Parks

The total costs for these services are approximately \$730 per month or \$8,700 per year. City general funds are utilized to pay for these services.

¹⁰ Two General Business Licenses (\$100.50) + Five Drayage Licenses (\$5.50) = \$228.50

2.3 Residential Recycling:

Currently Warrensburg residents have curbside or drop-off recycling services available to them.

Curbside Recycling Option:

Steve Haller Disposal provides weekly curbside recycling collection services for an additional service fee of \$2.50 a month. This service is only offered to residents that currently have a waste collection service agreement with the company. Approximately 100 households currently subscribe to this additional service. The collected materials are delivered to Education Textbook Services (ETS) for processing and marketing.

Drop-Off Recycling Option:

The Sheltered Workshop provides drop-off collection services to receive aluminum, corrugated cardboard, newspaper, and magazines/mixed paper on weekdays between 8:30 am and 2:30 pm. There is no charge to residents for this service. Materials are marketed through various brokers. The facility hopes to accept more materials as they continue to develop and expand their program.

Monthly Drop-Off Recycling Program:

For portions of the past four years¹¹, the City of Warrensburg provided a monthly drop-off recycling service at the Wal-Mart parking lot. Residents and non-residents could bring their approved material to the drop-off at no cost. This program was de-activated in October 2004.



Education Textbook Services (ETS) provided collection containers, staff assistance, transportation, sorting, and end marketing services for each event. The City paid ETS \$250 per event the first two contract years and \$300 per event the third contract year. The City was responsible for promoting the event,

¹¹ Two events in 2001; Twelve events in 2002; Eleven events in 2003; Ten events in 2004

educating the public concerning the drop-off program, managing volunteers, and collecting event data.

A Solid Waste Region F grant awarded to the City provided funding for these and other related activities for the first three years. The City of Warrensburg provided the funding for these services the final year.

This program was a popular event for residents interested in recycling. Chart IV illustrates the number of participants (cars) and the tons of material delivered during the life of the program.

Chart IV – 2001 to 2004 Recycling Yearly Average Analysis

Calendar Year	Pounds Collected	Number of Cars	Number of Volunteers	Pounds Collected/Car
2001*	22,400	285	45	78.6
2002	192,250	2,649	331	72.6
2003**	217,417	2,506	245	86.8
2004***	197,115	2,250	182	87.6
TOTAL	629,182	7,690	803	NA
MEDIAN	194,682	2,378	214	82.7

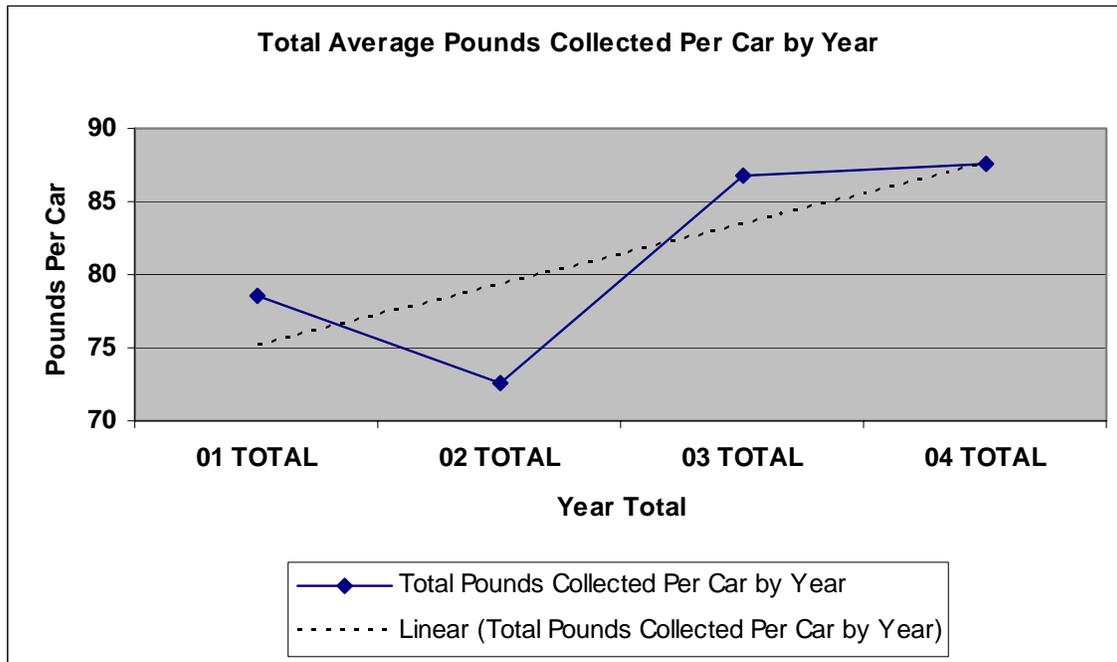
* 2 -Events were held in 2001.

** 11-Events were held in 2003. The December event was canceled due to weather.

*** 10-Events were held in 2004. The program ended in October.

Figure I shows the total average pounds collected per participant (car) for each year the program was operational.

Figure I – Total Average Pounds Collected Per Car by Year



Over the four years of the program’s existence, over 314 tons of material was diverted from disposal at a cost of \$29.45 per ton¹² (This figure does not include education, promotion, or staff/volunteer assistance costs). The costs to dispose of this material would have equaled approximately \$13,000 at \$41/ton. Thus, this program saved over \$3,500 in waste disposal fees.¹³

Another way to calculate the “cost” savings of such a material diversion program would be to consider the space saved at a disposal facility. The average rear load packer garbage truck can hold 23 cubic yards and 1 cubic yard generally weighs 1,000 pounds . This totals 23,000 pounds or 11.5 tons. Thus, we can assume that this program prevented more than 27 full garbage trucks from heading to the landfill. In the ten months of the program for 2004, almost eight full garbage trucks of material were diverted from the landfill as a result of the recycling program.

¹² \$9,250 (Total costs to ETS) / 314 tons

¹³ Total Disposal Cost subtracted from the total known cost of the recycling program.

Chart V illustrates options in Warrensburg for recycling of the listed materials. This chart provides a quick summary of the existing recycling services available within the City of Warrensburg.

Chart V – Recycling Services Available in Warrensburg, Missouri

Material	Steve Haller Disposal Curbside Recycling Service	Sheltered Workshop	Monthly Drop-Off Service (as of October 2004)
Newspaper	x	x	x
Corrugated cardboard	x	x	x
Magazines	x	x	x
White office paper	x	x	x
Junk mail	x		x
Plastics #1 - #2	x		x
Other plastics	x		
Aluminum cans	x	x	x
Tin	x		x
Clear glass	x		
Colored glass	x		

2.4 Yard Waste:

The Missouri State Code of Regulations prohibits the disposal of yard waste at sanitary landfills within Missouri. These materials are to be managed using alternative methods.

Residential Yard Waste Services:

Heartland Waste Disposal offers the only residential yard waste collection service. Customers must sign up for the seasonal service to participate. Heartland Waste Disposal personnel stated that less than five (5) customers currently participate in this service.

The Show-Me Regional Landfill accepts yard waste delivered to their facility. This material is transported to another facility in Kansas for processing.

Residents manage this waste by either backyard composting, burning, or throwing the yard waste material away with their household waste.

The City does collect tree limbs and branches during the Spring and Fall City Clean-Up event at no charge to residents. These materials are ground on site and then delivered to a City park. The ground material is offered to residents at no charge and used in City landscaping projects.

City Yard Waste Burning Ordinance Summary:

The current City burning ordinance indicates that households of a four (4) dwelling unit or less may burn yard wastes that are generated on premises. The Fire Chief can restrict burning or designate non-burn days when unsafe burn conditions are identified (i.e. significant wind or drought conditions).

2.5 Appliances:

Currently, appliance collection services are not available for residential customers. However, residents may set out appliances for collection during the spring and fall clean up events or hire collection as a separate service.

Residential Appliance Services:

Residents manage this waste by either delivering the appliance to the Landfill, hiring a private hauler (Typically at a cost of \$10 - \$15 per unit), or having the retailer they purchased the replacement appliance from collect the old unit for a fee.

2.6 Multi-Plex Solid Waste Services:

Multi-plex (more than one unit per structure) property managers do not establish long-term contracts for solid waste collection services. Managers interviewed stated that they frequently change service providers depending on cost and quality of services received/provided.

Managers complained felt they have no control over the types and quality of waste collection services received. They stated the control they had over these services was the threat of switching to a different service provider.

Managers also stated they had difficulty with tenants properly participating in the existing solid waste management program for waste. Managers indicated that some tenants refused to bag their waste or place the waste into the provided waste containers. This causes waste to blow around the parking lot and requires property management staff to collect litter on a regular basis.

2.7 Solid Waste Education:

The Warrensburg Citizens for Environmental Excellence (WCEE) was established with the initial intent to help coordinate the drop-off recycling grant program and increase environmental awareness. With assistance from this group, the City published an educational brochure, assisted with commercial recycling education, and performed two (2) solid waste satisfaction surveys.

This group continues to meet and expand their involvement in environmental issues in and around Warrensburg.

2.8 Spring & Fall Cleanup Weeks:

The City provides residents with spring and fall cleanup services on separate contracts. The services are received through a bid process that selects a service provider for each season separately. Residents may set out appliances, bulky items, and tree limbs/branches for collection at no cost. There is no limit to the amount of materials that residents are allowed to set out. Residents are however, prohibited from setting out materials that would typically be collected during normal waste collection weeks.

Heartland Waste was selected for the Fall 2004 Fall City-Wide Bulky Waste Pick-Up for a cost of \$11,500. The contractor collected appliances and bulky wastes from residential units throughout the City.

City staff collects tree limbs and branches from residential units during this same week. The material is ground on site and then taken to a City Park. Ground materials are

offered at no charge to residents and used in City landscaping projects. City staff estimated that ten City employees work a total of ten (10) days to perform these services. The City's labor cost for these services is approximately \$11,000 per event¹⁴

The total costs for a single City Wide Bulky Waste Pick Up event is estimated to be \$22,500. The total annual cost for the two (2) City-Wide Bulky Waste Pick-Up events is estimated to be \$45,000. This does not include vehicle maintenance, coordination costs, education, advertisement, or educational/promotional costs for these services. The funds to support this service are received from the City's general fund.

For the 2005 Spring Clean-Up program, volume restrictions have been developed. Residents are limited to a bulky waste pile of up to 6' x 6' x 4 ½'. The tree limb pile may not be larger than 4' x 15'. All Freon containing appliances must be tagged by a State Authorized Specialist in order to be picked up. There are no limits to the amount of appliances residents may setout for collection.

2.9 Household Hazardous Materials:

Johnson County hosted a household hazardous materials (HHM) collection event on October 2, 2004. Collection services were open to all Johnson County residents. Businesses or participants wanting to deliver agricultural bulk products were prohibited from participating.

The program was sponsored by the Johnson County Commission and the University Extension. The program was funded through a grant from the Region F Solid Waste District and the Missouri Department of Natural Resources.

When these events are unavailable, residents manage the disposal/recycling of this material by identifying local retailers that may accept the materials for a fee, holding onto the material until the next collection event, or disposing with their garbage.

¹⁴ City staff stated pay structures of grades D and F may be used. Used Step 7 rates and determined the average between the two grade structures.

2.10 Staff Services:

City staff provide general solid waste management support by answering questions and responding to code enforcement concerns.

Staff also coordinate fall and spring clean up services, and process private hauling business license requests.

3.0 Utility Billing Services:

The Missouri American Water Company provides the City with water utility billing service. The Company charges the City \$0.86/month for each customer. The City has approximately 5,000 customers. Thus, the City pays \$4,300 a month or \$51,600 annually for these billing services.

This was investigated to provide an approximation of potential costs of billing residents for received waste management services.

4.0 City Solid Waste Management Incurred Costs:

The City provides several solid waste management services in Warrensburg and funds these services through the general fund. Chart VI details the costs incurred by the City for the solid waste management services they provide or manage.

Chart VI – City of Warrensburg 2004 Solid Waste Management Service Costs

Service	Annual Cost	Annual Costs Per Occupied Household
Solid Waste Collection	\$ -	\$ -
Curbside Recycling	\$ -	\$ -
Drop-Off Recycling 2004 (Cost fo ETS)	\$ 3,000	\$ 0.50
Drop-Off Recycling 2004 (City Staff Time)	\$ 1,600	\$ 0.27
Spring Clean-Up 2004	\$ 12,000	\$ 2.01
City Staff YW Clean-Up (Spring)	\$ 10,704	\$ 1.79
Fall Clean-Up 2004	\$ 11,500	\$ 1.93
City Staff YW Clean-Up (Fall)	\$ 10,704	\$ 1.79
TOTAL Spring/Fall Clean-Up	\$ 44,908	\$ 7.52
Solid Waste Education	\$ -	\$ -
Illegal Dumping Staff & Disposal	\$ 1,188	\$ 0.20
City Building Solid Waste & Recycling (City Hall)	\$ 8,760	\$ 1.47
TOTAL ANNUAL COSTS	\$ 59,227	\$ 9.92

The City of Warrensburg participates and is responsible for management of the integrated solid waste management services listed in Chart IV. The most significant cost to the City is the spring and fall cleanup program totaling nearly \$45,000 or 76% of the total current solid waste management service costs. Funds for these City provided services are received from the City's General Fund. The total costs for these services is estimated to be \$59,227 annually. This equates to just under \$10 per household per year.

JOHNSON COUNTY, MISSOURI EXISTING SOLID WASTE SYSTEMS REPORT

1.0 Management of Generated Residential Waste Materials:

1.1 Residential Solid Waste:

Currently residents of Johnson County establish contracts for solid waste collection and disposal with private waste haulers. These contracts range in price from \$10 to \$15 a month per household¹⁵. The average contract cost is \$12.50 a month per household. Private haulers do not assess additional fees for disposal. The costs of disposal are included in this monthly fee. Assuming an average monthly waste collection fee of \$12.50, residents are paying \$150 annually for waste collection and disposal services.

Although the prices vary, the services provided are generally the same. For a majority of residences, waste is collected once a week on a pre-determined waste collection day. Haulers have indicated that they have elderly customers that have requested bi-monthly collection as they generate small amounts of waste. Waste haulers establish a separate price for these bi-monthly customers. Waste hauling company staff indicated that residential waste collection routes are operated throughout Johnson County Monday through Saturday or six (6) days a week.

Waste haulers indicated a maximum waste setout limit of 8 – 10 bags per household. Haulers were unable to provide an estimate to the amount of bags Johnson County residents typically setout for collection. This was due to several haulers providing services for urban, rural, and commercial accounts along the same routes.

The County does not currently require haulers to apply for a business license to perform solid waste services within the County.

Currently, Johnson County does not have ordinances that require residents to have waste collected for disposal. The County also does not have ordinances prohibiting open

¹⁵ Results of Hauler Survey

burning. Residents that do not establish contracts with a private waste hauling company either deliver their waste to a landfill or burn their waste.

1.2 Residential Recycling:

Currently, there are no recycling options directly available to Johnson County residents. However, several private companies allow customers to drop-off recyclables at their facilities at no charge.

Drop-Off Recycling Services:

The Sheltered Workshop in Warrensburg and Education Textbook Services (ETS) in Holden are two facilities known to allow customers to deliver recyclables at no charge.

The Sheltered Workshop provides drop-off collection services to receive aluminum, corrugated cardboard, newspaper, and magazines/mixed paper weekdays between 8:30 am and 2:30 pm. There is no charge to residents for this service. Materials are marketed through various brokers. The facility hopes to accept more materials as they continue to develop and expand their program.

Education Textbook Services in Holden provides drop-off collection services to receive aluminum, tin, corrugated cardboard, newspaper, magazines, junk mail, mixed office paper, and plastics. These materials are accepted at drop-off containers located in the facility's parking lot. Staff indicated that several rural residents used their facility on a regular basis.



The Whiteman Air Force Base (Base) provides recycling drop-off services to Air Force employees, Base service staff, and re-tired military personnel. These groups may receive recyclables from friends or neighbors that do not have access to these services at the Base.

Monthly Drop-Off Recycling Service:

For the past several years the City of Warrensburg provided a monthly drop-off recycling service at the Wal-Mart parking lot. Residents and non-residents could bring their approved material to the drop-off at no cost. This program was de-activated in October 2004.

A Solid Waste Region F grant awarded to the City provided funding for these and other related activities for the first three (3) years. The City of Warrensburg provided the funding for these services the final year.

1.3 Yard Waste:

Heartland Waste Disposal offers the only residential yard waste collection service. Customers must sign up for the seasonal service to participate. Heartland Waste Disposal personnel stated that less than five (5) customers currently participate in this service.

The Show-Me Regional Landfill accepts yard waste delivered to their facility. This material is transported to another facility in Kansas for processing.

Residents manage this waste by either backyard composting, burning, or throwing the yard waste material away with their waste.

1.4 Appliances:

Currently, appliance collection services are not available for residential customers.

Residents manage this waste by either delivering the appliance to the Landfill, hiring a private hauler (typically at a cost of \$10 - \$15 per unit), or having the retailer they purchased the replacement appliance collect the old unit for a fee.

1.5 Household Hazardous Materials:

Johnson County hosted a household hazardous materials (HHM) collection event on October 2, 2004. Collection services were open to all Johnson County residents. Businesses or participants wanting to deliver agricultural bulk products were prohibited from participating.

The program was sponsored by the Johnson County Commission and the University Extension. The program was funded through a grant from the Region F Solid Waste District and the Missouri Department of Natural Resources.

When these events are unavailable, residents manage the disposal/recycling of this material by identifying local retailers that may accept the materials for a fee or holding onto the material until the next collection event.

1.6 Multi-Plex Solid Waste Services:

A majority of multi-plex managers do not establish long-term contracts for solid waste collection services. Managers interviewed stated that they frequently change service providers depending on cost and quality of services received.

Managers complained they felt they have no control over the types and quality of waste collection services received. They stated the control they had over these services was the threat of switching to a different service provider.

1.7 Solid Waste Education:

Staff provide residents with Missouri Department of Natural Resource solid waste management literature and educational materials. Staff also provide information to residents concerning alternative disposal services (private and public) being offered in Warrensburg.

1.8 Staff Activities:

The County Community Health Services respond to public sanitation complaints and work with the property owner to develop a timeline/plan to fix the problem. A majority of these complaints relate to junk (i.e. cars, un-managed yards, abandoned structures, etc.) being stored on personal property.

CENTRAL MISSOURI STATE UNIVERSITY EXISTING SOLID WASTE SYSTEMS REPORT

1.0 General Central Missouri State University Information:

Central Missouri State University (CMSU) located in the City of Warrensburg, currently estimates that approximately 9,000 students (undergraduate and graduate) attend classes at the campus. More than 30% of these students live in one of 19 residence halls on campus. Over 90% of the students that attend classes at the University are from Missouri. There are currently 430 full-time faculty members employed by the University.



The University offers 150 programs of study leading to an associate's degree, certificate, bachelor's degree, master's degree, education specialist degree, or cooperative doctorate.

2.0 Management of Generated Residential Waste Materials:

2.1 Institutional Solid Waste:

Currently, CMSU contracts with Steve Haller Disposal for waste collection and disposal services. The existing contract was developed in 2004 and continues until 2008. The contract assess CMSU a per cubic yard (cy) fee of \$2.25 for provided services.

The following is a list summary of services received under the existing contract:

- Collection of 50 waste containers on a set schedule
- Waste container management
- Arrange containers at University's direction for special events
- Collection of five (5) corrugated cardboard containers
- Corrugated cardboard container management

Chart I illustrates the current waste container collection schedule and the total cubic yards available for collection.

Chart I – CMSU Waste Container Location, Size, and Collection Schedule¹⁶

Location	Cubic Yards	Number of Containers at Location	Number of Days Each Container is Collected Per Week	Total Cubic Yards Available for Collection Per Week
Science	6	1	5	30
Driving Range	3	1	1	3
General Services	12	2	3	36
General Services	6	1	5	30
Wood/Martin	6	1	5	30
Lovinger	6	1	3	18
Grinstead	6	1	5	30
Public Safety/TRG	6	1	3	18
Farm	3	1	1	3
Airport	6	1	1	6
Library	3	1	5	15
Selmo Park (2-90Gal/2-30Gal)	1	4	2	2
Ward Edwards	6	1	1	6
South Rec	3	1	1	3
Todd/Yeater	14	2	6	84
Yeater	6	1	1	6
Houts/Hosey-Nickerson	6	1	5	30
Natt/Brad	12	2	5	60
Hawkins	6	1	3	18
Central Village	8	4	3	24
Greenwood	8	4	3	24
Fraternity	12	2	5	60
Fitzgerald	12	2	5	60
Panhellenic	6	1	5	30
Ellis	18	3	6	108
Foster Knox	6	1	3	18
Conference Center	3	1	2	6
Diemer	6	1	2	12
Union	16	2	6	96
Multi	10	2	3	30
Pertle (Nov-Feb/1XWeek)	6	2	2	12
TOTAL	228	50		908

¹⁶ Provided by CMSU Janitorial Services

CMSU spends approximately \$2,050 a week for waste management services.¹⁷ This equals approximately \$106,000 per year (this assumes regular collection schedule for the entire calendar year). This equates to approximately \$12 per student per year for waste disposal.¹⁸

2.2 Institutional Recycling:

There are a variety of unconnected recycling services provided on CMSU campus. The provided services focus on University generated materials and not on student generated materials.

The Physical Plant provides a paper shredding service for internal materials and other departments which utilize the service. The shredded paper is stored in gaylord boxes and collected by Steve Haller Disposal for recycling. This material is taken to Education Textbook Services (ETS) in Holden. Steve Haller Disposal provides this service as a verbal agreement and at no cost.



Steve Haller Disposal also has five (5) corrugated cardboard containers located on campus. Janitorial services personnel may place cardboard in these containers instead of the containers designated for waste. Steve Haller Disposal provides this collection service as part of the waste collection service contract.

Staff in the Janitorial Services Department have established voluntary aluminum can recycling programs at the Student Union. Cardboard boxes are setup in the corners of hallways at the Union to receive aluminum cans. The aluminum cans are collected by janitorial staff and sold to a third party. The money received from this sale is assumed to remain with the personnel that collected this material.

¹⁷ 908 weekly available cubic yards at \$2.25 per cubic yard.

¹⁸ \$106,000 (estimated total annual disposal costs) / 9,000 (estimated student population)

The Re-Sale Department receives a variety of materials (i.e. chairs, computers, office



furniture, food service equipment, lab equipment, bleachers, etc.) that the University can no longer use. The Re-Sale Department works to identify end markets for these materials and also holds an auction for the materials typically once a month or when the storage yard is

nearly full. Re-Sale Department staff indicated that auctions typically are well attended and last less than an hour. A majority of the items are sold in bulk and removed from the site immediately or a few days after the sale.

Some items are being stored in hopes that a buyer/end market can be identified. These materials include a large quantity of thin plastic panels, metal contaminated concrete, misc. scrap metal, bleachers, and food service equipment. If buyers/end markets are not identified, the materials may in the future need to be disposed of.



The disposal costs could be a significant cost due to the quantities and special handling (i.e. dismantling, transportation, etc.) requirements.

2.3 Institutional Yard Waste:

Grounds Services currently collects yard waste materials during trimming and other related activities and delivers these materials to the University farm for static composting.

2.4 Institutional Solid Waste Education:

A student group called the Environmental Awareness Club (EAC) was established in 2002 to promote environmental awareness on campus. The group meets regularly to discuss environmental awareness and to participate in/coordinate direct impact projects. The EAC has a core group of 3-5 students that perform most of the management duties.

It was estimated that the group has approximately 20-30 students that participate on an infrequent basis. Biology Professor, Steve Mohler attends meetings and supports the group's activities.

There were no University directed solid waste education services identified during this study. Janitorial Services, Grounds Services, and Purchasing direct staff to provide solid waste related services, but do not provide solid waste education.

WHITEMAN AIR FORCE BASE

EXISTING SOLID WASTE SYSTEMS REPORT

1.0 General Air Force Base Facts/History:



The Whiteman Air Force Base (Base), located two miles south of the City of Knob Noster, is home to the 509th Bomb Wing which operates and maintains the B-2 bomber. The Air Force Base has more than 8,800 military members, Department of Defense civilians and Air Force family members living and working on the Base.

2.0 Management of Generated Residential Waste Materials:

2.1 Residential Solid Waste:

The Base currently contracts with Steve Haller Disposal for collection and disposal of waste generated on the base. Steve Haller Disposal collects residential waste weekly and delivers the materials to the Show-Me Regional Landfill in Warrensburg, Missouri for final disposal. This contract is managed directly by the Air Force.

Currently, there are no waste limits that Base residents may set out for collection.

Waste containers are available at the recycling drop-off facilities on base. Base residents, off-base employees, and retired military staff have been known to utilize these containers for disposal of their residential waste. Steve Haller Disposal provides collection services for these containers as part of the contract as well.

2.2 Residential Recycling:

The Air Force has contracted with a private service provider, Environmental Services, to perform recycling program services and development. The contractor manages the Base recycling center, a re-use retail store, and manages recycling related programs on the Base. Environmental Services has five (5) full time employees to assist with operations and general maintenance of the recycling and recycling related programs.

The Base currently contracts with Steve Haller Disposal for curbside collection of residential recyclables generated on the Base. Residential recyclables are collected during the same day as garbage collection. All collected recyclable materials are then delivered to the on-Base recycling center for processing and marketing.

Steve Haller Disposal also provides individual work stations with a corrugated cardboard



container. Some work stations also have a separated recycling container to accept a variety of recyclable materials. However, Steve Haller does not provide an on call collection service for these containers. Environmental Services staff collect these containers when they notice they are full or receive a request to collect the containers.

The recycling center facility consists of five (5) enclosed structures and one (1) building with an exposed wall. These structures and their uses are listed below:



Enclosed Structures

- Structure One: Storage of bailed materials and materials for future marketing
- Structure Two: Bailing activities
- Structure Three: Drop-off service building & clothes bailing activities
- Structure Four: Offices

Open Building:

Building One: Storage of bailed materials for shipment to markets

The entire recycling center facility is located on an impervious concrete pad. Drop-off containers are well arranged to allow for free and safe traffic movement within the lot.

Signage on the buildings and individual containers provide detailed descriptions of the types of acceptable materials.



The recycling center accepts the following items for recycling:

- Newspaper
- Chipboard/Boxboard
- Magazines
- Office paper
- Corrugated cardboard
- Plastics # 1 and # 2
- Clear & colored glass
- Aluminum
- Tin
- Brass
- Copper
- Clothes
- Shoes
- Clean C&D
- Wooden pallets
- Scrap metal



A majority of these materials are baled on site and marketed through recycling brokers or occasionally shipped directly to the mills. These marketed materials are collected by private contractors for delivery to brokers or mills.

Other materials are collected by private individuals under verbal agreements.

Chart I provides a summary of the amounts and final management methods for major materials received at the recycling center.

Chart I – Recycled Material Quantities and Management Methods

Material	Quantity Received Per Month	Final Management Method
Aviation maps	2- gaylords	Marketed with mixed paper due to the maps being bound.
Corrugated cardboard	1/6 th of a full truckload	Marketed to one of four brokers
Bond paper	9 bales	Marketed directly to mill
Newspaper	8 bales	Marketed to one of four brokers
Aluminum cans	1 bale (1 ton)	Marketed to one of four brokers

Staff indicated that the materials delivered to the recycling center are typically 95% contaminant free. Staff remove non-approved items and/or trash from recycling containers every morning.

The recycling center also removes bicycles from the waste containers and gives them to fire departments and other organizations that restore them for continued use.

Environmental Services staff established a retail store to provide an alternative to disposal of reusable items. This retail store is located near the recycling center in a separate warehouse. The warehouse currently does not have any utilities (i.e. water, electric, etc.) which limits the usage to daylight hours and warm weather. However, the warehouse has worked well as a storage and store floor for the items received.



The items received for the retail store are materials from Base/military operations that are expired, no longer usable for intended use, or currently do not have a use. These items may include:

- Office furniture
- Home decorations
- Home appliances
- Residential furniture
- Construction materials
- Lawn equipment

When materials are delivered to the recycling center an employee prepares the items for storage/display. Customers of the retail store are those with access to the Base and its services or an off-base third party that receives permission to purchase gross products.

Environmental Services also manages waste asphalt generated on the Base during deconstruction/construction projects. This material is ground once a year by a private contractor and sold to off-base third parties through a bid process managed by Environmental Services.

Half of the income generated from the recycling center, retail store, and related activity sales are allocated toward the service programs and the other half goes to the Commander's Welfare Fund which is used for Base or community improvement projects.

2.3 Yard Waste:

The Air Force contracts with Steve Haller Disposal to provide yard waste collection services for residential areas of the base. These materials are delivered to the recycling center for temporary storage. The storage container is also available for those with access to the Base to deliver their yard waste materials.



Environmental Services staff transport the material to an impervious compost pad at another location on the Base. A tub grinder is used to grind large organic materials (i.e. limbs, stumps, etc.). The materials are turned periodically to manage the composting process. During the colder seasons an in-vessel composting system is used. Finished product materials are used on the Base for landscaping projects.

2.4 Appliances:

The recycling center accepts appliances but does not advertise this service. These materials are collected by a third party for recycling when the units can not be resold.

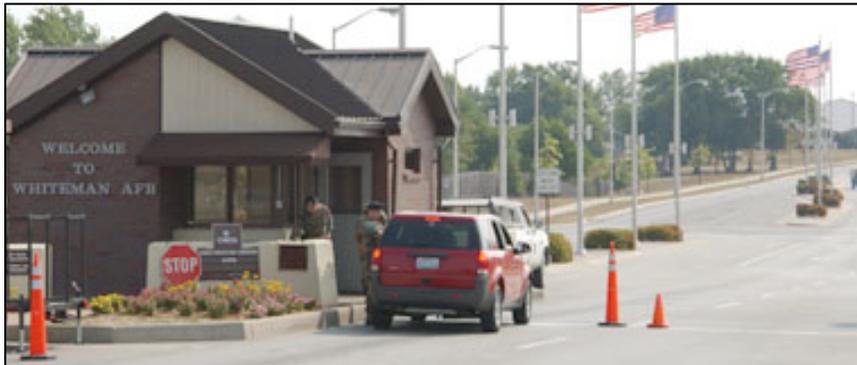
2.5 Solid Waste Education:

Environmental Services staff provide a tour of the recycling center, retail store, and review available services during Air Force employee orientations. Staff also attend departmental meetings to provide updates concerning waste management projects or to discuss concerns of participation/non-participation.

2.6 Security Concerns:

Due to security issues, the recycling center is not permitted to allow access to their facility to people that do not have clearance to use Base services. The recycling center, as well as the retail store are also prohibited from receiving materials from those that do not have access to the base.

These security restrictions have restricted the possibility of providing direct alternative disposal services to surrounding communities or businesses.



PRIVATE HAULING COMPANIES

INFRASTRUCTURE REPORT

1.0 General Information:

This report identified seven (7) private garbage haulers offering residential and/or commercial solid waste collection in the Warrensburg region. These companies are:

- Brooks Disposal
- Collins Sanitation
- Heartland Waste
- Ryan's Hauling Service
- Steve Haller Disposal
- Vic's Disposal
- Waste Corporation of America

Letters and surveys were mailed to each company. Two follow up phone calls were made to each company that did not respond. Completed surveys were received from Brooks Disposal, Steve Haller Disposal, and Heartland Waste. The information they provided is used to provide the general private hauling companies infrastructure report.

These hauling companies provide solid waste management services in Warrensburg, Johnson County, and throughout the region.

2.0 Hauling Collection Vehicles:

Haulers indicated that their waste collection fleet mainly consisted of rear load packer trucks. Some hauling companies indicated that they maintained one waste collection vehicle and used older vehicles for service parts.

A private hauling company mentioned that automated collection vehicles or front load packer trucks were desired service collection vehicles but extremely cost prohibitive to the company without significant waste hauling contracts.

One company had side compartment loader vehicles to provide curbside recycling services. However, rear load collection vehicles have been used for this service when the side compartment loader vehicles are unavailable.

3.0 Residential Waste Collection:

Currently, no hauling company has established a contract for waste collection for all residents of Warrensburg or Johnson County. Residents of Warrensburg and Johnson County establish individual contracts or service agreements for solid waste collection services with private companies. These contracts range in price from \$10 to \$15 a month per household. The average contract cost is \$12.50 a month per household. Private haulers do not assess additional fees for disposal. The costs of disposal are included in this monthly fee. Assuming an average monthly waste collection fee of \$12.50, residents are paying \$150 annually for waste collection and disposal services.

4.0 Commercial Waste Collection:

Waste haulers also offer services to commercial and institutional customers. These services are typically arranged through verbal contracts or short-term service agreements. Some of the larger businesses may have long-term contracts.

5.0 Residential Recycling Service:

Currently Steve Haller Disposal is the only company that provides curbside recycling services to Warrensburg residents. This service is offered to residents at an additional cost of \$2.50 per month. This service is only offered to residents that currently have a waste collection service agreement with the company.

6.0 Yard Waste Collection Service:

Heartland Waste Disposal offers the only residential yard waste collection service. Customers must sign up for the seasonal service to participate. Yard waste is collected in a rear load waste collection vehicle.

7.0 Spring & Fall Cleanup Weeks:

The City provides spring and fall cleanup services to residents at no charge. Heartland Waste provided these services in 2004 under awarded contracts with the City. Over two weeks, Heartland Waste collected residential appliances and bulky items. There were no limits to the amount of materials that residents were allowed to setout in 2004.

For the 2005 Spring Clean-Up program, volume restrictions have been developed. Residents are limited to a bulky waste pile of up to 6' x 6' x 4 ½'. The tree limb pile may not be larger than 4' x 15'. All Freon containing appliances must be tagged by a State Authorized Specialist in order to be picked up. There are no limits to the amount of appliances residents may setout for collection.

SHOW-ME REGIONAL LANDFILL

INFRASTRUCTRE REPORT

1.0 General Information:

The Show-Me Regional Landfill, south of Warrensburg, is owned by Allied Waste. This facility provides final disposal services for collected residential and commercial waste generated within the Johnson County region and beyond. The facility is open Monday through Friday 7:00am to 4:00pm and on Saturdays 7:00am to 11:00am.

The Landfill receives approximately 475¹⁹ tons of waste per day or approximately 148,000²⁰ tons a year. The current assessed charge to dispose of waste at this facility is \$41 per ton.

2.0 Facility Services:

The Landfill has established disposal contracts for several customers including private waste hauling companies. These contracts typically offer long-term contracts with a discounted disposal fee.

Chart I below illustrates the management services provided for the materials received at the Landfill.

Chart I – Landfill Management Practices for Materials Received

Material	Service Provided On Site	Final Management Method
Residential & Commercial Waste	Weigh and waste screen	On site disposal
Tires	Removed from waste	Outside contractor
Appliances	Removed from waste, container provided	Outside contractor
Scrap Metal	Removed from waste, container provided	Outside contractor
Yard Waste	Accepted	Transported to another facility in Kansas
Batteries	Removed from waste, container provided	Outside contractor

¹⁹ Kelly Rooney, Show-Me Regional Landfill General Manager

²⁰ 475 daily tons * 6 business days in a week * 52 weeks

3.0 Lifespan of Facility:

The current life (final disposal service years) of the Show-Me Regional Landfill is estimated to be 40 years. The Landfill does own adjacent 69 acres that may allow for future Landfill expansion and thus extension of the facility's life²¹.

²¹ Kelly Rooney, Show-Me Regional Landfill General Manager

BANJO RECYCLING

INFRASTRUCTURE REPORT

1.0 General Information:

Banjo Recycling in Sedalia, Missouri provides recycling collection and processing services to businesses, institutions, and for community drop-off recycling programs. They currently do not receive materials or provide any services in Johnson County.

2.0 Materials Accepted for Recycling Processing and Marketing:

Banjo Recycling currently collects/receives the following for recycling processing and marketing:

- # 1 PETE Plastic
- # 2 HDPE Plastic
- Newsprint
- Magazines
- Office Paper
- Corrugated Cardboard
- Aluminum
- Tin Cans
- Car Batteries
- Appliances

They do not accept glass for recycling because they do not have a stable market.

These materials are marketed using various brokers at various locations.

The facility recently began accepting appliances for recycling. They offer these services for \$5 per appliance.

3.0 Review of Received Materials:

Materials are received via various verbal agreements between multiple generators or service providers. They also have established service contracts with local education institutions outside of Johnson County.

Banjo Recycling generally provides roll-off containers for their customers to store the collected recyclables. Material is also received at their facility's drop-off recycling stations.

4.0 Future Services/Expansion:

The facility indicated they would be willing to work with the City of Warrensburg. They feel that they are close enough to Warrensburg to provide recycling collection and processing services.

EDUCATION TEXTBOOK SERVICES (ETS) INFRASTRUCTURE REPORT

1.0 General Information:

Education Textbook Services (ETS) in Holden, Missouri has the main function of providing textbook sales services to a variety of educational institutions. They provide new textbooks, purchase and resell used textbooks, and have established a public book store.



2.0 Materials Accepted for Recycling Processing and Marketing:

ETS also provides recycling services as a secondary business. They currently collect/receive the following for recycling processing and marketing:

- All plastics
- Books
- Newsprint
- Chipboard/Boxboard
- Magazines
- Office Paper
- Corrugated Cardboard
- Aluminum
- Tin Cans
- Brass
- Copper



These materials are mainly marketed to brokers in Kansas City. Some of the materials are contracted to be sold to large processors in Kansas City.

They do not accept glass for recycling because they do not have a stable end market. They also stated that insurance and liability costs would increase if they handled this material.

3.0 Review of Received Materials:

Materials are received via various verbal agreements between multiple generators or service providers. Chart I illustrates the party that delivers the materials to the processing facility and the generation source of the materials.

Chart I – Recycling Material Collection and Generation Source

Material Delivery/Collection Company	Generation Source
Steve Haller Disposal	Warrensburg curbside recycling program
Steve Haller Disposal	CMSU white office paper and corrugated cardboard
ETS	Lexington drop-off recycling program
ETS	Warrensburg drop-off recycling program
City of Holden	Holden drop-off recycling program
Public	ETS facility public drop-off recycling program
ETS	Education institution textbooks



ETS estimated it costs them \$30 per ton of material to process all of the recyclables received and to prepare them for marketing.

4.0 Future Services/Expansion:

The facility is currently considering expansion at the existing site. The space would allow for more materials to be accepted and more activities to occur inside the facility.

It was stated that ETS would offer drop-off recycling collection services at no charge in the City of Warrensburg if the City agreed to provide the containers and maintain the site.

SHELTERED WORKSHOP INFRASTRUCTURE REPORT

1.0 General Information:

The Sheltered Workshop in Warrensburg is a state supported vocational program that provides work for persons with mental retardation/developmental disabilities. The facility employs adults with developmental disabilities. The facility also currently provides drop-off collection service for a few recyclable materials.

2.0 Materials Accepted for Recycling Processing and Marketing:

The Sheltered Workshop provides drop-off collection services to receive aluminum, corrugated cardboard, newspaper, and magazines/mixed paper weekdays between 8:30 am and 2:30 pm. There is no charge to residents for this service.



The materials collected are transported to the facility in Higginsville for processing and marketing. Materials are mainly marketed through brokers in Kansas City.

It was stated that the facility was recently awarded a grant to purchase a new vertical down-stroke bailer for the purpose of bailing corrugated cardboard.

3.0 Future Services/Expansion:

The facility hopes to accept more materials as they continue to develop and expand their program.

The facility also has plans to offer commercial corrugated cardboard collection services in the Warrensburg area.

These services would be offered for a small collection fee.



CITY OF WARRENSBURG, MISSOURI

BARKER LEMAR PROCEDURES REPORT

1.0 Monthly Drop-Off Recycling Survey Analysis:

BARKER LEMAR, Warrensburg Citizens for Environmental Excellence (WCEE), and other drop-off recycling volunteers assisted in performing a drop-off recycling participant survey. The survey was performed on September 11, 2004 and 106 surveys were completed.



Seventy (70) or 66% of these respondents indicated they lived in the city limits of Warrensburg.

The information below summarizes the responses received from Warrensburg residents.

A. Where Were the Materials Generated?

- 87% - Single Family Household (SFH)
- 6% - SFH and Business
- 3% - Multi-Family Dwelling (MFD)
- 1% - SFH, School, and Church
- 1% - SFH and Church
- 1 % - School

A large majority of the participants delivered materials generated from their households. However, more than 9% of all participants delivered materials generated outside of their homes. This indicates that not just residents were actively recycling, but businesses, schools, and other organizations utilized this recycling program as well.

B. What is Your Participation Frequency?

- 94% - Every Month
- 3% - No Reply
- 1% - Every Other Month
- 1% - Almost Never

This indicates that those that did participate in the drop-off recycling program did so on a consistent basis.

C. What is Your Current Satisfaction Level?

- 4.0 Median
1 to 4 (4 being satisfied)

Respondents indicated that they were satisfied with the services the drop-off recycling program provided them.

D. What Do You Like About The Program?

- 77% - Convenience
- 63% - Accessibility
- 59% - Service
- 44% - Time & Date

Respondents could select more than one item

Respondents were able to select several facets of the drop-off recycling program that they liked. The majority of the responses indicated an appreciation for the convenience and accessibility of the program. This relates to the amount and consistency of the participants in this program.

E. Would You Be Willing to Pay Portion of Program Costs?

- 77% Yes
- 17% No
- 6% No Reply

Over 75% of the respondents indicated they would be willing to pay a portion of the program costs to help establish and continue a similar recycling service in Warrensburg.



2.0 Residential Focus/Discussion Group Analysis:

2.1 Focus Group Discussion Results:

BARKER LEMAR sub-contracted with **MOWRY STRATEGIES** to provide development and management services for two (2) focus groups to discuss recycling issues in Warrensburg. Two (2) focus group sessions were held November 15, 2004 to discuss recycling issues. One (1) group consisted of people that actively participate in recycling. The other group was open to residents that did not currently participate in recycling. These focus group sessions provided an open environment in which topics could freely be discussed without censorship or judgment.

Recycling Focus Group Results:

The first focus group session was for those who recycled. The group had four (4) in attendance. A summary of the results of this session are discussed below.

Participants in this session were familiar with the drop-off program and the existing curbside recycling service offered by a private hauler. They did not indicate a good

knowledge of what happened to the material after it had been collected. However, this knowledge did not play into their reasoning for participating in the recycling programs. The group participated in recycling activities to reduce the amount of waste being landfilled and wanted to be environmentally conscious.

The group stated that the best way to encourage recycling was making it mandatory. In other words, assess a monthly fee on the utility bill to support the costs of the program. Participants felt that spreading the cost of the program would help decrease costs and encourage participation.

A comment was made by one of the participants during the meeting that the services are decentralized.

Non-Recyclers Focus Group Results:

The second group was for those that do not current recycle. The group consisted of one (1) participant. A summary of the results of this session are discussed below.

The participant had taken recyclables to the drop-off program less than a year ago. The participant was familiar with the drop-off program but was not eligible for the curbside recycling service.

The participant stated that because they were not eligible for the curbside recycling service they relied on the drop-off services. They indicated that they did not have an idea as to how much the drop-off program costs but would be willing to pay up to \$10 a month for this or a curbside recycling program.

3.0 Recycling Survey Analysis:

3.1 Recycling Survey Results:

BARKER LEMAR and the City of Warrensburg developed and performed a residential recycling service survey. The survey was published in a local newspaper and available on the City's website for residents to complete and submit. A total of 22 completed surveys were received.

Overall, the responses received indicated a strong support for the establishment of a recycling program in Warrensburg. The survey results are more than likely skewed in favor of recycling as those interested in recycling took the effort to complete the survey. Nevertheless, the data does show strong support for the possibility of a fee to help cover the costs of a potential recycling program.

The questions and a summary of the responses received are detailed below.

1. Do you support efforts to provide recycling in Warrensburg?
(Strongly Oppose) 1 2 3 4 5 (Strongly Support)

- 22 (all) respondents selected **5 (strongly support)**.

2. If recycling were available (either drop-off facility or curbside recycling) how likely is it that you would participate?
(Very Unlikely) 1 2 3 4 5 (Very Likely)

- 22 (all) respondents selected **4**.

3. Would you be willing to pay for a portion of possible costs to help provide a recycling program.

YES NO

- 18 or 81% of the respondents selected **YES**.
- 2 or 9% of the respondents selected **NO**.
- 2 or 9% of the respondents did not indicate a response or stated they would **probably pay a portion of the costs**.

4. Do you currently recycle?

YES NO

- 21 or 95% of the respondents selected **YES**.
- 1 or 5% of the respondents selected **NO**.

3.2 Additional Comments:

23% of the respondents indicated they lived outside city limits and were strongly in favor of efforts to provide recycling options in Warrensburg. This information may help support a County and City cooperative effort to initiate future recycling programs.

JOHNSON COUNTY, MISSOURI BARKER LEMAR PROCEDURES REPORT

1.0 Monthly Drop-Off Recycling Survey Analysis:

BARKER LEMAR, Warrensburg Citizens for Environmental Excellence (WCEE), and other drop-off recycling volunteers assisted in performing a drop-off recycling participant survey. The survey was performed on September 11, 2004 and 106 surveys were completed.



A total of 106 surveys were completed during the drop-off recycling event held September 11, 2004. Thirty-six or 34% of these respondents indicated they lived outside of Warrensburg and in Unincorporated Johnson County. The information below summarizes the responses received from Johnson County participants.

A. Where Were the Materials Generated?

- 86% - Single Family Household
- 11% - Business
- 3% - Multi-Family Dwelling

A large majority of rural participants delivered materials generated from their households. However, more than 10% indicated that they were bringing materials from businesses. It was unclear if these businesses were located outside the City limits or if the participant that delivered the material was from Johnson County.

B. What is Your Participation Frequency?

- 86% - Every Month
- 6% - Every Other Month
- 6% - Few Times a Year
- 2% - Almost Never

This indicates that those that did participate in the drop-off recycling program did so on a consistent basis.

C. What is Your Current Satisfaction Level?

- 4.0 Median
1 to 4 (4 being satisfied)

Respondents indicated that they were satisfied with the services the drop-off recycling program provided them.

D. How Many Miles Did You Drive to Participate Today?

- 49% - drove less than 5
- 29% - drove 5 - 10
- 22% - drove 10 - 20

More than half of the rural participants drove more than 5-miles to deliver their recyclables. Over 20% of the rural participants drove more than 10-miles. This indicates their level of interest and dedication to participating in this program.

E. What Do You Like About The Program?

- 83% - Accessibility
- 80% - Service
- 74% - Convenience
- 65% - Time & Date

Respondents could select more than one item

Respondents were able to select several facets of the drop-off recycling program that they liked. The majority of the responses indicated an appreciation for the accessibility and services of the program.

F. Would You Be Willing to Pay Portion of Program Costs?

- 86% - Yes
- 11% - No
- 3% - No Reply

Over 85% of the rural respondents indicated they would be willing to pay a portion of the program costs to help establish and continue a similar recycling service.

G. Are You Planning Other Activities in Warrensburg as Part of this Trip?

- 69% Yes
- 31% No

Almost 70% of the rural participants indicated that they were planning other activities in Warrensburg besides just delivering recyclables to the drop-off.



CENTRAL MISSOURI STATE UNIVERSITY BARKER LEMAR PROCEDURES REPORT

1.0 Management of Generated Residential Waste Materials:

1.1 Institutional Solid Waste:

BARKER LEMAR, Steve Haller Disposal, the Environmental Awareness Club, Janitorial Services, Grounds Services, and household hazardous materials (HHM) Services coordinated a visual waste sort of five (5) campus waste containers on October 21, 2004. The goal of the waste sort was to approximate the types and quantities of materials being disposed of by location and generation type.



Chart I illustrates the location, container size, and the percent full for each container selected.

Chart I – Selected Containers for Visual Waste Sort

Container Location	Container Size	Percent Full
Fraternity Complex	6 cy	100%
General Services	6 cy	100%
Union	6 cy ¹	100%
Library	3 cy	100%
Houts/Hosey-Nickerson	6 cy	75%

¹ The Union container size is 8 cy. However, 75% of the container was collected for analysis.

The results of the visual waste sort identified a significant quantity of recyclable materials that are currently being disposed of in waste containers. The survey also identified facilities that may not be utilizing the provided corrugated cardboard recycling containers.

Chart II provides the percentage by volume of material category that was observed in the waste containers sampled. A description of each material category follows the chart.

Chart II – Container Volume Percentage Observed by Material Category

Location	Fiber	Plastic	Glass	Metal	Electronics	Organic	Misc.	C&D	TOTAL
Fraternity House	49%	11%	3%	6%	0%	1%	0%	30%	100%
General Services	23%	21%	1%	2%	0%	16%	2%	35%	100%
Union	54%	26%	0%	2%	1%	2%	15%	0%	100%
Library	85%	14%	0%	0%	0%	0%	1%	0%	100%
Houts/Hosey-Nickerson	71%	19%	0%	3%	0%	4%	3%	0%	100%

Fiber: Newspaper, magazines, office paper, junk mail, corrugated cardboard, books, and toweling.

Plastic: PETE #1, HDPE#2, #3-#7, plastic bags, plastic film, and kitchen containers.

Glass: Clear and colored glass beverage and food containers.

Metal: Aluminum cans, tin, scrap metal.

Electronics: Computer components, TVs, VCRs, and Phones.

Organic: Yard trimmings, yard waste, and food scraps.

Misc: Textiles, fine waste mix, pallets, and liquids.

C&D: Concrete, scrap wood, and scrap construction metal.

Chart III shows the average total percentage by volume of materials identified in the sampled containers by location.

Chart III – Average Total Percentage of Materials For All Sample Loads

Location	Fiber	Plastic	Glass	Metal	Electronics	Organic	Misc.	C&D	TOTAL
Total Average Waste Percentage	56.4%	18.2%	0.8%	2.6%	0.2%	4.6%	4.2%	13%	100%

Chart IV illustrates the total percentage by volume of material that is estimated to have been recyclable for each of the waste categories. The estimated recyclable content of these materials does not consider unusable items due to material contamination. It assumes that 100% of the type of generally recyclable materials could be collected and removed from the waste stream.

Chart IV – Percentage of Material Estimated to be Recyclable by Category

Location	Fiber	Plastic	Glass	Metal	Electronics	Organic	Misc.	C&D	TOTAL
Total Percentage Estimated to Be Recyclable	52%	4.8%	0.8%	2.2%	0.2%	3%	2%	9%	74%
Total Percentage Estimated to Be Non-Recyclable	4.4%	13.4%	0%	0.4%	0%	1.6%	2.2%	4%	26%
Total Average Waste Percentage	56.4%	18.2%	0.8%	2.6%	0.2%	4.6%	4.2%	13%	100%

Using the total average waste percentage for each waste category, the assumption that these average percentages can be applied to all waste containers across the campus, and the known waste collection contract costs, disposal costs by material thus can be estimated.

Chart V shows the estimated disposal costs for one week and for the entire year.

Chart V – Estimated Disposal Costs by Material Category

Location	Fiber	Plastic	Glass	Metal	Electronics	Organic	Misc.	C&D	TOTAL
One Week of Collection	\$1,156	\$373	\$17	\$54	\$4	\$94	\$86	\$266	\$2,050
One Year Collection	\$59,784	\$19,292	\$848	\$2,756	\$212	\$4,876	\$4,452	\$13,780	\$106,000

2.0 Sampled Container Analysis:

The following is a summary analysis for each of the containers that were sampled.

2.1 Fraternity House Container:

The largest amount of material by volume in the sampled load was corrugated cardboard and boxboard. 35% of the waste was corrugated cardboard and boxboard from moving boxes, retail item boxes, and food boxes.



The second largest amount of material by volume was construction and demolition (C&D) scrap wood. 20% of the waste consisted of broken lumber, large pieces of ply-board, broken loft materials, ceiling tiles, and other misc. C&D. It may be possible that some of this material was not generated at the Fraternity House Complex but rather illegally dumped by an unknown party.

A significant amount of beer cans and beer bottles were also observed.



Another material that was prevalent throughout the waste was bathroom paper towels.

General Notes: The hauler stated that when he arrived to collect the waste, an unknown person was in the container collecting aluminum cans.

Several bags were double or triple bagged. The waste inside these bags was no different than the rest of the waste in single bags. It was unclear why the waste was double or triple bagged.

2.2 General Services Container:

Several materials encompassed an equal amount by volume in the sampled load. Corrugated cardboard, plastic bags, yard waste, and scrap wood each encompassed 15% of the total container volume.

The corrugated cardboard items consisted of supply and moving boxes. The plastic bags mainly consisted of very large durable fertilizer bags that did not compact well. Yard waste consisted of several bags filled with leaves. The scrap wood observed appeared to be from a broken gate and other misc. deconstruction projects.



A significant amount of air filters were also observed in the sampled load. These were placed in large cardboard boxes and placed in the waste container. This disposal method consumes a considerable amount of waste container space.

A fair amount of newspaper was also seen throughout the waste.



General Notes: It is assumed that University employees mainly use the General Services waste containers.

Yard waste materials are prohibited from disposal at landfills in the state of Missouri.

Even though a cardboard recycling container is located at General Services, a large amount of this material was still observed in the sampled load.

Few beverage (aluminum and plastic) containers were observed. This may indicate a collection service is available at this facility or the materials were removed from the waste container.

2.3 Union Container:

The largest amount of material by volume in the sampled load was corrugated cardboard. 25% of the total waste was corrugated cardboard from food service boxes. Some of the corrugated cardboard was contaminated from food oils or other liquids. However, it is more than likely this contamination occurred after the material had been placed in the waste container.



The second largest amount of material by volume was newspaper at 20% of the total sampled load. A large amount of newspapers were completely intact indicating they had not been used and were disposed of as a stack.

A large amount, nearly 8%, of Styrofoam and commercial beverage containers (Taco Bell) were observed.



General Notes:

It is assumed that University employees mainly use the Union waste containers.

The waste hauler estimated he collected 75% of the waste from the container for the visual waste sort. The container is 8 cy and was completely full. Thus, we received approximately 6 cy of waste.

It is important to note that even though a cardboard recycling container is located at the Union, a large amount of this material was still observed in the sampled load.

Very few food containers were observed during the analysis. This may indicate that food containers are being collected for recycling purposes.

Few large amounts of food scraps were seen during the analysis. Either food is disposed of in a separate container or food services is not generating a significant quantity of food scraps.

2.4 Library Container:

The largest amount of material by volume in the sampled load consisted of newspaper (40%) and white office paper (35%) totaling 75% of the total waste. These materials were not contaminated with any liquids. A significant amount of newspapers appeared to be disposed of in large stacks. This seems to indicate they had not been used and were disposed to make space for replacement papers.



The second largest amount of material by volume was bathroom paper towels at 5% of the total sampled load.

General Notes: Several commercial beverage containers (Ritazza and McDonalds) were observed.

2.5 Houts/Hosey-Nickerson Container:

The largest amount of material by volume in the sampled load was boxboard and corrugated cardboard. 55% of the total waste consisted of boxboard (45%) and corrugated cardboard (10%) from moving boxes, retail item boxes, and food boxes. The boxboard entirely consisted of food packaging (i.e. cereal boxes, beverage packaging, etc.).



The second largest amount of material by volume was newspaper and white office paper at 12% of the total sampled load. It appeared that no newspapers were disposed of in large quantities at one time like at the Union and Library. Rather these materials were disposed of loose and mixed with other materials.

Several plastic beverage and food containers were observed in the sampled waste. All plastic beverage and food containers combined totaled 16% of the total waste volume. Half of this volume consisted of PETE #1 and HDPE #2 plastics.

General Notes: Retail plastic bags were prevalent throughout the sampled waste. It appears that residents re-use these bags as small garbage can liners.

3.0 Student Waste Management Survey Analysis:

BARKER LEMAR developed a student waste management survey to attempt to determine the perception students had concerning waste management service and recycling options on campus. The Environmental Awareness Club (EAC) assisted with distributing and collecting more than 100 surveys.

The results of this survey are detailed below:

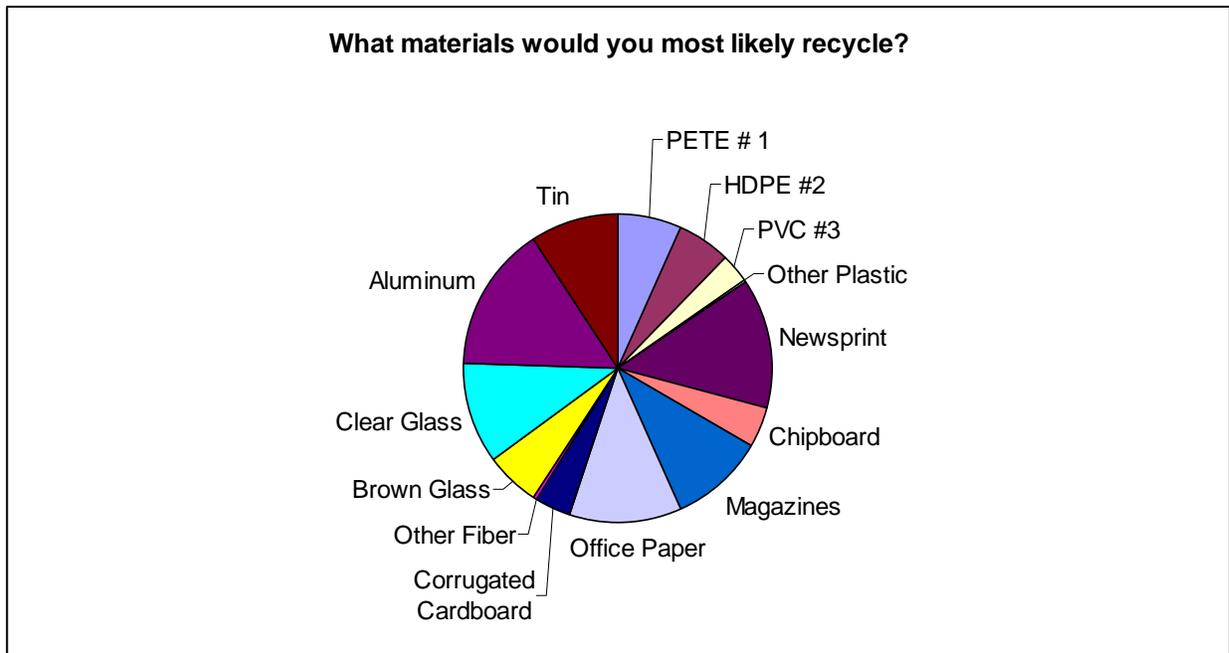
1. Do you feel there are enough recycling options available to you at CMSU?

20% Yes 80% No

This response identifies an interest from the respondents to have recycling services available to them on campus.

2. If no, what materials would you most likely recycle?

15% Aluminum 13% Newspaper 12% Office Paper
10% Magazine 10% Clear Glass 40% Other Materials



Students were able to select multiple materials they would most likely recycle. Aluminum was the largest percentage of material that students indicated they would most likely recycle. Newspaper was the second largest percentage indicated as the material students would most likely recycle.

3. What drop-off recycling program would be most convenient for you?

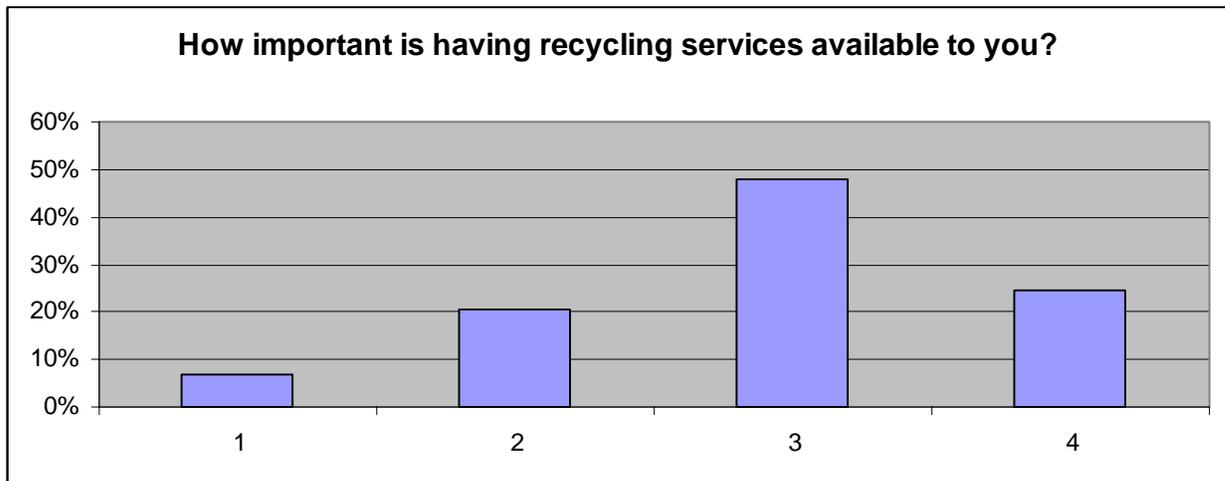
- 42% Containers placed in residence halls
- 42% Containers dispersed across campus
- 15% Containers centralized on campus
- 1% Apartment Complex

There is a split decision as to the most convenient drop-off recycling program. However, it is clear that students would rather have the services available on campus than off-campus.

4. How important is having recycling service available to you?

(Scale from 1- Unimportant to 4- Very Important)

- 1 – 6%
- 2 – 21%
- 3 – 48%
- 4 – 25%



(Scale from 1 to 4. 1-Unimportant, 4 Very Important)

These results indicate that the majority of respondents (more than 70%) feel that having recycling services available is important to them.

5. If recycling was made available on campus, would you participate?

92% Yes 8% No

This strongly indicates a perception that students would actively participate in a recycling program if one were made available on campus.

6. Have you placed non-recyclables into a CMSU recycling container?

13% Yes 87% No

This question was asked to approximate a potential contamination level in possible future recycling programs. Contamination levels in recycling programs may depend upon a variety of issues such as the type of material being collected, the targeted participants, the location of the recyclable collection facility, the type of education performed, etc.

7. Where do you live?

46% On campus housing
34% Off campus less than 1-mile away
21% Off campus housing more than 5-miles away

The respondents to the survey indicated that nearly half live on campus in University housing and the remainder live off-campus.

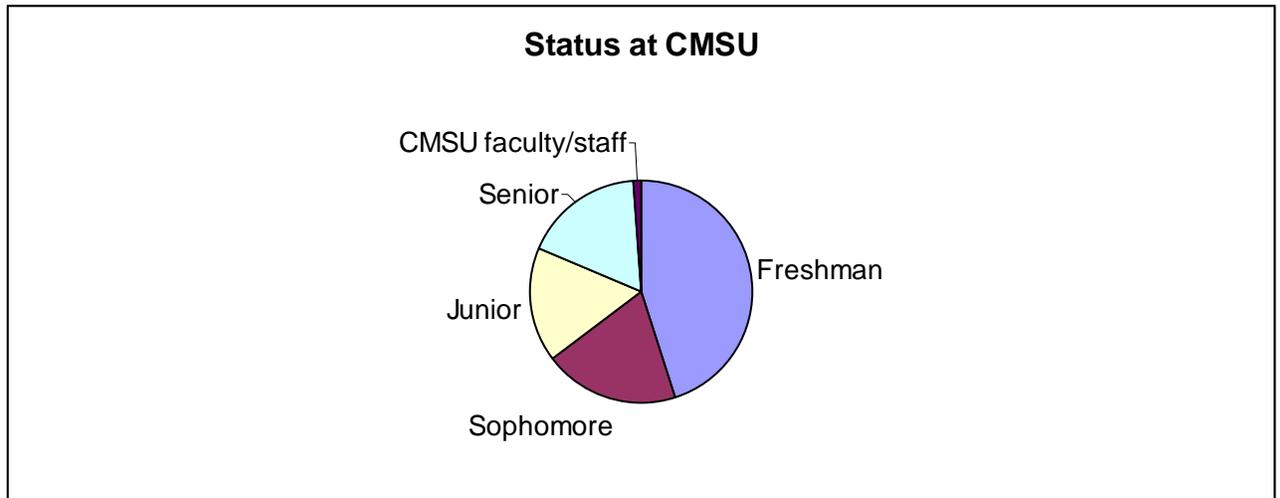
8. Do you recycle when not on-campus?

64% Yes 36% No

A majority of respondents indicated that they actively recycle while not on -campus.

9. Status at CMSU:

45% Freshman 20% Sophomore 17% Junior 18% Senior
1% CMSU Faculty/Staff



Freshman made up the majority of survey respondents. Juniors and Seniors made up 35% of the survey respondents.

10. Where do you get most of your information concerning campus programs?

29% Word of mouth
22% Student newspaper
19% University website
16% Announcement boards
9% Student Organizations
6% Other

Respondents indicated that word of mouth was their major source of information concerning campus programs. The second most used source for information was the student newspaper.

3.1 Additional Comments:

The following are comments received from the respondents. These comments provide insight to the respondent's perceived feelings concerning recycling on campus.

"I really hope they get something going."

"In the past, CMSU had recycling bins on campus. What happened to them?"

"I think if recycling services were made available in dorms, many residents would participate – especially aluminum cans!"

"We need more recycling centers!!!"

"...There are no recycling bins in our hall...We are more likely to throw them (soda cans) in the trash to save time, rather than take them to a recycling center."

4.0 Student Discussion Session:

BARKER LEMAR held a student recycling discussion session October 20, 2004 at the University. The discussion session was to complement the student waste management survey and to provide more anecdotal information concerning students interests/concerns of waste management/environmental issues on campus. The discussion session was advertised by flyers posted by the EAC, discussed in a news article in the Mule Skinner student news paper, and e-mails sent to student activity organizations and the student government.

Four (4) freshmen and one (1) sophomore participated in the discussion session. A summary of the results of the discussion session is detailed below.

4.1 Current recycling services/participation:

Participants stated that they did not recycle on campus because there was not a recycling program conveniently available to them.

One of the participants stated that they collected aluminum cans generated in their house and delivered them to Education Textbook Services (ETS) in Holden for recycling on a regular basis. ETS provided money for the delivered aluminum cans. The residence manager where this participant lived required this activity. Paper and cardboard were also collected and transported to ETS or the monthly drop-off program for recycling. The participant stated that they would probably not participate as frequently in these activities if it was not required of them.

Students identified Office Depot and Wal-Mart as the only local places they knew that accepted materials for recycling. Office Depot accepts printer cartridges for recycling and Wal-Mart accepts grocery bags for recycling at no charge.

A majority of the participants indicated that they actively participated in these recycling programs when they were able.

One (1) participant indicated that his fraternity (ATO) collected cell phones and received a \$25 per cell phone donation to provide to a charitable organization from a phone company. These cell phones are then refurbished and provided to domestic abuse counseling service centers.

Participants stated that during move in and move out days, a significant amount of cardboard boxes, office paper, furniture, and carpet is disposed of. They stated that large dumpsters are made available near appropriate areas, but are overflowing with materials quickly.

They suggested that cardboard and office paper recycling containers be made available to help reduce the amount of waste and conserve space in the waste containers.

Participants stated they felt guilty about disposing of newspapers and aluminum cans at the Union and Library. They notice that these materials are currently being thrown away and feel that someone should do something to help keep this material from being thrown away.

4.2 Perception of recycling:

It was stated that “not recycling” was not something they felt bad about. They understood that recycling would conserve resources but did not feel an immediate connection to this conservation effort.

“If I want to turn on the TV. it'll turn on regardless if I recycle my aluminum cans or not.”

Participants did state that if recycling services were convenient and the recycling message was more personal, they would more than likely actively participate.

4.3 Suggestions:

- The group suggested newspaper only containers at locations newspapers are made available and near trash containers at the Union and Library. They also suggested color coordinated containers to accept glass, plastic, and aluminum cans at the Union.
- University support of a competitive recycling event between residence halls or floors. The participants with the largest quantity of collected recyclable material would receive extra funds for a party or some other incentive.
- Provide reverse vending machines for aluminum can recycling. These machines could return money or possibly provide a credit receipt to be used towards purchases at the Union food court. A majority of the participants strongly indicated that they would use such machines if they were made to be convenient.
- It was suggested that any waste management or recycling services/programs be promoted in the student packets they receive at the beginning of each year. Participants indicated that these packets are used throughout the year and the materials are kept and reviewed several times a year for coupons or general information.
- Carpet is sold at the beginning of the school year at residence halls. By the end of the year, these carpets are removed and thrown away with the rest of the

wastes. It was suggested that a recycling alternative be made available and promoted during the move out period.

4.4 General Comments:

- There was a perception that grounds services mowed the same areas several times a week. Participants felt that this was unnecessary and a waste of their tuition funds.

- Several participants noticed yard sprinkling systems were operating for a long period of the day during the fall. It was suggested that the systems may be receiving a purging treatment in preparation for the winter season. A sign may have been helpful to inform students understand what services were being performed.

- Motion sensors for rooms have been installed in several campus facilities. Participants indicated they would appreciate more of these as an indication that the University was providing leadership in resource conservation.

- Controls for air conditioning are turned off too soon each season. Students did not have control over the heat.

- University phones only work for on-campus calls. Students are unable to establish contact from local service providers that are off-campus but not considered long-distance.

CITY OF WARRENSBURG, MISSOURI

MUNICIPALLY OPERATED

SOLID WASTE AND RECYCLING SERVICES REPORT

1.0 Municipally Operated Residential Solid Waste and Recycling Collection:

1.1 Background

Communities provide basic utility and infrastructure services to their residents and commercial entities. These utility and infrastructure services may include water supply and treatment, snow plowing, general road repair, electric and gas service, billing, administration, and a variety of other support duties. Communities may feel a responsibility to ensure adequate services are provided that encourage economic development and increase quality of life.

Some communities have felt it beneficial to establish and manage solid waste services within their community. The traditional focus is on residential solid waste collection and recycling collection, but may also include services to commercial entities.

The following is a brief analysis and estimate of costs if the City of Warrensburg began to operate and maintain a solid waste collection program. This program was calculated using the following base services:

- Once a week residential waste collection to households with four (4) or less attached units.
- Bi-monthly fiber only (i.e. newspaper, office paper, corrugated cardboard, etc.) curbside recycling using 45-gallon toters.

1.2 Waste and Recycling Collection Vehicles:

Waste Collection Services Provided

One Rear Load Packer and its operating crew can service approximately 350 homes per 8-hour day (this 8-hour day includes a trip to the landfill for tipping of collected waste). There are approximately 4,800 housing units with four (4) or less units. For this analysis,

it will be assumed that service would be provided to households with four (4) or less units.

Three (3) waste collection vehicles operating Monday through Friday would be able to service approximately 5,250 households. This is 450 more households or approximately one (1) service vehicle day more than necessary. This extra capacity would help allow for service capacity expansion or special pick-up services to be performed.

A backup waste collection vehicle would be necessary to ensure adequate service during unscheduled vehicle maintenance, assistance during special collection events, and assist with collection of “missed” waste. Thus, a total of four (4) waste collection vehicles would be required.

Recycling Collection Services Provided

There are approximately 4,800 housing units with four (4) or less units. For this analysis, it will be assumed that service would be provided to households with four (4) or less units.

The type of curbside recycling program affects the type and quantity of recycling collection vehicles necessary to provide service. For this analysis a bi-monthly fiber only (i.e. newspaper, office paper, corrugated cardboard, etc.) with a 45-gallon toter curbside recycling collection service was considered. This type of service could be provided by a rear load packer vehicle (similar to the waste collection vehicle).

One (1) rear load packer can service approximately 500 homes per 8-hour day (this 8-hour day includes trips to the recycling processor to tip collected recyclable materials). The recycling vehicle may be able to service more households per day than a waste collection vehicle because the typical monthly curbside fibers only recycling participation rates are approximately 75% of all households. Thus, 3,600 households¹ on average would require curbside recycling service once a month. As the collection occurs only once a month, the quantity of materials per household are typically significantly increased.

¹ 4,800 housing units with four (4) or less units * 75% = 3,600 homes.

A total of two (2) rear load packer trucks operating Monday through Friday should provide adequate monthly fiber only recycling collection service. This provides enough service for 5,000 homes per week or 1,000 homes per service day. The extra capacity may be used to collect recyclable fiber materials from local businesses or City facilities.

A backup rear load packer truck would be necessary to ensure adequate service during unscheduled vehicle maintenance, assistance during special collection events, and assist with collection of “missed” waste. Thus, a total of three (3) rear packer trucks would be required.

Figure 1 below shows a sample rear-packer collection vehicle. This type of collection vehicle can be used for both waste and recycling collection activities.

Figure 1 – Rear-Packer Collection Vehicle:



Waste Collection Vehicle Size

Assuming that each household sets out three garbage bags on average², 1,050 households³ (one waste collection day with three collection vehicles operating) would set out 3,150 garbage bags. The typical residential garbage bag weighs approximately 18 pounds⁴. Thus, approximately 56,700 pounds or 28.4 tons per day would be collected each service day. One waste collection vehicle would then be responsible for

² City staff and private hauler staff estimates.

³ 350 Households (Waste collection vehicle daily service capacity) * 3 (Operating waste collection vehicles) = 1,050 maximum households serviced per day.

⁴ City of Dubuque, Iowa Garbage setout rate analysis.

approximately 9.5 tons or approximately 19 cubic yards of material.⁵ Most waste collection vehicles have a capacity of 23 cubic yards or more. This indicates that one waste collection vehicle should be able to service its daily residential waste collection route before needing to tip the collected waste at the landfill.

Recycling Collection Vehicle Size

Assuming 3,600 households (75% of serviceable households) participate in the bi-monthly recycling collection program, this would equate to 720 households per collection day. If each participant sets out a full 45-gallon toter, a maximum of 32,400 gallons of recycling material would be collected per service day. This equates to approximately 187 cubic yards.⁶ Thus, each recycling collection vehicle would be responsible for a max of 94 cubic yards per service day.

Again, most rear-packer collection vehicles have a maximum capacity of 23 cubic yards or more. Assuming the rear-packer recycling collection vehicles would have a capacity of 23 cubic yards, each operating recycling collection vehicle may require approximately four (4) daily trips to the recycling processor to tip collected materials.

NOTE: It is extremely unlikely that every household participating in the bi-monthly recycling program would set out completely full toters. Assuming the average percentage full recycling toter per participant would be 50%, this reduces the daily cubic yards that a recycling collection vehicle would responsible for to 47 cubic yards. This in turn reduces the daily trips each vehicle must make to the recycling processor to a total of two (2) daily trips.

Waste and Recycling Collection Vehicle Costs

A typical rear packer truck, less than 10 years old will cost between \$50,000 to \$80,000. The yearly operational costs of this type of waste collection vehicle depends on several factors (i.e. hours of operation, maintenance levels performed, type of vehicle, age of vehicle, etc.) however, it is typical to budget \$800 a month per vehicle for general maintenance⁷. For this analysis, the back up collection vehicles were assigned a 50%

⁵ 1,000 pounds of MSW typically equals 1 cubic yard in a waste collection vehicle.

⁶ One cubic yard = 173 gallons (dry)

⁷ Estimates from private hauler fleet manager in Des Moines, Iowa.

reduction of maintenance costs as these vehicles would require less general maintenance than the main vehicles.

Waste and Recycling Collection Fuel Costs

Fuel costs over the past several years have significantly increased. The average rear packer truck receives three (3) miles per gallon or over 8,600 gallons of fuel per year.⁸ The current diesel fuel cost is \$1.95 per gallon for the Midwest region. This is an at the pump fuel cost. It may be possible to establish purchase agreements to decrease this cost as fuel may be purchased in bulk. It may also be possible to avoid the assessed taxes on fuel purchased to be used in municipal service vehicles. However, for the purpose of this analysis a \$1.95 per gallon cost was assumed. This is \$0.40 higher than a year ago.⁹ Thus the approximate costs to fuel one garbage truck would equal approximately \$17,000 per year. For this analysis, the back up collection vehicles were assigned a 50% reduction of fuel costs as these vehicles would utilize less fuel than the main vehicles.

Waste and Recycling Collection Vehicle Storage and Employee Facility

The waste collection vehicles would require a proper facility that provides security, protection from the elements, as well as a location for maintenance services. This facility could also be used to house the dispatcher and other City service departments.

While the type and size of the building could vary immensely, for the purpose of this analysis a simple 60' x 140' x 15' Morton building with overhead service entry doors was selected (see Figure 2). The costs of constructing this type of building were estimated to be \$90 per square foot¹⁰ for a total of \$756,000. This price includes construction of the base facility. It does not include building fixtures (i.e. bathrooms, appliances) or service/utility equipment (i.e. communication equipment, vehicle maintenance equipment, parking lots, utility connections, etc.). An estimate for these additional costs was not immediately available. For the purposes of this analysis an amount of \$50,000 for additional costs was assumed. These costs are typically dispersed over 20-years.

⁸ Assuming 25,000 miles driven annually

⁹ Energy Information Administration: <http://tonto.eia.doe.gov/oog/info/wohdp/diesel.asp>

¹⁰ City staff building cost estimate

Figure 2 – Commercial Vehicle Service Morton Building



1.3 Employee Costs:

Waste Collection Vehicle Employee Operations

Rear waste collection vehicles typically require two (2) – three (3) employees. One (1) drives the vehicle and the other staff collects waste. For this analysis a total of two (2) employees were determined as necessary to operate a waste collection vehicle.

The City of Warrensburg's pay structure does not currently provide a pay grade for waste collection service employees. Grades D & F Step 7 were averaged together to provide a general idea of employee costs. The average costs total \$13.38 an hour. Assuming 40 hour weeks at 52 weeks, this cost is \$27,800 annually. This figure does not include benefits.

A backup crew would be required to support the main crews to allow for adequate service coverage. This crew would also provide support during special collection events, assistance during large collection volume events (storms), and cover other employees on vacation or out sick. Thus, a total of eight (8) full time employees would be required to provide adequate waste collection services.

Recycling Collection Vehicle Employee Operations

One (1) operator per vehicle should be able to handle driving and recyclable collection duties.

The City of Warrensburg's pay structure does not currently provide a pay grade for recycling collection service employees. Grades D & F Step 7 were averaged together to provide a general idea of employee costs. The average costs total \$13.38 an hour. Assuming 40 hour weeks at 52 weeks, this cost is \$27,800 annually. This figure does not include benefits.

A backup employee would be required to support the main crews to allow for adequate service coverage. This employee would also provide support during special collection events and cover other employees on vacation or out sick. Thus, a total of three (3) full time employees would be required to provide adequate recycling collection services.

Waste and Recycling Collection Dispatcher Requirements

The waste and recycling collection vehicles would require a dispatcher to assist with route management duties on a daily basis. Grade C Step 7 was used to estimate the costs for this position. The cost for this position would be \$12.11 an hour. Assuming 40 hour weeks at 52 weeks, this cost is \$25,188 annually. This figure does not include benefits.

Waste and Recycling Collection Vehicle Maintenance Staff

Maintenance staff would be required to provide general services on the waste and recycling collection vehicles to keep them operating at peak performance and delay the acquisition needs of replacement vehicles. Grade D Step 7 was used to estimate the costs for this position. The average costs total \$13.38 an hour. Assuming 40 hour weeks at 52 weeks, this cost is \$27,800 annually. This figure does not include benefits.

The services of this maintenance staff could be provided to other City departments when no services were required for the waste and recycling collection vehicles.

Waste and Recycling Collection Customer Service Staff

Two (2) full-time customer service positions may be required to handle customer questions, customer complaints, assist the dispatcher locate customers needing special services, and provide other general administrative assistance services. Grade C Step 7 was used to estimate the costs for this position. The cost for this position would be \$12.11 an hour. Assuming 40 hour weeks at 52 weeks, this cost is \$25,188 annually. This figure does not include benefits.

Waste and Recycling Collection Human Services/Administrative Assistant:

This position would be responsible for billing residential customers for the waste and recycling collection services as well as provide human resources assistance to waste and recycling collection staff. Grade C Step 7 was used to estimate the costs for this position. The cost for this position would be \$12.11 an hour. Assuming 40 hour weeks at 52 weeks, this cost is \$25,188 annually.

Employee Benefits:

City staff estimated that the employee benefit costs would equal 30% of the total salaries paid per employee. For an annual salary of \$25,188 the benefits would be approximately \$7,556 per year.

1.4 Other Service Costs:

- Worker's Compensation Claims
- Training
- Lawsuits and Related Legal Assistance
- Education
- Employee Education
- Office/Administrative Costs
- Financing Charges for Building and Vehicle Purchase Costs
- Long-Term Building/Vehicle Replacement Costs
- Facility Land Acquisition

These costs would also need to be determined to provide a comprehensive analysis of support services to maintain a residential waste collection service.

Chart I provides a breakdown tabulation of the estimated costs to operate residential waste collection services within the City of Warrensburg, Missouri without the costs identified in section 1.4.

Chart I – Estimated Residential Waste Collection Services for Warrensburg, MO

Service	Per Unit Cost	Total Monthly Cost	Total Annual Cost	Total Annual Cost Per Serviceable Household	Total Annual Cost Per Serviceable Household Post 5-Years
VEHICLES					
4-Rear Load Packers	\$ 75,000	\$ 5,000	\$ 60,000	\$ 12.50	
3-Rear Load Waste Collection Packers General Maintenance Per Year	\$ 9,600	\$ 2,400	\$ 28,800	\$ 6.00	\$ 6.00
1-Rear Load Waste Collection Packer (Backup) 50% General Maintenance Per Year	\$ 4,800	\$ 400	\$ 4,800	\$ 1.00	\$ 1.00
Total 3 - Waste Collection Vehicle Fuel Costs	\$ 17,000	\$ 4,250	\$ 51,000	\$ 10.63	\$ 10.63
Total 1 - Waste Collection Vehicle (Backup) 50% Fuel Costs	\$ 8,500	\$ 708	\$ 8,500	\$ 1.77	\$ 1.77
FACILITY					
Maintenance Shop Construction	\$756,000	\$ 3,150	\$ 37,800	\$ 7.88	\$ 7.88
Additional Facility Costs	\$ 50,000	\$ 208	\$ 2,500	\$ 0.52	\$ 0.52
Maintenance Shop Utilities	\$ 15,000	\$ 1,250	\$ 15,000	\$ 3.13	\$ 3.13
STAFF					
One Full-Time Dispatcher Staff	\$ 25,118	\$ 2,093	\$ 25,118	\$ 5.23	\$ 5.23
Dispatcher Benefits	\$ 7,535	\$ 628	\$ 7,535	\$ 1.57	\$ 1.57
Two Staff Crew Per Waste Collection Vehicle	\$ 55,600	\$ 18,533	\$ 222,400	\$ 46.33	\$ 46.33
Waste Collection Crew Benefits Per Person	\$ 16,680	\$ 5,560	\$ 66,720	\$ 13.90	\$ 13.90
One Full-Time Vehicle Maintenance Staff	\$ 27,800	\$ 2,317	\$ 27,800	\$ 5.79	\$ 5.79
Maintenance Staff Benefits	\$ 8,340	\$ 695	\$ 8,340	\$ 1.74	\$ 1.74
Two Customer Service Assistance Staff	\$ 50,376	\$ 4,198	\$ 50,376	\$ 10.50	\$ 10.50
Customer Assistance Benefits	\$ 15,113	\$ 1,259	\$ 15,113	\$ 3.15	\$ 3.15
One Full-Time Billing/Personal Duties Position	\$ 25,188	\$ 2,099	\$ 25,188	\$ 5.25	\$ 5.25
Billing/Personal Duties Position Benefits	\$ 7,556	\$ 630	\$ 7,556	\$ 1.57	\$ 1.57
DISPOSAL COSTS					
Assumed Disposal Costs for 4,800 Annual Tons	\$ 41	\$ 16,400	\$ 196,800	\$ 41.00	\$ 41.00
TOTAL		\$ 71,779	\$ 861,347	\$ 179.45	\$ 166.95
Total Monthly Costs per Household:				\$ 14.95	\$ 13.91

The total costs (excluding costs identified in section 1.4 and the vehicle depreciation and non-general maintenance costs) to provide this service is estimated to be just over \$860,000 a year. This equates to \$179 per household per year or \$14.95 per household per month.

Chart II provides a breakdown tabulation of the estimated costs to operate a residential, monthly recycling service for the collection of fiber materials within the City of Warrensburg, Missouri without the costs identified in section 1.4.

Chart II - Estimated Residential Monthly Recycling Services for Warrensburg, MO

Service	Per Unit Cost	Total Monthly Cost	Total Annual Cost	Total Annual Cost Per Serviceable Household	Total Annual Cost Per Serviceable Household Post 5-Years
VEHICLES					
3-Rear Load Packers	\$ 75,000	\$ 3,750	\$ 45,000	\$ 9.38	
2-Recycling Collection Vehicles General Maintenance Per Year	\$ 9,600	\$ 1,600	\$ 19,200	\$ 4.00	\$ 4.00
1-Recycling Collection Vehicle (Backup) 50% General Maintenance Per Year	\$ 4,800	\$ 400	\$ 4,800	\$ 1.00	\$ 1.00
Total 2 - Recycling Collection Vehicle Fuel Costs	\$ 10,200	\$ 1,700	\$ 20,400	\$ 4.25	\$ 4.25
Total 1 - Recycling Collection Vehicle (Backup) 50% Fuel Costs	\$ 5,100	\$ 425	\$ 5,100	\$ 1.06	\$ 1.06
FACILITY					
Maintenance Shop Construction	\$756,000	\$ 3,150	\$ 37,800	\$ 7.88	\$ 7.88
Additional Facility Costs	\$ 50,000	\$ 208	\$ 2,500	\$ 0.52	\$ 0.52
Maintenance Shop Utilities	\$ 15,000	\$ 1,250	\$ 15,000	\$ 3.13	\$ 3.13
STAFF					
One Full-Time Dispatcher Staff	\$ 25,118	\$ 2,093	\$ 25,118	\$ 5.23	\$ 5.23
Dispatcher Benefits	\$ 7,535	\$ 628	\$ 7,535	\$ 1.57	\$ 1.57
One Staff Person Per Recycling Collection Vehicle	\$ 27,800	\$ 6,950	\$ 83,400	\$ 17.38	\$ 17.38
Recycling Collection Crew Benefits Per Person	\$ 8,340	\$ 2,085	\$ 25,020	\$ 5.21	\$ 5.21
One Full-Time Vehicle Maintenance Staff	\$ 27,800	\$ 2,317	\$ 27,800	\$ 5.79	\$ 5.79
Maintenance Staff Benefits	\$ 8,340	\$ 695	\$ 8,340	\$ 1.74	\$ 1.74
Two Customer Service Assistance Staff	\$ 50,376	\$ 4,198	\$ 50,376	\$ 10.50	\$ 10.50
Customer Assistance Benefits	\$ 15,113	\$ 1,259	\$ 15,113	\$ 3.15	\$ 3.15
One Full-Time Billing/Personal Duties Position	\$ 25,188	\$ 2,099	\$ 25,188	\$ 5.25	\$ 5.25
Billing/Personal Duties Position Benefits	\$ 7,556	\$ 630	\$ 7,556	\$ 1.57	\$ 1.57
RECYCLING TIPPING FEE COSTS					
Assumed Recycling Tipping Fee Costs for 3,740 Tons	\$ 30	\$ 9,350	\$ 112,200	\$ 23.38	\$ 23.38
TOTAL		\$ 44,787	\$ 537,447	\$ 111.97	\$ 102.59
Total Monthly Costs per Household:				\$ 9.33	\$ 8.55

The total costs (excluding costs identified in section 1.4 and the vehicle depreciation and non-general maintenance costs) to provide this service is estimated to be just over \$537,000 a year. This equates to \$112 per household per year or \$9.33 per household per month.

A recycling tipping fee cost of \$30/ton was used as an approximation of service costs.¹¹ Several local recycling processors have indicated an interest in receiving recyclable materials at no charge from the party delivering the materials. However, the revenue generated from the sale of the materials the processor sells may not offset processing costs. Thus, the processor may have to assess a tipping fee charge.

¹¹ Education Textbook Service (ETS) estimated per ton costs to process recyclables.

The total cost of providing both waste and recycling collection as separate services and separate departments would total \$1,398,794 a year or \$24.28 per household per month. However, by combining the waste collection and recycling collection operations into one department, the following efficiencies and cost savings are created:

- One (1) dispatcher would be able to handle both waste and recycling collection route assistance duties.
- One (1) maintenance employee would be able to perform required maintenance duties on both the waste and recycling collection vehicles.
- Two (2) customer service representatives provide adequate coverage of customer relations and administrative assistance duties.
- One (1) human services/administrative assistant would provide the required support for the department.
- The facility would provide adequate office and administrative space, and provide enough garage space to allow required vehicle maintenance to occur. A majority of the waste and recycling collection vehicles would be required to be parked outside.

These efficiencies and cost savings total \$222,327 per year or \$3.86 per household per month.

Chart III illustrates the estimated costs for the combined services of waste and recycling collection for Warrensburg without the costs identified in section 1.4.

Chart III – Combined Waste and Recycling Collection for Warrensburg, MO

Service	Per Unit Cost	Total Monthly Cost	Total Annual Cost	Total Annual Cost Per Serviceable Household	Total Annual Cost Per Serviceable Household Post 5-Years
VEHICLES					
4-Rear Load Waste Collection Packers	\$ 75,000	\$ 5,000	\$ 60,000	\$ 12.50	
3-Rear Load Recycling Collection Packers	\$ 75,000	\$ 3,750	\$ 45,000	\$ 9.38	
3-Rear Load Waste Collection Packers General Maintenance Per Year	\$ 9,600	\$ 2,400	\$ 28,800	\$ 6.00	\$ 6.00
1-Rear Load Waste Collection Packer (Backup) 50% General Maintenance Per Year	\$ 4,800	\$ 400	\$ 4,800	\$ 1.00	\$ 1.00
2-Recycling Collection Vehicles General Maintenance Per Year	\$ 9,600	\$ 1,600	\$ 19,200	\$ 4.00	\$ 4.00
1-Recycling Collection Vehicle (Backup) 50% General Maintenance Per Year	\$ 4,800	\$ 400	\$ 4,800	\$ 1.00	\$ 1.00
Total 3 - Waste Collection Vehicle Fuel Costs	\$ 17,000	\$ 4,250	\$ 51,000	\$ 10.63	\$ 10.63
Total 1 - Waste Collection Vehicle (Backup) 50% Fuel Costs	\$ 8,500	\$ 708	\$ 8,500	\$ 1.77	\$ 1.77
Total 2 - Recycling Collection Vehicle Fuel Costs	\$ 10,200	\$ 1,700	\$ 20,400	\$ 4.25	\$ 4.25
Total 1 - Recycling Collection Vehicle (Backup) 50% Fuel Costs	\$ 5,100	\$ 425	\$ 5,100	\$ 1.06	\$ 1.06
FACILITY					
Maintenance Shop Construction	\$756,000	\$ 3,150	\$ 37,800	\$ 7.88	\$ 7.88
Additional Facility Costs	\$ 50,000	\$ 208	\$ 2,500	\$ 0.52	\$ 0.52
Maintenance Shop Utilities	\$ 15,000	\$ 1,250	\$ 15,000	\$ 3.13	\$ 3.13
STAFF					
One Full-Time Dispatcher Staff	\$ 25,118	\$ 2,093	\$ 25,118	\$ 5.23	\$ 5.23
Dispatcher Benefits	\$ 7,535	\$ 628	\$ 7,535	\$ 1.57	\$ 1.57
Two Staff Crew Per Waste Collection Vehicle	\$ 55,600	\$ 18,533	\$ 222,400	\$ 46.33	\$ 46.33
Waste Collection Crew Benefits	\$ 16,680	\$ 5,560	\$ 66,720	\$ 13.90	\$ 13.90
One Staff Crew Per Recycling Collection Vehicle	\$ 27,800	\$ 6,950	\$ 83,400	\$ 17.38	\$ 17.38
Recycling Collection Crew Benefits	\$ 8,340	\$ 2,085	\$ 25,020	\$ 5.21	\$ 5.21
One Full-Time Vehicle Maintenance Staff	\$ 27,800	\$ 2,317	\$ 27,800	\$ 5.79	\$ 5.79
Maintenance Staff Benefits	\$ 8,340	\$ 695	\$ 8,340	\$ 1.74	\$ 1.74
Two Customer Service Assistance Staff	\$ 50,376	\$ 4,198	\$ 50,376	\$ 10.50	\$ 10.50
Customer Assistance Benefits	\$ 15,113	\$ 1,259	\$ 15,113	\$ 3.15	\$ 3.15
One Full-Time Billing/Personal Duties Position	\$ 25,188	\$ 2,099	\$ 25,188	\$ 5.25	\$ 5.25
Billing/Personal Duties Position Benefits	\$ 7,556	\$ 630	\$ 7,556	\$ 1.57	\$ 1.57
DISPOSAL COSTS					
Assumed Disposal Costs for 4,800 Annual Tons	\$ 41	\$ 16,400	\$ 196,800	\$ 41.00	\$ 41.00
RECYCLING TIPPING FEE COSTS					
Assumed Recycling Tipping Fee Costs for 3,740 Tons	\$ 30	\$ 9,350	\$ 112,200	\$ 23.38	\$ 23.38
TOTAL		\$ 98,039	\$ 1,176,467	\$ 245.10	\$ 223.22
Total Monthly Costs per Household:				\$ 20.42	\$ 18.60

Chart Legend:

	- Waste Collection Service Cost		- Recycling Collection Service Cost
	- Waste and Recycling Collection Shared Service Costs		

The total costs (excluding costs identified in section 1.4 and the vehicle depreciation and non-general maintenance costs) to provide these combined services is estimated to be over \$1,176,000 a year. This equates to \$245 per household per year or \$20.42 per household per month. The annual costs would decrease after the first five (5) years due to initial equipment payments being completed.

NOTE:

These cost estimates do not take into account costs identified in section 1.4. Peripheral costs would need to be thoroughly evaluated to determine the total costs for providing these services.

Additional Analyses Necessary:

The figures in this analysis provide a good foundation for reviewing costs associated with waste and recycling collection. However, a comprehensive analysis would be required to determine detailed costs related to the development of municipally operated waste and recycling collection services. Said analysis may include an evaluation of the following studies:

- Fleet replacement strategies and costs
- Fleet maintenance strategies and costs
- Long-term purchase plan for waste and recycling collection vehicles
- Maximum fleet service capacities (i.e. household serviced per day) and increasing capacity strategies
- Local land and facility development costs
- Maintenance and administrative facility design
- Maximum administrative support capacities (i.e. customer service representative duties) and increasing capacity strategies
- Long-term vehicle and employee costs
- Transferring risks from the private sector to the public sector

These analyses are beyond the scope of this project. However, it is important to identify these analyses as future waste and recycling collection service options are evaluated.

CITY OF WARRENSBURG, MISSOURI

RECOMMENDATIONS TO IMPLEMENT AN INTEGRATED SOLID WASTE MANAGEMENT SYSTEM

RECOMMENDATIONS - INTRODUCTION

Building an integrated solid waste management system for a municipality follows some of the basic principles of constructing a house. The primary components shared by a construction contractor and an integrated solid waste management system planner include:

- ✓ Designing a blueprint via research that meets the needs of the users;
- ✓ Constructing a solid Foundation and creating a structural Framework;
- ✓ Implementing Finish work meeting the unique needs of the users, and;
- ✓ Developing the required financial support to Maintain the project.

The previous sections of this report describe the research **BARKER LEMAR** completed to help design the conclusions in this section. This research helped researchers develop a unique blueprint for an Integrated Solid Waste Management (ISWM) Program for CMSU, Johnson County, and the City of Warrensburg. Additionally, **BARKER LEMAR** will reference the Missouri Municipal League's study, "Solid Waste Management Practices in Missouri Municipalities" dated December 2004. The League's study provides an excellent summary of solid waste collection systems, financing systems, and resource recovery/recycling systems. The Missouri Municipal League Study is located in the Toolbox under the MO Municipal League Study tab.

Many aspects of an integrated system are very closely tied to and are inter-dependent upon each other. Some of the recommendations in this section will produce minimal results without their corresponding components in place. For example, funding a part time education coordinator to promote a new curbside program and assist with media relations will be less likely unless solid waste and recycling user fees are implemented to adequately fund and support the position.

Transforming a blueprint into the “brick and mortar” of a constructed ISWM program is the purpose of this Recommendations Section. Throughout this Recommendations Section **BARKER LEMAR** will attempt to identify how the various pieces of the project tie together supporting a beneficial, efficient, and self-supporting ISWM program.

FOUNDATIONAL SYSTEMS and a STRUCTURAL FRAMEWORK

Municipalities implementing an ISWM program share core civic responsibilities, these responsibilities, as related to solid waste, include three primary components:

- ✓ **Administration and oversight of equitable residential solid waste and recycling collection service(s).**
 - **Equitable access to the proposed solid waste and recycling systems, specifically residents of multi-family dwellings.**
 - **Equitable systems for collecting fees and sharing costs.**
- ✓ **Management of multiple residential waste streams and recyclable commodity streams.**
- ✓ **Providing competitively priced services**

Equitable treatment was communicated as a tenet that should be woven into the proposed ISWM system, including:

- **Equitable access to the proposed solid waste and recycling systems, specifically residents of multi-family dwellings.**
- **Equitable systems for collecting fees and sharing costs.**

Continuity of specific services presently provided in Warrensburg was also communicated as important to retain. Current services include the spring and fall clean-up services, weekly residential solid waste collection, and drop-off recycling (in some form). **Additionally, any proposed ISMW solution should review the potential contribution County residents, CMSU, and Whiteman Air Force Base might provide.** An ISWM system in Warrensburg should be designed to take full advantage of the resources provided by the entities mentioned above.

The “Do Nothing” Option

In any system evaluation, doing nothing is an option. **BARKER LEMAR** is not recommending the status quo. Currently very limited recycling services are available to residents, 5%-10% of the homes are estimated to not have garbage services, the City of Warrensburg provides services that support integrated solid waste management without receiving any revenue to offset the costs, and the potential economies of scale provided in the recommendations are not being utilized. **BARKER LEMAR** staff believes the recommendations improve upon the existing services.

RECOMMENDATION 1

IMPLEMENT AN INTEGRATED RESIDENTIAL SOLID WASTE AND RECYCLING SERVICES CONTRACT

-
- ✓ **UNIT BASED GARBAGE COLLECTION**
 - ✓ **CURBSIDE AND DROP-OFF RECYCLING**
 - ✓ **YARD WASTE COLLECTION (42 WEEK)**
 - ✓ **CURBSIDE BULKY WASTE COLLECTION**
 - ✓ **SPRING/FALL CLEAN-UP COLLECTION (OPTIONAL)**

Recommendation 1: Implement a Contract for Integrated Residential Solid Waste and Recycling Services. This recommendation was developed from the research performed in Warrensburg and information collected from the cities of Creve Coeur, Kirksville, Columbia, Rolla, and the County of St. Charles in Missouri, the cities of Ottumwa, and Wauke in Iowa, and the Missouri Municipal League. Three additional cities with integrated solid waste contracts are located in the Toolbox under the Contracts tab. The individual components of the recommendation have been developed specifically for Warrensburg and were designed around the *existing* processing and collection infrastructure.

The primary goal of contracting for residential garbage collection is to provide improved service at a competitive price that collects and manages multiple materials. The recommended residential solid waste and recycling contract manages materials via

curbside recycling, yard waste collection, bulky waste collection, and spring and fall clean-up collection under equitable and enforceable terms. The contract and its specific terms of service are developed and monitored by the City for its residents providing staff with a greater degree of control. Contracting residential garbage collection assists with budgeting and provides a mechanism for the City to raise funds that support ISWM complimentary projects like pollution prevention and resource management education.

Municipalities do have the responsibility to ensure the health and safety of the citizenry including the proper and timely disposal of refuse in its many forms. The Missouri Municipal Leagues Study showed that 46% of the cities over 10,000 people contracted for solid waste collection. Contracting for safe disposal is very common and integrating other services is equally as common. Examples of municipal recycling contracts are located in the Toolbox under the Contracts tab.

To work at its best this recommendation requires multiple sub-requirements (e.g. designing a curbside collection program); consequently, this recommendation is the most complicated.

A Primer on Unit Based Pricing Systems for Residential Waste

Pay-as-you-throw systems set a standard fee for a known volume of waste, usually determined in gallons. Toters and bags are the traditional method of implementing Unit Based Pricing (UBP) systems.

Variable Rate UBP

“Variable Rate” UBP systems are one form of a “pay-as-you-throw” system. A variable rate system might sell 35-gallon, 65-gallon, and 96-gallon toter services for separate fees. The picture below shows residential solid waste toters being used in conjunction with a green 18-gallon recycling bin. Standard sized containers are a key element of any “Variable Rate” UBP system.



Non-Variable Rate UBP

Collection systems not using standardized toters sizes may use standard sized bags. Bag systems are UBP systems too, but they are not “Variable Rate” systems.

Bag systems do not rely on a container; rather they rely on residents to purchase a special bag, often a non-traditional color. If the specific garbage bag is not used, then the waste is not collected. Some cities have selected a blue-colored waste collection bag so collection crews could easily identify them; this created the term “Blue Bag Collection System”.

Paying for Extras

“Variable Rate” and other Unit Based Pricing Systems require households to pay for any additional waste generated beyond a predetermined amount of waste. This additional waste is paid for using different methods depending on the system

Toter systems require “extra” waste set outside the toters be identified via a brightly colored pre-paid sticker attached to the additional refuse. The volume of garbage allowed per sticker must be clearly communicated on the sticker. For example, one sticker might allow four additional bags of garbage or one single sized mattress, ten stickers might pay for a contracted hauler to collect a large appliance at the curbside. Stickers (sold in \$2.00 increments) are generally sold in local retail stores and at municipal offices.

UBP systems that use a standardized garbage bag (“Blue Bag” system) do not require a sticker for extras if the waste is contained in one of the pre-paid standardized bags. Larger items that cannot fit in a standardized bag would still require identification via a sticker or similar mechanism.

UBP and Curbside Recycling Options

Unit based pricing systems work well if they are combined with a curbside recycling option. Unlimited curbside recycling provides households an alternative management tool for waste material; recycling helps residents reduce waste and therefore reduce the need to purchase stickers for additional waste that exceeds the maximum allowable amount per home per week.

What Type of Housing will Receive Contracted Residential Services

To determine what type of multi-family unit (MFU) residential dwelling is going to participate in the recommended contracted services and what type of MFU will not participate is a significant decision. Those housing units not under contract will be considered “commercial” and can receive independent bids from any service provider. Commercial businesses are not part of the recommended residential solid waste and recycling contract.

MFUs that have two, three or four residential units are recommended to be participants in the contract for residential collection services.

Enforcing UBP Rules at MFUs

Enforcement issues will be a part of any contracted service. Toter systems and bag systems must identify a system to communicate enforcement issues. For example, the recommended UBP systems that use standard toter sizes requires any “extra” material to be properly identified with a pre-paid disposal sticker. If “extra” material was improperly identified and set out, haulers may not know what housing unit to issue a “warning”. If the warning was ignored and the extra waste was not picked up or identified with a pre-paid disposal sticker, then the issue may require enforcement action. The City or hauler must know to whom the enforcement action should be sent (landlord/owner, property management group, etc.).

Enforcement –Warnings for “Extras” and Penalties for Non-compliance

A UBP system works when it is equally applied to every resident. Consequently haulers and the City of Warrensburg should prepare to administer warnings and penalties for participating households that do not comply with rules. Setting out waste without the pre-paid sticker or proper bag is a common non-compliance issue. Many cities implement a warning system but if warnings do not work, a financial penalty is used to motivate residents to comply with the UBP standards.

Advantages of a Solid Waste and Recycling Collection Contract

- **UBP Fees Are Equitable.** Unit based garbage services operate more like a utility in that larger generators pay more.
 - 5%-10% of Warrensburg residents do not subscribe to a residential garbage collection service. A UBP structure would provide service to these waste generators.
 - Illegal dumping in commercial dumpsters should be reduced as every resident has ample, yet limited, convenient curbside garbage collection.
 - Unit Based Pricing (UBP) systems reward recycling and provide a disincentive to generate waste.
 - UBP systems are flexible to accommodate fixed income and single resident households.
 - UBP can be organized to support various apartment complexes. A contract defines the participating household size and a contract identifies the minimum requirements for service and provides disincentives for poor service.
 - Contracted companies charge a minimum fee per household and are reimbursed for additional materials. \$2.00 stickers allow various items to have “sticker value requirements” including bulky items like appliances, mattresses, and construction/demolition wastes.

- **A Residential Contract Should Lower Fees.** A contract allows haulers to bid an exact number of households within a known geographic area for a specific period of time, generally a minimum of five years. A citywide contract provides for more dense collection (homes collected per hour) and consequently collection fees decrease.
 - During the data collection phase some smaller haulers were concerned they could not compete with larger companies as they thought their ability to “grow” into a contract was limited. However, contracts can be written that allow time for smaller firms to access capital and purchase the necessary equipment. Warrensburg has enough hauling companies operating in the area to provide competitive bids for a unified residential hauling contract.
 - UBP contracts set the standard amount of waste to be collected per home allowing contractors to better gauge and therefore bid more accurately the cost of providing residential solid waste collection and disposal services.

- **Administrative Fees Can Be Collected From The UBP Contract.** Warrensburg can retain a small monetary amount from the residential household collection figure. These funds help pay for residential ISWM services like education, bin replacement costs, and overall management. Enough funds should be raised annually to financially support a part time staff person. Revenue from the sale of collected materials can also generate revenue depending on market conditions.

- Sticker or bag fees for “extra” solid waste set out can be charged to pay the contractor for increased volume, weight, route time and help pay for education and outreach services.
- The Contractor Performs Services Previously Provided by the City and Increases Frequency of Some Services.
 - The City of Warrensburg offers yard waste collection two weeks a year for a cost of \$22,000. Yard waste collection could be identified as part of the annual residential collection service and provided 42 weeks each year.
 - The City of Warrensburg pays for a Spring and Fall clean-up service for an annual cost of \$23,000. Clean-up events could be identified as part of the annual residential collection service and provided two times a year.
- Contracts Create Convenient and Uniform Services Throughout the Community.
 - UBP garbage collection and curbside recycling requires communication and uniform services simplifies the educational messages.
 - Curbside recycling and curbside yard waste are extremely convenient which was one of the highest-ranking categories in the drop-off survey.
- Multi Family Units, Mobile Home Parks, and Neighborhoods in Johnson County can be Included in the UBP Contract.
- Collection Schedules are Easier to Communicate.
- The Number of Waste Collection Vehicles Operating in Overlapping Service Areas is Reduced.
 - One rear load solid waste truck is equivalent to approximately 1,800 cars.
 - Overlapping service areas may increase the volume of solid waste collection trucks up to 2-3 times what a contracted route might experience.
- Contracts Allow for Improved Service and Quality.
 - Quality of collection service has been identified as a problem at apartments in Warrensburg.
- Mandatory Garbage Collection Ordinances are Easier to Enforce.

Disadvantages of Solid Waste and Recycling Collection Contract

Some haulers (depending on the type of contract Warrensburg implements) will no longer haul residential solid waste.

- Garbage bag limits and yard waste limits and unit based pricing for bulky items may be seen as a hardship for limited income families.

- Change from open-subscription to subscription will upset some people that think their costs will go up.
- Additional City resources will be required initially to implement the UBP contract and all the related systems.
- Enforcement actions are required for non-compliance.
- Recycling toters and/or solid waste toters must be purchased initially and the toters must be managed and replaced periodically.

Implementation Note

Missouri law requires a two-year grace period before a solid waste contract would be implemented. This two-year period would allow the City to prepare requests for qualifications, requests for proposals, and it would allow time to educate residents on the winning proposal and associated services.

Contractual Options

Contracts might be exclusive for the entire residential population, or a contract might allow several companies to compete as in a Franchise Agreement. Regardless of the contract type, contract haulers perform under the same Unit Based Pricing and recycling rules. Examples of contracts are located in Toolbox under the Contracts tab.

REQUIREMENTS AND SUGGESTIONS THAT SUPPORT A SOLID WASTE AND RECYCLING COLLECTION CONTRACT:

REQUIREMENT 1A.

DESIGN AND IMPLEMENT A UNIT BASED GARBAGE COLLECTION PROGRAM

BARKER LEMAR recommends a unit based residential garbage collection system based on a pre-paid bag system or a variable rate (variable size) wheeled toter system. This recommendation is based on the success of unit based bag systems in other Missouri cities and the unique variables identified in Warrensburg. Haulers in Warrensburg use rear load packers extensively and this same rear load system can be used for a UBP system that uses bags and/or toters.

For examples of UBP systems that set bag limits and use toters please see the Toolbox under the Contracts and Ordinances tabs.

Extra fees are charged for additional materials beyond the set garbage volume. Pre-paid stickers have to be sold that are attached to extra materials like furniture, additional refuse, appliances, or other bulky items.

Advantages and Disadvantages of Toter-based UBP System

Advantages of a variable rate toter system versus a UBP bag system is the:

- Speed and efficiency toters can be collected;
- Standardized use of lids;
- Ease that a wheeled toter can be maneuvered, and;
- Aesthetic appeal of the toters at the curb.

Some toter collection trucks are “right-hand drive” and they use only one person to perform all collection tasks. The one-person toter collection trucks are usually equipped with an articulating arm that grabs the container and dumps in into the truck. Toter trucks using the mechanized arm manage more houses per route than traditional rear load collection crews and they tend to be safer as drivers handle less weight per shift and they are not getting out of the cab as often. Efficient toter collection trucks often translate into significantly lower costs per household for garbage collection service.

An articulated arm is not necessary if toters are used. Toters are also managed using a one-person or two-person collection crew and rear load trucks. The rear-load trucks are mounted with a small tipping mechanism to help lift the heavier toters into the truck’s waste hopper.

One hauler in Warrensburg identified a concern accessing wheeled toters in the neighborhoods around CMSU with an articulated arm. The parking areas of concern utilize curbside parking all day and access to toters with an articulated arm might be very difficult.

A disadvantage of a toter system for garbage collection is the initial cost of the toters, delivery costs, and replacement costs. Toters may cost \$35 to \$55 depending on type and size of order. Toters are assigned to a household or parcel not a specific person and are considered the property of the City. Residents must be instructed not to take a toter when they move or it will be considered stolen City property.

Advantages and Disadvantages of a Bag-based UBP System

The advantages of toters listed above (speed and efficiency, lids, wheels, aesthetic appeal) are generally not part of a bag system. However, the disadvantages associated with toters, (including the initial expense to purchase toters, replacement costs, truck modifications, and costs associated with tracking “lost” toters), do not exist. The bag system’s greatest disadvantage is the difficulty of processing the bag and removing the contents. Another disadvantage of a bag based UBP system is the perceived inconvenience of buying special bags for all wastes.

Both systems require some type of sticker or other notification for “extra” materials that are too big for bags or cannot fit in the toter.

REQUIREMENT 1B.

DESIGN AND IMPLEMENT A RESIDENTIAL CURBSIDE RECYCLING PROGRAM

BARKER LEMAR recommends a bi-monthly mixed paper and metal curbside recycling program. “Mixed paper” includes newspaper, unsolicited mail, office paper, slick newspaper inserts, and magazines. “Metal” includes food cans and beverage cans. The mixed paper and metal material would be “co-mingled” together in the same container. The recommended container is a small toter with capacity ranging from 35-45 gallons. This recommendation is based on the existing processing infrastructure available near Warrensburg, historical commodity prices, estimated fees for the service, simplicity, likelihood of success with a transient student population, and success with toter recycling systems in other areas.

Bi-weekly collection is significantly less expensive than weekly; however, a disadvantage of bi-weekly or monthly service is lower participation as people forget about the correct date.

Sizing and Choosing the Recycling Container

Traditional green bins (18 gallon capacity) have been identified as being too small for weekly collection of plastic containers, mixed paper, metal containers, and glass containers for modern families. If bins are undersized, the material collected per participating household may decrease as people may simply discard overflowing materials.

Reducing the collection of materials down to mixed paper and metal is estimated to require approximately 15-25 gallons per week or 30-50 gallons/two-week period/participating household. Mixed paper, specifically 30-50 gallons of newspapers can become too heavy for some residents to lift, consequently a wheeled toter is the preferred collection system. Bi-weekly service with a 30-50 gallon wheeled toter provides residents with ample capacity and the convenience of carts with lids and wheels.

Purchase of toters with capacity of 30-50 gallons would be required before the program started. Grant funds from the State of Missouri, Solid Waste Region F, or other sources like corporate donations could help offset the purchase price.

Why Not Include Plastic Containers and Glass Containers

Although households generate plastic containers and glass containers they would not be part of the curbside system, this is to reduce processing fees (the fewer materials sorted, the lower the processing costs) and decrease broken glass contaminating paper grades.

Processing Fees and the Potential to Generate Revenue

A residential curbside recycling program will require a contract for collection/hauling and material processing. Processing fees and revenue from materials sold to end markets or brokers are key components to a curbside program. Many processing contracts are private and are written between the hauler and the processing company. However, the curbside contract can stipulate when the City can earn revenue based on third party

market prices (like those identified in a number of trade magazines). Fiber and metal have historically predictable prices and a fee from the sale of materials can be predicted and budgeted. For examples of processing contracts please see the Toolbox under the Contracts tab.

The curbside program can add commodities at a later date when processors are ready to manage the expected volume.

Adding Selected Johnson County Developments

Johnson County residents in more dense areas may also join with the City of Warrensburg. Developments/neighborhoods that might be candidates to join in the service include: Comers Subdivision, Green Acres, Green Meadows, South Heights, Southern Hills, Springridge Trailer Court, and Valley View. Generally the greater number of potential participants the more attractive the service becomes to potential bidders.

Toters, Bins, or Bags for Collection of Recyclables

Previously, the use of bins vs. toters was discussed. Some curbside collection systems use plastic bags to collect recyclables. Processing bags remains difficult and time consuming for the programs using this system. A bi-weekly system using bags requires more labor and effort by the residents than a bi-weekly system using a wheeled toter. A disadvantage of toters is that they are more expensive to purchase and the must be periodically replaced/repared. Theft of toters must be managed. Toters are generally distributed to stay with the house and not the resident. If a resident leaves and takes the toter, the City must charge the previous occupant a fee.

REQUIREMENT 1C.

DESIGN, IMPLEMENT AND PROMOTE A MOBILE PUBLIC DROP-OFF FOR CARDBOARD, MIXED PAPER, AND PLASTIC CONTAINERS

The curbside system is being developed as a paper and metal collection service. In order to provide a mechanism to recycle cardboard, PET (soda bottles), and HDPE (milk

jugs), **BARKER LEMAR** is recommending an unstaffed mobile drop-off program. With this type of service, a compartmentalized collection trailer or roll-off box is transported to a pre-designated site in the City and left for a period of time (usually one week). City and county residents may bring their recyclable materials to the drop-off site and deposit the material into the various marked compartments. Plastic containers, metal containers, cardboard, and mixed papers are recommended to be collected via the drop-off service.

In an effort to control costs, this drop-off program would be shared by the City of Warrensburg and Johnson County. The mobile drop-off would operate on a route - spending one week at a time in one of four areas each month. The City of Warrensburg, Johnson County, or a separate contractor could provide the drop-off service. The drop-off service would require approximately 10-15 hours each month including time to clean the site, discard wastes, dump recyclables at the processor, and re-set the drop-off trailer at the new spot.

A drop-off program provides opportunity for small businesses, non-profit organizations, and civic groups to participate in recycling.

The drop-off services being provided in Warrensburg by the Sheltered Workshop and the drop-off available at Education Textbook Services would also be promoted as recycling partners with the City via educational materials.

REQUIREMENT 1D.

DESIGN AND IMPLEMENT UNIT BASED YARD WASTE COLLECTION PROGRAM

BARKER LEMAR is recommending that disposal of yard waste be implemented citywide via a unit based pricing structure similar to solid waste.

A unit-based system should involve paper yard waste bags sold in local retail stores. A majority of bag revenue is used to pay for hauling and processing and a small portion of

the funds are available for program administration and solid waste and recycling education/promotion.

Paper bags can be composted and are relatively affordable. Some yard waste systems in other cities use a cart or toter; however, high volume days exceed the capacity of toters and carts and some bags are required for the overflow.

The Warrensburg area does not currently have an operating compost site. A management team and a processing site would have to be secured via contract before yard waste collection could be implemented.

A disadvantage to the bags is guaranteeing that households use bags from which Warrensburg and their contractors receive revenue, if any other type of unapproved bag is sold or used in the area it would amount to a free service for the resident.

A municipal burn ban would complement the yard waste bag system by encouraging households to use bags and recycle rather than burn yard wastes – A burn ban is discussed as Recommendation 3.

REQUIREMENT 1F (OPTIONAL).

INTEGRATE SPRING AND FALL CLEAN-UP CONTRACTS (OPTIONAL)

Integrating the Spring and Fall clean-up contract could be bid as part of the residential unit-based waste and curbside recycling program. Or, the City of Warrensburg could re-bid the Spring and Fall clean-ups allowing other collection companies to bid.

BARKER LEMAR recommends using a public drop-off area for trash during the clean-up events, as some households prefer to self-haul rather than set their waste in front of their homes. Residents selecting to self-haul waste to a convenient central location reduces the time route crews spend on the residential streets and reducing time on the route can significantly decrease the price paid for collection services.

REQUIREMENT 1G.

IMPLEMENT A BILLING SYSTEM

The contracted system for residential garbage, yard waste, bulky materials, and recycling will require a new billing system. The Missouri Municipal League Study showed 44% of cities of more than 10,000 people collect the waste service bills and 67% of these charge a fee for the service. **BARKER LEMAR** recommends Warrensburg manage the billing for the hauler. Contracted solid waste services, specifically variable rate systems, work well when they are treated as if they were another utility. An advantage of municipalities treating solid waste management as a utility is the ability to turn specific services off, like water, if the utility is not paid. Additionally the City can manage the addition of solid waste services to new housing units via building permits and water service faster than a private hauler.

Estimated Start-up Costs, Management Costs, and Potential Revenue of Proposed Curbside Recycling and UBP Garbage Collection System

Chart I illustrates the estimated start-up costs associated with developing and maintaining the activities of Recommendation 1.

Chart I – Estimated Start-Up Costs for Recommendation 1

Service	Annual Cost	Annual Costs Per Occupied Household	Monthly Costs Per Occupied Household
Total Spring/Fall Clean-Up Contracted Service Costs	\$ 24,000	\$ 5.00	\$ 0.42
Service Contract Establishment (City Staff Time & Benefits)	\$ 15,113	\$ 3.15	\$ 0.26
Service Contract Annual Administration & Monthly Billing (City Staff Time & Benefits)	\$ 15,113	\$ 3.15	\$ 0.26
Purchase 5,250 Waste Collection Toters	\$ 183,750	\$ 38.28	\$ 3.19
Purchase 5,250 Recycling Toters	\$ 183,750	\$ 38.28	\$ 3.19
Purchase 4,800 Extra/Bulky Waste Sticker Development Costs	\$ 432	\$ 0.09	\$ 0.01
Purchase 9,600 yard waste bags	\$ 2,880	\$ 0.60	\$ 0.05
Purchase 9,600 yard waste stickers	\$ 864	\$ 0.18	\$ 0.02
Solid Waste Education	\$ 5,813	\$ 1.21	\$ 0.10
TOTAL ANNUAL COSTS	\$ 431,714	\$ 89.94	\$ 7.50

Note: The above fees do not include actual contracted service costs.

City Service Costs:

The most significant start-up costs of Recommendation 1 would be the purchase of the bi-monthly recycling totes. Each tote costs approximately \$35 per unit (these costs may be off-set by receiving grant funds). It is important to remember that this cost occurs at this level only once. Replacement totes may need to be purchased later in the program, but not in these quantities.

A similar one time expense would be the time of a City staff person at \$12.10/hour working towards establishment of the service contract agreement. This analysis assumed one City staff working part time for 6-months to complete bid specifications, opening bids, and contractor selection.

Continued contract administrative/management duties were estimated to be one week out of every month for management of the pre-paid sticker program for extra waste and yard waste. Another full week per month was estimated to provide time and costs of service billing duties.

The other City staff continued costs would be for solid waste education and customer service/assistance. This analysis assumed one City staff person would work on these activities an average of one full week every month.

The Spring/Fall cleanup event would no longer have City staff responsible for collection of materials, thus reducing City labor expenses. This service would be provided in the established contract for an annual fee.

With the establishment of Unit Based Pricing (UBP) ordinances and a yard waste burn ban, residents will need to purchase City approved stickers for the disposal of extra waste and yard waste. City staff could be responsible for management of the development and sales of these stickers. The City would be able to assess a fee to help off-set the cost of these services. Chart II shows the estimated revenue generated through assessed service fees.

Chart II – Estimated Service Fee Charges and Revenue

Type	Total Service Charge	Service Fee to City	Total Annual Service Fee to City
Weekly Waste Collection		\$ 0.50	\$ 28,800.00
Bi-Monthly Recycling Collection		\$ 0.50	\$ 28,800.00
Extra/Bulky Waste Sticker Sales (3,600 or 75% of purchased)	\$ 2.00	\$ 0.25	\$ 900.00
Yard Waste Sticker Sales (7,200 or 75% of purchased)	\$ 1.50	\$ 0.25	\$ 1,800.00
Yard Waste Bag Sales (7,200 or 75% of purchased)	\$ 1.00	\$ 1.00	\$ 7,200.00
TOTAL	\$ 4.50	\$ 2.50	\$ 67,500.00

RECOMMENDATION 2.

IMPLEMENT AN INTEGRATED SOLID WASTE MANAGEMENT (ISWM) COORDINATOR

-
- ✓ **MANAGE BUDGET**
 - ✓ **PERFORM EDUCATION AND OUTREACH**
 - ✓ **PERFORM DAILY MANAGEMENT OF PROGRAMS**
 - ✓ **PERFORM INSPECTIONS AND LICENSING**
 - ✓ **ACQUIRE AND TRACK DATA**
 - ✓ **FUNDED VIA USER FEES – YARD WASTE AND BULKY ITEM STICKERS, CURBSIDE COLLECTION FEES, PROCESSING REVENUE**
 - ✓ **WRITE GRANTS AS NEEDED**

Significant changes in the collection of solid waste, yard waste, and curbside compatible materials have been recommended. Along with changes, **BARKER LEMAR** has attempted to identify possible funding mechanisms to support the new programs. Another significant recommendation is the addition of an ISWM coordinator.

This position will have primary responsibilities for working with the public, contractors, and City administrators in the development and application of the selected solid waste disposal and recycling services. The Coordinator position will also monitor revenue (bag sales, processing fees, franchise fees, etc.) and perform inspections and licensing that generate revenue. The Coordinator can also review the opportunity for “host fees” the City and County could implement. Additionally, this position will serve as education

coordinator providing presentations and information to adults, civic groups and students. The education coordinator can continue to work with the Warrensburg Citizens for Environmental Excellence (WCEE) to communicate changes and collect information from the public. **BARKER LEMAR** recommends that the City of Warrensburg create a separate budget for ISWM funds related to revenue and expenditures. The Coordinator position will be paid from a line item in this budget.

FINISH WORK - MEETING THE UNIQUE NEEDS OF WARRENSBURG

The finish work aspect of constructing an ISWM system are the details that make the program unique to Warrensburg and provide tools that mesh with the existing parts. The following items are also being recommended for Warrensburg.

- ✓ Implementation of new waste hauling licensing and related inspection requirements
- ✓ Implementation of a yard waste burn ban
- ✓ Implementation of a recycled content purchasing policy

RECOMMENDATION 3.

IMPLEMENT LICENSING AND INSPECTION PROGRAM

-
- ✓ ***GENERATE REVENUE***
 - ✓ ***VEHICLE INSPECTION (WATER TIGHT SEALS, BRAKES, FLASHERS, SAFETY EQUIPMENT, ETC.)***
 - ✓ ***INSURANCE AUDIT***
 - ✓ ***VALID AND APPROPRIATE STATE DRIVER'S LICENSE***

Establish a Single Business License Specifically for Waste Hauling Companies

Currently there are two separate business licenses available for haulers (Drayage and General Business License). Each license allows the license holder to perform the same

types of waste collection services within City limits. However, the Drayage license cost is \$5.50 per year while the General Business license cost ranges between \$20.50 and \$100.50 depending on total gross amount of volume of business. City staff estimated that most hauling companies are required to pay \$100.50 annually. Haulers aware of the Drayage license request this while other companies request the more costly General Business license.

The current system unintentionally causes disparity between waste hauler companies applying for business licenses in Warrensburg. By establishing a separate waste haulers business license, the City can establish service rules by which all the waste haulers (commercial haulers, yard waste haulers, residential haulers, recycling trucks, etc.) are required to follow. These rules can be detailed in the permit/license itself.

Other communities have even required that each waste collection vehicle that operates in their area request and receive an operations permit. The fees collected for the waste collection vehicle permit are used to off-set administration and vehicle inspection costs. See the Licensing and Inspection tab in the Toolbox for examples of permit and license fees.

Define Drayage License/Permit

This license is given to haulers that request this permit over the general business license. It may be important to provide a definition as to what a “drayage” is and set a policy defining what types of businesses/individuals may receive a Drayage license. The policy should be set so revenue and business permit requirements are not lost if waste haulers apply.

Require Hauling Companies to Perform Desired Services

By establishing a separate waste haulers business license, the City can establish service rules which all waste haulers are required to follow. These rules may require haulers to perform the following services:

- Operate waste collection vehicles that are water tight waste collection vehicles.
- Maintain a shovel and broom on each waste collection vehicle that operates in Warrensburg for the collection of spilled wastes.

- Clean waste collection vehicles to prevent health and safety hazards to company employees and residents.
- Cover waste to prevent fugitive waste escaping waste collection vehicle during transportation.
- Collect waste within a certain time period that has been determined to have escaped from the waste collection vehicle.
- Require waste collection vehicle drivers to obtain the appropriate state commercial vehicle licenses.
- Company provides and maintains liability insurance on all vehicles and vehicle operators.

Provide Authority to Truck Inspectors

It is important to provide authority for the appropriate department to inspect and enforce the requirements of the approved license. Without this process in place, the purpose of the inspection is lost and the system simply becomes another program.

The inspection process can also serve to handle complaints from the public. This ability to inspect and maintain records is especially important if the contractor is working on a City contract.

RECOMMENDATION 4.

BAN RESIDENTIAL BURNING OF YARD WASTE

-
- ✓ ***IMPROVES AIR QUALITY AND INCREASES BAG SALES***
 - ✓ ***MATERIAL CAN BE PROCESSED LOCALLY AND GIVEN AWAY TO THE PUBLIC***
 - ✓ ***AT PRESENT, A COMPOSTING FACILITY IS NOT AVAILABLE LOCALLY***

BARKER LEMAR is recommending a ban on burning household yard waste within the city limits.

Smoke from burning leaves, grass, brush, and most plants contain high concentrations of pollutants, such as carbon monoxide, particulate matter (soot), toxic chemicals, and reactive gasses that can contribute to smog formation. Carbon monoxide binds with hemoglobin in the bloodstream to reduce oxygen flow. Carbon monoxide can be dangerous for young children, smokers, the elderly, and people with chronic heart or lung disease. The smoke can be an immediate health concern for some people. Pollution levels adjacent to burn areas can exceed human health standards.

By establishing a yard waste burn ban within the city limits, residents will be required to participate in other more environmentally and health conscious waste management activities. The current rules encourage residents to burn their yard waste. This activity may also encourage some to add other materials to the burn pile as a perceived appropriate disposal method. Several people interviewed through this project indicated they burn the organic materials of their waste as a disposal management method. These materials included food scraps, paper, cardboard, magazines, food containers, and yard waste.

RECOMMENDATION 5.

IMPLEMENT A RECYCLED CONTENT PURCHASING POLICY

-
- ✓ ***COOPERATIVE PURCHASING AGREEMENTS WITH CMSU OR OTHER ENTITIES COULD SAVE MONEY BASED ON VOLUME PURCHASES***
 - ✓ ***BUYING RECYCLED CONTENT PAPER AND OTHER PRODUCTS PLACES THE CITY IN A LEADERSHIP POSITION***
 - ✓ ***BUYING RECYCLED CLOSSES THE LOOP AND HELPS TO STRENGTHEN MARKETS***

BARKER LEMAR recommends that the City of Warrensburg develop a committee to review how a recycled content purchasing policy could be implemented. This committee should have individuals familiar with municipal purchasing requirements including historical use and historical price. Cooperative purchasing via a state recycling

organization, a university, county government, or a collective purchasing cooperative organized within the county could help drive the cost of purchasing recycled content materials down, and perhaps reduce existing prices.

JOHNSON COUNTY, MISSOURI

RECOMMENDATIONS TO IMPLEMENT A COUNTY-WIDE RECYCLING PROGRAM

RECOMMENDATIONS - INTRODUCTION

Providing recycling services to the rural residents of Johnson County is an important part of an overall area integrated solid waste management plan. Providing as much continuity of services between City programs and County programs as possible will increase the impact of education efforts in the area and work towards stabilizing overall program costs.

Recommendations 1 and 2 were developed from the research performed in Warrensburg, Johnson County, and information collected from various cities in Missouri and Iowa. The individual components of the recommendation have been developed specifically for Johnson County and were designed around the existing infrastructure.

RECOMMENDATION 1

DESIGN AND IMPLEMENT A RESIDENTIAL CURBSIDE RECYCLING PROGRAM.

-
- ✓ **DESIGNED FOR LARGER HOUSING COMPLEXES AND AREAS OF MORE DENSE POPULATIONS**
 - ✓ **MAY WORK FOR MOBILE HOME PARKS AND SIMILAR COMMUNITIES**
 - ✓ **PROXIMITY OF DENSER NEIGHBORHOODS TO WARRENSBURG MAY BE A STARTING POINT TO DEVELOP CURBSIDE**
 - ✓ **PARTNERSHIP WITH RESIDENTIAL HOUSING AND DEVELOPMENT GROUPS**

Recommendation 1 suggests that Johnson County work collaboratively with the City of Warrensburg and multi family units, mobile home parks, and neighborhoods in Johnson County that are in close proximity to the City of Warrensburg to provide identical curbside recycling services. Provision of services that are alike in type of material collected, frequency of collection, and method of collection may assist all entities in obtaining more cost effective contracts and increase the effectiveness of educational efforts in the Warrensburg municipal and surrounding area.

Advantages of Recommendation 1

- Provides County residents with convenient curbside recycling services.
- Provides residents located adjacent to the Warrensburg city limits with uniform services.
- Takes advantage of pricing synergies by working with the City of Warrensburg.

Disadvantages of Recommendation 1

- Some County residents may resist paying for additional services.
- Purchase of recycling bins by the County is typically required.
- The program requires oversight and management including bin replacement, education, etc.

REQUIREMENT 1A.

COLLABORATE WITH THE CITY OF WARRENSBURG TO DEVELOP A CURBSIDE RECYCLING PROGRAM

Implement curbside recycling based on infrastructure and partnership with the City of Warrensburg. A working partnership with the City of Warrensburg may allow the County to provide economical, comprehensive waste management opportunities to County residents located close to the Warrensburg city limits.

Please see the "Recommendation Section" for the City of Warrensburg, specifically Recommendation 1 and all associated requirements for a description of the bi-weekly paper and metals only recycling program proposed for Warrensburg.

By working jointly with the City of Warrensburg, Johnson County can provide a more comprehensive recycling service to county residents living adjacent to the City. This partnership can encourage increased efficiencies in education efforts and reduce public confusion regarding recycling program requirements and guidelines.

RECOMMENDATION 2.

IMPLEMENT A MOBILE DROP-OFF RECYCLING PROGRAM FOR OUTLYING AREAS OF JOHNSON COUNTY

-
- ✓ **DROPOFF RECYCLING**
 - ✓ **SERVICE TO RURAL AREAS**
 - ✓ **COMPLEMENT CURBSIDE PROGRAM**

Recommendation 2 suggests that the County provide outlying rural County residents recycling services through a mobile drop-off recycling program. With this type of service, a compartmentalized collection trailer or roll-off box is transported to various pre-designated sites throughout the county and left for a period of time (usually one week). Rural County residents may bring their recyclable materials to the drop-off site and deposit the material into the various marked compartments. Plastic containers, metal containers, cardboard, and mixed papers are recommended to be collected via the drop-off service.



Advantages of Mobile Rural Drop-off Service

- Provides outlying County residents with access to recycling services.
- Provides a more economically favorable recycling option for rural residents based on population densities.
- Costs may decrease if the service is shared with Warrensburg.

Disadvantages of Mobile Rural Drop-off Service

- Some County residents may not view drop off recycling as a convenient option.
- Contamination problems at un-staffed drop-off programs require extensive annual education and outreach.
- Disposal cost for non-recyclable items.

Acceptable Materials

At a minimum, the drop-off collection program should collect HDPE and PET plastics and metal containers not collected in the curbside recycling program. At the County's discretion, the drop-off collection program may also collect the same mixed paper as collected in the curbside recycling program.

Cooperative Effort with Warrensburg

BARKER LEMAR recommends that the County and Warrensburg share the drop-off service as an effort to save costs. In this cooperative system, Warrensburg would have the drop-off trailer one week out of the month. The remaining weeks of the month, the trailer would be placed at three separate locations in rural Johnson County for one week at a time.

Locating the curbside collection unit once a month in the Warrensburg city limits will allow the large population base of the area (unincorporated residents and city residents) to utilize the service for the placement of materials not collected by curbside service (i.e. HDPE, PET, and metal containers). It may also provide convenience for rural residents traveling to Warrensburg to shop or conduct business.

Locating the curbside collection service in three areas of the county for a week at a time provides residents in unincorporated areas an opportunity to recycle.

The City of Warrensburg, Johnson County, or a separate contractor could provide the drop-off service. The drop-off service would require approximately 10 – 15 hours each month to clean the site, discard wastes, dump recyclables at the processor, and re-set the drop-off trailer at the new spot.

Siting the Drop-off Location

Many municipalities have found that semi-secured drop-off locations decrease the temptation of the public to engage in illegal dumping and improper material sorting. **BARKER LEMAR** recommends that Johnson County work to develop drop-off locations that provide a minimum level of security and supervision and are visible and well lit. Semi-secured locations may include municipal maintenance shops and other public facility locations.

PROGRAM FUNDING FOR MOBILE RURAL DROP-OFF SERVICE AND RECOMMENDATION 1

Option 1: User Fees and Material Sales

Assessed residential service fees on garbage collection and/or curbside recycling services and the sale of collected recyclable materials may help off-set the operational costs associated with Recommendation 1.

Option 2: Grant Funding

Grant funding is an excellent option for jumpstarting a recycling program. Johnson County may be able to apply for grant assistance through the Region F Solid Waste District. A favorable award may assist with the purchase of curbside recycling bins and cover other start-up costs. Johnson County should investigate working with the City of Warrensburg on a joint grant application. Grant funds should not be viewed as a long-term option for financing a recycling program.

Option 3: Tax Assessment

Johnson County may pursue the ability to collect fees for recycling service through an annual property tax assessment or similar means.

CENTRAL MISSOURI STATE UNIVERSITY

RECOMMENDATIONS TO IMPLEMENT AN INTEGRATED SOLID WASTE MANAGEMENT SYSTEM

RECOMMENDATIONS - INTRODUCTION

After performing three months of data collection in Johnson County, the City of Warrensburg, CMSU, and other cities in Missouri, **BARKER LEMAR** has attempted to develop recommendations that are specific to Central Missouri State University.

The recommendations for CMSU were developed from the research, interviews, surveys, and discussion sessions performed at CMSU. The individual components of the recommendation have been developed specifically for CMSU and were designed around the existing processing and collection infrastructure in the nearby area.

The primary objective of implementing additional recycling projects at CMSU is to reduce the amount of recyclable materials entering the waste stream. Recyclable materials have continued value and are sought after by recycling industries. Removing these materials from the waste stream may decrease total disposal costs or provide some revenue.

Currently CMSU has a waste reduction and recycling base from which to build. Asset recovery, shredded paper recycling, and cardboard recycling are a few of the institutionalized recycling programs currently in place.

To build additional recycling and waste reduction programs at any level requires leaders, administrative support, money, and good public relations.

TRAIN STAFF

BARKER LEMAR recommends that CMSU identify one or two individuals that have an interest and passion for waste reduction and recycling and provide resources allowing these individuals to develop skills necessary for implementing institutionalized solid waste reduction and recycling systems.

Beyond the recommendations made in this report, several organizations exist that have a primary goal of implementing integrated solid waste management programs on college campuses. These groups are operated by university staff that understand the administrative hurdles, institutional controls, budget constraints, and other systems common to a university system.

BARKER LEMAR recommends University administrators and staff open communication with other universities with exceptional recycling and waste reduction operations. This communication may be quickly facilitated via the National Recycling Coalition's College and University Recycling Coalition.

The University of Missouri Outreach and Extension program currently has assistance entitled "Green Campus: College and University Waste Reduction" that can also provide assistance and or contacts in Missouri.

INSTITUTIONALIZE INTEGRATED SOLID WASTE MANAGEMENT

The University is a focus point for the community and should be a leader in integrated solid waste management. Until integrated solid waste management becomes part of the institution and not a side activity, programs will have a more difficult time succeeding.

After two or more key staff people receive training and exposure to other waste reduction and recycling programs within university systems, they should be empowered to implement at least one idea that falls within the realm of an integrated solid waste management program. One small success that becomes part of the University system will help to build an institutional foundation for future success.

CREATE A RECYCLING BUDGET

Institutionalized waste management programs must include a budget for outreach, education, and promotion. Like any other new program that impacts students, faculty and staff, money is required at some point to ensure success. Corporate recycling programs implemented by **BARKER LEMAR** staff were often funded with existing funds saved via waste reduction and recycling systems and then re-allocated for new recycling and waste reduction systems.

IMPLEMENT A PUBLIC RELATIONS AND COMMUNICATION CAMPAIGN

BARKER LEMAR'S success implementing recycling programs and the success other universities are having with recycling programs hinge on excellent communication. Asking people to change behavior is not always easy, developing a communication budget and communication plan greatly assists in the success of a new recycling program. Communication must continue throughout the life of the recycling program especially within a student population. Several campuses have paid nominal fees to have students compete to design a marketing campaign for the campus recycling and re-use programs.



VARIOUS PROGRAMS HAVE BEEN SUCCESSFUL ON CAMPUSES

Each campus is unique, and not all recycling programs work on every campus. The University should be prepared that some programs made not be as successful as others. Various universities are actively collecting and/or exchanging various “nontraditional” materials, including:

- Exchanging office supplies (for staff and faculty),
- Organizing exchanges for magazines and books,
- Deconstructing buildings and re-using materials,
- Recycling laser print cartridges,
- Recycling rechargeable batteries,
- Providing self-serve wood cutting areas,
- Recycling telephone books,
- Recycling scrap metal, and
- Composting food scraps.

RECOMMENDATION 1
**IMPLEMENT PILOT RECYCLING PROJECTS TO
COLLECT RECYCLABLE MATERIALS**

- ✓ **NEWSPAPER COLLECTION CONTAINERS**
- ✓ **CARDBOARD COLLECTION CONTAINERS**
- ✓ **DISTRIBUTOR PRODUCT RESPONSIBILITY AGREEMENTS**
- ✓ **“MOVE IN-MOVE OUT” CORRUGATED CARDBOARD RECYLING**

Each of the recycling tasks affects a certain percentage of the waste stream. Thus, the individual recommendations have been prioritized to target the largest amount of recyclable material identified in the waste stream. Waste volumes were identified from the visual waste sort **BARKER LEMAR** performed at CMSU.

Advantages of Recommendation 1

- Reduces Material Landfilled
 - Decrease costs by reducing the waste container collection schedule.
 - Decrease costs by decreasing waste containers needed at specific locations.
 - Reduce over-flowing/spillage and un-sanitary conditions at high volume waste containers.
- Places CMSU in a Leadership Role Regarding Environmental Stewardship.
 - Develop role model management practices for students to continue in their professional careers.
 - Incorporate environmental stewardship in other University management activities.
- Provides Students Enhanced Educational/Financial Opportunities.
 - Student groups may manage portions of recycling programs.
 - Student groups responsible for servicing the program may receive CMSU funds or end market funds.

Disadvantages of Recommendation 1

- Causes an increase in initial administrative duties and costs to develop, implement, and manage programs, including the re-wording of contracts.
 - If the University's administration does not provide support for long-term recycling and waste reduction projects, then the programs will either fail or they will rely on support from student groups – groups that have shown to provide inconsistent support. The interest of the various student groups can vary depending on the interests of the members.

PILOT RECYCLING PROJECT 1A.

DESIGN AND IMPLEMENT A NEWSPAPER COLLECTION PROGRAM

REASON:

Newspapers were identified as a significant recyclable material being disposed of at the University. These materials are generally easy to collect and contamination levels are fairly low.

LOCATION OF ACTIVITY:

Two locations were identified during the visual waste sort as major generation sources for this material. The Union and Library both contained large amounts of clean newspaper materials in the waste containers.

ACTIVITY PROGRAM DESCRIPTION:

Collection containers, specifically designed to accept newspapers, could be placed near newspaper stands and waste container stations. Users of these containers place the newspaper through a slot that is similar to a door mail slot. This helps prevent other contaminants from entering the collection container.

These containers would need to be emptied on a regular basis to prevent overflow and to re-enforce participation in the program. Depending on container size newspaper would be collected daily Monday through Friday. The contents of the newspaper collection centers would be delivered to a single newspaper collection container/station for storage until the material was recycled.

Student groups may be encouraged to provide these collection/management services with financial incentives. Existing janitorial service employees at these locations would be responsible for reporting full containers, enforcing recycling policies, encouraging participation, and for using the available containers for recycling.



PILOT RECYCLING PROJECT 1B.

REDESIGN AND IMPROVE CORRUGATED CARDBOARD COLLECTION PROGRAM

REASON:

Corrugated cardboard was identified as a significant recyclable material being disposed of at the University, specifically the cardboard was observed to be from facilities that had existing corrugated cardboard recycling containers.

The corrugated cardboard is being collected at no cost to the University.

CURRENT ACTIVITIES:

Currently, the University has five (5) corrugated cardboard recycling containers for University usage. These five corrugated cardboard container locations may be adequate for the collection of the cardboard but the existing education and outreach program could be improved

EDUCATION:

Education of janitorial services and employees of facilities that have corrugated cardboard recycling containers should be educated and encouraged to utilize these containers when appropriate.

Education of existing services can be performed to remind users to use the recycling service properly (break down boxes, remove contamination, etc.). Education may be signs at the “point of compliance” or verbal reminders during staff meetings. Enforcement of proper container usage through random inspections, and administrative support could also improve the amount of cardboard diverted from the landfill.

Students indicated they were unaware of corrugated cardboard recycling containers being available on campus. Students should be encouraged to utilize these containers. This would provide a disposal alternative for students interested in recycling.

PILOT RECYCLING PROJECT 1C.

BEVERAGE DISTRIBUTOR PRODUCT RESPONSIBILITY AGREEMENTS

REASON:

Beverage distributors contract with the University for exclusive rights to provide their products for purchase on University property. The University receives funds for this exclusive right. However, the University is currently responsible for the disposal costs of these materials. Thus, funds received from the distributor contract are being used to subsidize the disposal cost of their products. Requiring the distributor to provide administrative/financial support for the management of their consumed products would alleviate some of the University’s financial responsibilities.

PLASTIC BOTTLE RECYCLING:



The Union was identified as the largest generator of PET plastic beverage containers. Requiring the beverage distributor to provide services for product management could be determined and enforced through the existing contract. The agreement would provide details on how the beverage distributor is to provide product management assistance.

In this case it may be appropriate for the beverage distributor

to provide funds for the University to purchase beverage container recycling collection stations and funds for the management of these stations.

The National Recycling Coalition and its College and University Recycling Council developed a toolkit that includes sample bid language, options to address recycling and waste reduction concerns, and case studies from nine schools around the country. The Toolkit is available at no cost to NRC members (\$12 for non-members). (Contact: National Recycling Coalition, 1325 G Street, NW, Suite 1025, Washington, DC 20005-3104, Phone: 202.347.0450).

Materials received at these stations would need to be collected on a regular basis to prevent over flows/spillage and to encourage recycling participation. Student groups may be encouraged to provide collection/management services with financial incentives.

Existing janitorial service employees at these locations would be responsible for reporting full containers, enforcing recycling policies, encouraging participation, and for using the available containers for recycling.

Grants from PET recycling trade associations may also be available to fund and promote PET bottle recycling on campus.

PILOT RECYCLING PROJECT 1D.

“MOVE IN – MOVE OUT” RECYCLING

REASON:

Students, University staff, and Waste haulers identified the beginning and ending of the school years as significant waste generation periods. Students indicated that numerous corrugated cardboard boxes are disposed of during these periods for lack of disposal alternatives. The garbage containers available during these periods quickly overflow and students then place waste materials on the ground. Multiple materials are available for recycling during move-out periods including materials available for direct re-use in

Warrensburg like clothing, shoes, electronics, furniture, school supplies, and other materials.

PROGRAM DESCRIPTION:

Common areas near residence halls could be selected as a recycling hub. A corrugated cardboard recycling container, carpet recycling bin, clothing, electronics, furniture, and other bins could be located in the vicinity of the waste container.

Monitoring of a move-in and/or a move-out recycling event would be highly recommended to provide a safe recycling atmosphere (especially if trucks must back in to replace containers) and to keep contamination to a minimum.



Disadvantages of cardboard containers provided during move-in days include overflowing recycling containers like those pictured to the left. (Source: *University of Michigan – Student Move-In Guide*)

As a program becomes institutionalized the various outreach tools used to communicate to students can be used to divert materials and recycle more materials. The University of Michigan offers Move-in and Move-out information in printed form and on their website. Examples of their recovery efforts are located below. (Source: *University of Michigan – Student Move-Out Guide*, [Http://www.recycle.umich.edu/grounds/recycle/student_move-out.html](http://www.recycle.umich.edu/grounds/recycle/student_move-out.html)). The University also reminds students to return silverware, plates, glasses, and trays to Dining Services.

<p>Clothing</p>	<p>Must be clean and undamaged. Include items like shirts, robes, p.j.'s, socks, coats, hats, etc.</p>	
<p>Food and Toiletries</p>	<p>Must be un-opened and un-used packages. Include canned foods, ramen noodles, soap, shampoo, Pop Tarts, tea bags, etc. No perishables please!</p>	
<p>Bedding</p>	<p>Must be clean and undamaged. Pillows, blankets, sheets, mattress pads, foam bed rolls, towels and throw rugs.</p>	
<p>Household Items</p>	<p>Must be in usable condition. Include items like small appliances, kitchen and cooking utensils, baskets, school supplies, etc. Small electronics like unwanted cell phones, pagers and PDAs are also accepted.</p>	

RECOMMENDATION 2.

DETERMINE A BASELINE WASTE GENERATION RATE WITH OBJECTIVE DATA

REASON:

Currently, CMSU knows the number of contracted waste and cardboard recycling containers as well as extra containers for special events. **BARKER LEMAR** was unable to identify more objective data regarding the type and amount of waste being discarded. Consequently, a brief visual waste sort was performed to quickly identify materials that could be recycled as well as the location they were generated.

DESCRIPTION:

BARKER LEMAR recommends CMSU perform a more detailed study to collect objective baseline data. Objective data provides insight into waste management inefficiencies, need for further education, and/or needs to develop alternative management practices. Baseline data would assist the University in developing specific goals.

A Waste Characterization Study generally requires laborers to separate pre-selected loads of solid waste and then weigh and calculate the overall percentage of various waste categories. Waste Characterization Studies can also estimate volume for each waste category as volume is how the University pays for waste disposal services.



The picture above was taken at the Barker Lemar visual waste sort at the CMSU campus in the fall of 2004,

Another type of study is a “Capture Study”. This type of study sorts and weighs material from both recycling bins and solid waste bins. Ultimately this type of study provides a tool to measure how successful a specific program is in removing various waste components.

CMSU should also ask for a report from their hauler regarding the amount of cardboard collected each month.

OTHER RECOMMENDATIONS FOR CONSIDERATION:

The following are general solid waste management recommendations for consideration by the University. These ideas were developed through the research performed by **BARKER LEMAR** on campus. However, these recommendations were not considered a major waste management priority and were not developed into full recommendations at this time.

INTERNAL WASTE MANAGEMENT:

- Recycled content purchasing policy.
- Encourage improvements in departmental waste efficiencies through developed incentive programs (i.e. recognition, financial).
- Install compactors. Currently, the University pays for the volume of waste being collected for disposal. Compacting the waste generated at significant waste generation locations would increase the available waste container space as well as decrease the waste collection schedule.

RECYCLING:

- Establish joint service agreement with County and City for the development of a drop-off recycling site (permanent or mobile) on the University.
- Support inter-residence hall environmental projects (i.e. recycling competitions).
- Increase education/promotion for the use of the existing paper shredding/recycling program offered by the printing services.

CO-HOSTING “COLLECTION EVENTS”:

- According to the student focus groups, providing students with a financial incentive to recycle would decrease the amount of material being disposed.
- Corporations and various associations sponsor collection events for recycled materials – sponsored programs include “Reuse a Shoe” by Nike, Laptops for

Kids by the Child Cancer Foundation, the Hope Line Foundation (cell phones for battered women), and “Clothes for Kids” sponsored in part by Coca-Cola.

- Fraternity members identified cell phones collected for charities and cash redemption paid by the cell phone companies as a “worthwhile” project. If aluminum cans, electronics, tennis shoes, and other materials could be saved and recycled, there is a possibility they could be redeemed for cash and/or credit (for helping charities).

During the waste sort, aluminum containers were identified in significant quantities from fraternities and sororities; however the materials do not have a deposit and therefore are not considered by students to be “that valuable”.

CONTENT OF CONTRACT EXAMPLES

- Creve Coeur, MO - Garbage, Rubbish and Recycling Collection Bid/Contract
- Kirksville, MO - Solid Waste and Recyclable Material Collection Contract
- Sikeston, MO - Disposal of Solid Waste and Garbage Contract
- Waukee, IA - Curbside Waste & Recycling Contract
- Ottumwa, IA - Refuse Collection Contract
- Ottumwa/Wapello County, IA - Yard Debris Management Agreement
- Iowa Waste Systems Landfill - Disposal Service Agreement
- Cedar Rapids/Linn County - Request for Proposal for Recycling Processing Services

CONTENT OF ORDINANCE EXAMPLES

- Columbia, MO - Refuse Ordinance
- Columbia, MO - Special Business District – Solid Waste Ordinance
- Rolla, MO - Garbage, Trash, and Refuse Ordinance
- Rolla, MO - Fire Protection Ordinance
- Kirksville, MO - Solid Waste and Recyclable Collection, Transportation, and Disposal Services Ordinance
- Sikeston, MO - Solid Waste Ordinance
- St. Charles County, MO - Solid Waste Code
- Ottumwa, IA - Solid Waste Ordinance
- Iowa City, IA - Open Burning Ordinance
- Sioux Falls, SD - Garbage and Trash Ordinance

CONTENT OF LICENSING AND INSPECTION EXAMPLE

- Sikeston, MO - Licensing Ordinance
- Sioux Falls, SD - Garbage/Recycling Hauler License Application and Inspection Forms

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