October 13, 1999

Mr. David Mazza
Program Coordinator
City of Pittsburgh Recycling Program
3001 Railroad Street
Pittsburgh, PA 15201

Subject: Assessing Requirements to Establish a Yard Waste Management Facility for the City of Pittsburgh

Dear Dave:

This letter is to provide the City of Pittsburgh's Recycling Program with the results of R.W. Beck's efforts to assess what would be required to develop, implement and promote a yard waste management facility for the City of Pittsburgh.

The cost to deliver materials to a private composting operator for processing has steadily increased over the past few years, therefore the City is looking at the feasibility of starting and operating its own yard waste management site as a means to cut costs and generate material for use at City locations.

PLANNING AND IMPLEMENTING A YARD WASTE COMPOSTING SITE IN THE CITY OF PITTSBURGH

This report assumes the following:

- Approximately 4,700 tons of residential yard waste was collected from the curb, at drop-offs, and from City facilities in 1998. Tonnage has grown steadily and is expected to continue growing over the coming years. Collection (other than dropped off materials) is performed by City personnel.
- All material collected is delivered to a private contractor for processing at a cost of $29 per ton for transportation and processing.
- The City receives five percent of the finished product by weight and purchases additional mulch at a cost of $20 per ton.

To assist the City in assessing the need for and what is required to establish a yard waste management facility, R.W. Beck is providing the following:

- Estimated volumes of yard waste based on tonnage generated, and estimated composting/processing area required.
- Physical requirements for a yard waste management facility.
- Implementation factors and estimated costs.

Throughout this report you will find references to the ***Municipal Yard Waste Composting Reference Manual*** (***Composting Manual***--1991). The City may have received a copy of this manual during its initial distribution shortly after its completion. If you cannot locate a copy in your office, please let me know and I will be happy to help you obtain one.

YARD WASTE VOLUMES

The City has reported that the amount of yard waste collected has been climbing steadily from year to year. Most of the materials are dropped off by residents at one of four drop-off sites, one located in each division of the City. City crews perform a limited collection of leaves by vacuuming, primarily in heavily tree-lined areas. They also conduct one spring collection and accept Christmas trees.

In order to determine the size of site needed, the tonnage must be converted to a volume estimate. Because most of the leaves are dropped off, and without a breakdown of the amount of material dropped off versus the amount vacuumed, a conversion figure based primarily on loose leaves will be used for estimating volume.

According to the ***Composting Manual***, the density of loose, dry leaves is 200-260 pounds per cubic yard. The range for dry, vacuumed leaves is 250-350 pounds per cubic yard, and for moist, vacuumed leaves it is 350-450 pounds per cubic yard. Taking into account that some leaves may be damp and that some are collected vacuumed, a figure of 300 pounds per cubic yard will be used to estimate volume of leaves. Mixed yard waste, as collected, can range over a much wider scale, from 350 to 950 pounds per cubic yard. It is assumed, however, that yard waste would be shredded or chipped prior to composting, and the volume range for shredded yard waste is 450 to 600 pounds per cubic yard. For purposes of this report, 525 pounds per cubic yard, the middle of the range, will be used to estimate volume. The City reported that a total of 4,700 tons of material was collected in 1998, of which approximately 2,000 tons, or 43 percent, was leaves.

Table 1 presents: (1) the potential range of volume based on actual collection of 4,700 tons in 1998 up to 10,000 tons collected; and (2) total acres required for composting based on a maximum of 3,000 cubic yards per acre, as required in the ***Guidelines for Yard Waste Composting Facilities*** issued by the Pennsylvania Department of Environmental Protection (DEP).

Table 1 indicates that a minimum of eight acres is required for the active composting area alone, based on 1998 volume of material. City personnel have reported, however, that the City may prefer not to actively compost the material, but to grind or shred it only and use the final product as mulch. If this is the case, the land requirements would be smaller. The ***Composting Manual*** indicates that the volume of shredded mixed yard waste ranges from 450-600 pounds per cubic yard. Assuming an average of 525 pounds per cubic yard, the size requirements for the site are as illustrated in Table 2.

TABLE 1
ESTIMATED VOLUME/ACREAGE REQUIRED FOR PITTSBURGH CITY COMPOSTING SITE

Tons Collected	Total Pounds	Total Cubic Yds.*	Active Composting Area (acres)	Total Composting Area (acres)**
4,700	9,400,000	23,619.05	7.87	17.5
5,000	10,000,000	25,190.48	8.40	18.2
7,500	15,000,000	37,785.71	12.60	25.6
10,000	20,000,000	50,380.95	16.79	33.2

*Assumes 300 lbs. per cubic yard for 43% of tonnage, 525 lbs. per cubic yard for the balance of the material.
**Assumes 2 acres for staging area, storage area sized at approximately 50% of active composting area, and 50 foot buffer.

TABLE 2
ESTIMATED VOLUME/ACREAGE REQUIRED FOR PITTSBURGH CITY MULCHING OPERATION

Tons Collected	Total Pounds	Total Cubic Yds.*	Active Storage Area (acres)	Total Site Area (acres)**
4,700	9,400,000	17,904.76	5.97	10.6
5,000	10,000,000	19,047.62	6.35	11.0
7,500	15,000,000	28,571.43	9.52	14.4
10,000	20,000,000	38,095.24	12.70	18.3

*Assumes 525 lbs. per cubic yard with storage in windrows, maximum 3,000 cubic yards per acre.
**Assumes 2 acres for staging area and 50 foot buffer.

LOCATION OF COMPOST SITE

DEP's ***Guidelines for Yard Waste Composting Facilities*** specify that composting operations, including storage, composting and curing, shall not take place in the following areas unless the operator takes special precautions and obtains written authorization from the Department:

- In a 100-year flood plain
- In or within 300 feet of an exceptional value wetland
- In or within 100 feet of a wetland other than an exceptional value wetland

- Within 100 feet of a sinkhole or area draining into a sinkhole
- Within 300 feet measured horizontally from an occupied dwelling unless the owner has provided a written waiver consenting to the facility being closer than 300 feet
- Within 50 feet of a property line, unless the operator demonstrates that only curing of compost is occurring within that distance
- Within 300 feet of a water source

- Within 3.3 feet of a regional groundwater water table
- Within 100 feet of a perennial stream

In addition, access to the site must be controlled, so the site must be in a location where such control is possible. Vehicle access points must be gated or protected by some other barrier. Sites with natural barriers or those that are somewhat remote are preferable because they are less visible and therefore less prone to be entered by unauthorized persons, and generally less likely to cause problems because of proximity to occupied dwellings or businesses.

The City has indicated interest in establishing a site at Hess Run, located near the lower parking lot of the Pittsburgh Zoo. This is City property, so there is no purchase required and no need to obtain permission of another property owner. The Hazelwood section of the City has also been mentioned as a potential area for siting a facility, though it has been reported that siting may be difficult due to residents' concerns over the impact of such a facility on their neighborhood.

Based on a brief visit to the Hess Run site, it appears that the site has some potential for use as a composting/yard waste processing facility. Further study is required to ensure that all requirements pertaining to proximity to water can be met or addressed appropriately. It appears that there would no problems from the standpoint of distance from residential properties or property lines. The site has natural barriers, and users can only access the site through an entrance that is controlled by the City.

The City may wish to continue looking into other potential sites in case the Hess Run site turns out to be unworkable. City-owned properties should probably be the first to be evaluated, but other locations should be explored as well. While there has been little interest to date, the City should probably try to keep an open dialogue with potential players such as colleges and universities, the Pittsburgh Zoo, and the Pittsburgh Civic Garden Center to discuss cooperative arrangements. The City has reported that it will be working with the Civic Garden Center on a pilot project. Cooperative efforts of this type sometimes open the door to greater opportunities.

Implementing and Operating a Yard Waste Management Site

As mentioned above, there are two options for the City to consider for managing its yard waste: (1) composting; or (2) shredding or grinding materials to be stored and used as mulch. The City has reported a preference for the latter. The major difference between the two operations is how the finished product can be used. Compost is more stable, and has a wider range of uses, from soil amendment to top dressing or mulch. Shredded or ground material that is not composted has more limited applications. It can only be used for mulch, and because it is not as stable as finished compost (that is, weed seeds and other potentially problematic materials are not destroyed by the composting process).

Managing the site as a mulching operation does not eliminate the obligation for the City to submit a Yard Waste Composting Facility Application Form that provides the information required by DEP for site approval. Siting requirements and many of the operational requirements still need to be met. The advantages are that less space, time, personnel and equipment are required, and as a result, there is lower operating cost.

Tables 3 and 4 illustrate the estimated cost for the City to operate the site as a composting facility and as a mulching facility, respectively. These tables indicate that active composting would be more expensive than chipping/shredding materials to use as mulch. However, at an estimated cost of $60 per hour, it is more expensive than contracting with Emory Tree Service for transportation and processing of yard waste.

TABLE 3
ESTIMATED COST TO OPERATE A COMPOSTING SITE

Tons Collected	Composting Only		Composting/Screening	
	Processing Hrs.*	Total Cost**	Processing Hrs.*	Total Cost**
4,700	846	$50,760	1,410	$84,600
5,000	900	$54,000	1,500	$90,000
7,500	1,350	$81,000	2,250	$135,000
10,000	1,800	$108,000	3,000	$180,000

*Assumes .18/hrs./ton for composting only, .3/hrs./ton for composting/screening (based on figures from Manor Township leaf composting site (Lancaster Co.); also assumes loading and delivering compost as needed.

**Assumes a cost of $60/hr. (Manor Township)

TABLE 4
ESTIMATED COST TO OPERATE A MULCHING SITE

Tons Collected	Processing Hrs.*	Total Cost**
4,700	705	$42,300
5,000	750	$45,000
7,500	1,125	$67,500
10,000	1,500	$90,000

*Assumes .15/hrs./ton to chip/shred, stack/store, and load and deliver materials

**Assumes a cost of $60/hr.

These estimated costs are comparable with current program costs, which are estimated at approximately $136,300 for transportation and processing of 4,700 tons of yard waste by a private contractor at a rate of $29 per ton.

It should be noted that the City already has much of the equipment necessary to operate as a mulching facility, including a portable Willebald conveyor-fed grinder with hammers, two front end loaders, and dump trucks can be made available for use on the site as well. The City should evaluate the capacity of the grinder, however, to determine whether or not it will be adequate for managing all materials currently delivered to the site, and if so, whether or not an increased flow of material can be managed should more material be delivered.

If the decision is made to operate as a composting facility, additional equipment would be desirable. While windrows can be turned using a front end loader with a bucket, it would be more efficient to manage composting on a site of the size required by the City using a windrow turning machine. Table 5 provides information on other equipment that should be considered if the City decides that composting, rather than shredding/grinding alone, is the preferred method for managing its yard waste.

TABLE 5
POTENTIAL EQUIPMENT FOR USE AT A COMPOSTING FACILITY

Equipment	Cost Range	Capacity Range	Comments
Windrow Turning Equipment	$40,000-$80,000		Windrow turning attachment, requires front end loader/tractor
Front End Loader	$100,000		Needed to form windrows and to push or pull windrow equipment
Chippers and Shredders	$15,000 - $100,000	20 yd^3 – 200 yd^3/hr	Includes both Shear Shredders and Hammermills. Loader may be needed to feed hopper.
Tub Grinders	$50,000 - $150,000	10 tons – 50 tons/hr	Loader and/or knuckle boom may be needed to feed hopper.
Screens	$60,000 - $150,000	10 tons – 50 tons/hr	Loader and/or knuckle boom may be needed to feed hopper
Thermometers • Analog • Digital	 $50 - $150 $300 - $750		 Stem needs to be 3 to 4 feet long. Temperature range should be 0^0 to 200^0F

Any equipment needed for operating a mulching or composting facility is eligible for up to 90 percent funding under the Section 902 grant program authorized in the Municipal Waste Planning, Recycling and Waste Reduction Act (Act 101). Application for any equipment that can or will be used for other purposes will be scrutinized carefully by DEP and funding may be made available only on a prorata basis determined by the percentage of time the equipment is anticipated to be used for yard waste management. All operational costs must be borne by the City. Act 101 does not permit the use of grant funding for operations.

City recycling personnel have reported that there is a general impression that funds will be available from the City for operating the site. Because of the nature of the collection system, most of the material to be managed by the City is from residential sources. This means there is no revenue to the City in tipping fees to use the site. When asked whether the City has or would consider accepting materials for a fee from other sources, such as landscapers, nurseries, institutions or other businesses, it was reported that this was not likely because the City does not want to compete with the private sector. However, if the material is simply being disposed of because the cost imposed by the private sector to manage the material is too high, the City may want to revisit this issue as a potential revenue source to aid in operating the site.

CONCLUSIONS

- The City currently is collecting approximately 5,000 tons of yard waste from the curb, at drop-off sites, and from City facilities. This collection is performed by City personnel.
- Yard waste tonnage has increased steadily over the past few years, and continued increases are expected.
- The City pays a private contractor $29 per ton for transportation and processing of yard waste. The contractor returns five percent of the finished material by weight, and the City purchases additional material at a cost of $20 per ton.
- The City is interested in processing its own yard waste, and is considering two options: (1) composting; and (2) shredding/chipping material for mulch.
- Land requirements and management costs are less to operate a mulching, rather than a composting operation.
- The estimated cost for the City to operate its own yard waste management facility is less than the cost of the City's current management system using a private sector processor.
- If the City decides to operate any type of yard waste management facility, it must submit a Yard Waste Composting Facility Application Form to DEP to demonstrate that the City is meeting the requirements contained in DEP's ***Guidelines for Yard Waste Composting Facilities***.

- The City already owns much of the equipment needed for a mulching operation. Additional equipment would be required for a composting operation.
- The City does not wish to compete with the private sector and accept materials from landscapers, nurseries, and similar operations for a fee.

RECOMMENDATIONS

- The City should establish its own yard waste management facility to reduce the cost of managing these materials.
- If the City has sufficient need for mulch that could be generated by managing its own yard waste, the City should locate an appropriate site and establish a yard waste processing facility to shred/chip material to produce mulch. Production of mulch requires less land area and can be accomplished at a lower cost than producing compost.
- If the City finds that yard waste generated by landscapers, nurseries, and similar operations is being disposed because fees imposed by the private sector to manage these materials are too high, the City should reconsider its decision not to accept these materials and charge a fee (which should be less than the private sector). Accepting these materials for a fee would provide a revenue source to aid in operating the site.

Given the significant savings anticipated and the potential for generating materials the City currently purchases, it would be to the City's benefit to site, build and operate its own yard waste management facility.

Sincerely,

Sandra L. Strauss
Environmental Analyst

cc: Kathleen Kilbane, SWANA
Carl Hursh, DEP
Debbie Miller, R.W. Beck