Building Recycling Collection Infrastructure For Public Space Recycling

Careful consideration in building the recycling collection infrastructure at the start of a public space recycling program supports long-term success and involves far more than setting out new recycling containers. A successful program consists of containers that are supported by staff and the community, where the materials really get recycled. This is rare and truly something to celebrate.

The public space recycling collection infrastructure generally includes the following components:

- **Public containers**: Specially designed containers to collect recyclable materials are placed in areas frequented by the public, where recyclable materials are generated.
- **Public education**: Labels or signs are placed on or around the containers to explain what materials are accepted.
- **Collection method**: A city department (such as Public Works or Parks and Recreation) or a hauling company is responsible for servicing the containers, which involves gathering material from the containers (generally by pulling bags out by hand or through mechanical collection) and transporting the material. Ideally this collection should include a tracking system or feedback loop to monitor the program so that the manager of the recycling program is able to evaluate it regularly.
- **Transportation**: A collection vehicle hauls the materials out of the public space—this vehicle may or may not be outfitted with a mechanical collection system.
- **Holding area**: This area stores materials until a significant amount has been collected and is ready to be transported for processing.
- **More transportation**: Materials need to be hauled from the holding area to a recycling facility.
- **Processing**: Materials hauled to a recycling facility (sometimes called a MRF or Material Recovery Facility) are processed (sorted, condensed into bales, etc.) before they are sold to end markets.
- **End markets**: To truly recycle a material, there must be end markets available to purchase the material and use it to make new products.

Although the above elements are crucial pieces of infrastructure, policy infrastructure also plays a key role in designing your system. For example, a bottle bill (or container deposit legislation) can be more effective than a public space recycling program. States that have a bottle bill encourage residents to recycle their bottles individually, thus changing the need for collection and transportation systems to center around drop-off sites instead of many public containers. A bottle bill is generally implemented to encourage recycling, complement existing curbside recycling programs, and to specifically reduce beverage container litter. Additionally, states that have significantly higher fees for trash than for recycling are better able to demonstrate the value of recycling to individual citizens and encourage more recycling in general.

**Recycling and waste collection infrastructures are different**

Ensuring that materials are getting recycled is at the heart of a successful recycling program, regardless of what sector it is serving. However, most of our public spaces have not been designed with recycling in mind. Many of them do have a garbage collection infrastructure, which is designed to prevent litter in public spaces rather than ensure a material can be recycled. A recycling collection infrastructure must be able to keep the recyclable materials in
marketable condition in order to sell them to be made into new products.

When curbside programs began, entirely new operations were put in place to handle these valuable resources—different containers, different education, different trucks, and more. To implement a public space recycling program, there are generally two paths: Alter and use the current garbage infrastructure for recycling or create a new recycling infrastructure altogether.

Identifying the current collection infrastructure and determining how you will incorporate recycling

Before making any changes to an existing garbage collection infrastructure or investing in new recycling collection infrastructure, use these questions as a guide to understanding how garbage is collected in your public space and what equipment, processes, and systems you currently use:

- What is the infrastructure for collecting waste?
- What other maintenance infrastructure exists around the public space? For example, is there a separate infrastructure for regularly picking up litter in the parks? Who gardens or removes snow in the park? Can either of these programs be used to help the success of your recycling program?
- Where are the containers and how are containers serviced?
- What are the steps involved in transporting garbage from the container to a garbage facility?
- Who is involved and what are their roles?

Gathering this information will help you map out and understand the larger garbage collection infrastructure as well as the general public space maintenance infrastructure. The garbage structure may be dramatically different from the recycling collection infrastructure. Another part of the public space maintenance infrastructure may be a better place to start. The next step is to think through the options (in terms of costs, efficiencies, and environmental benefits) of operating within the garbage collection infrastructure or developing a new infrastructure for recycling.

- What materials will be collected for recycling?
- How will you maintain the quality of these materials throughout the collection process so they can really get recycled?
- If you collect recycling in the same way you collect garbage (mechanically, by hand, under a trash contract, etc.), are you limited to using certain containers? This may or may not give you the ability to distinguish the recycling containers from garbage containers or provide additional education.

- What are the steps involved in transporting recyclables from the public container to a recycling facility? (These will most likely be different from garbage—different trucks, different carts, different dumpsters, different facilities.)
- Where will the recyclables be taken for processing and selling to end markets? This affects how your materials need to be collected and what materials you can collect.
- How will quantities be tracked?
- How will contamination be monitored?
- What are your measures of success?

The collection infrastructure you choose will have a significant impact on the long-term development of your program. It will affect the cost of your program, the staff that carries out the transition, the ongoing maintenance of the program, public perception, and the environmental benefits of your program. The size of your public space(s) and the scope of your program as a whole may require a long-haul transition and a long-term investment in a public space recycling program. It is best to consider options completely before making a decision. Concessions made in the short term to get a new system up and running may create bigger problems and expenses down the road. Building recycling collection infrastructure on top of an existing garbage collection infrastructure
is a large remodeling project, which at times can feel inefficient and backwards (like when you find yourself washing your dishes in the bathtub during a kitchen remodeling project). On the other hand, starting from scratch and investing in an entirely new recycling infrastructure is cost-prohibitive for most communities and can lock you into a new system before you even have the opportunity to test it out. Either way, you’ll need to be prepared to look at the infrastructure as a whole system to make an informed decision about where to modify what you have and where to create something new.

**Working within a garbage infrastructure**

Altering the current garbage system can appear cheaper and easier because it does not require an upfront investment in new equipment, different containers, and a shift in operations. However, when working within a garbage infrastructure, you are constrained to using containers, collection methods and transportation that are designed for garbage, which may or may not be appropriate (or available) for recycling. Also, the more recyclables are treated like trash throughout the chain, the more adjustments must be made to address contamination and getting the material actually recycled. It is possible to make these changes, but it is difficult and can be expensive. There are consequences to using waste systems to collect recyclables. It is likely that you will encounter challenges if you value recycling more than garbage but you use a garbage infrastructure. If this is the route chosen for your program, here are some challenges you might encounter (you may identify other issues as well).

**Collection, storage and transportation methods must be compatible for both trash and recycling**

Trash collection systems in public spaces can be highly automated systems designed to handle large amounts of trash. The storage containers specific to the garbage collection equipment may or may not be serviceable by recycling trucks to transport the materials to a recycling facility and may require altering to make sure materials are getting recycled.

**NOTES FROM THE FIELD**

The transition period of building a public space recycling infrastructure from a garbage collection infrastructure is hard. We met many of the challenges described above in our pilot project at Mears Park. Our art-inspired recycling containers needed to be designed to work with the mechanized garbage collection infrastructure. The initial plan was to collect recyclables using the City’s automated collection vehicle, with a dumpster attachment that needed to be emptied by a front-loading truck. This path created an obstacle when we found that there were no recycling trucks in the area that could service this type of dumpster.

Parks and Recreation researched options to modify a front-loading dumpster so that it could be emptied by a rear-loading truck. However, this modification wouldn’t prove cost effective unless there was a significant amount of recyclables collected—much more than would be generated at Mears Park. Until the route would be expanded beyond Mears Park, it was more feasible for staff to pull out the recyclables from the collection dumpster by hand, rather than modifying the dumpster. Staff would then put the recycling in 90-gallon carts that could be collected by local recycling trucks.

Ultimately, there was another solution identified. Parks and Recreation tapped into an existing resource, and are having staff who regularly pick up litter in the park also monitor and service the recycling containers. They pull recycling out of the containers by hand and put it in bags. The bags are then transported via a pickup truck to the central holding area. The city has identified this as a short-term solution to be used only until a recycling collection route is filled out enough to make the original, more mechanized collection system efficient.

While the mechanized trash collection infrastructure for Mears Park needed much adjustment to add recycling, in contrast, the trash collection infrastructure for Como Park Zoo and Conservatory needed very little change to be used for recycling. Como’s infrastructure now involves pulling bags by hand and transporting them via golf carts to centralized dumpsters for trash and carts for recycling.
Efficiencies may only be gained with high volumes of material

A trash collection system based on high volumes will be inefficient when applied to public space recycling. At the onset, there aren’t the higher volumes of recycling that will come as the program matures.

Efficiencies for trash collection may inhibit the ability of staff to report on the recycling program

For example, the mechanized nature of trash collection infrastructures creates less opportunity for collection staff to recognize contamination and report problems at the point of collection.

Efficiencies may decrease the value and recyclability of the material collected

Although you can gain some cost efficiencies the quality of recyclables may be compromised by using a trash collection infrastructure. For example, many garbage trucks use compaction, which increases the capacity of trucks but actually damages the recyclables by crushing glass and embedding it into other materials. This collection method has raised serious issues about the quality of materials (especially when glass becomes embedded in paper) and adds significantly to processing costs.

The public is observant and may perceive the mishandling of recyclables

Observant park visitors will notice if recycling and garbage are being collected in the same way, by the same vehicle, or even at the same time. This can lead to skepticism about public space recycling.

Specialized containers, as well as collection and transportation methods designed for recycling collection, and systems that protect the quality of materials contribute to the success of public space recycling. Although an entirely new collection infrastructure designed especially for recycling is ideal because it is more likely to yield long-term benefits, most communities do not have the resources for such a major overhaul all at once. It takes time to build a public space recycling program and to transition from wasting to recycling.

Establishing effective recycling collection contracts

The basic process for getting recyclables (and garbage) collected and delivered to a facility involves entering into a contract with a hauler. This begins by issuing a Request for Proposals (RFP) for collection services. RFPs are public information and examples are widely available. The criteria for selection of the “hauler” can be established in the RFP documents, and that document usually serves as the basis of the service and contract itself. The decisions you make about the containers, education, the materials to collect, and the level of involvement of your staff in servicing the individual containers must all be solidified prior to writing an RFP; however, these choices may limit who can respond to your RFP, so it is wise to survey the landscape as you go.

Collection contracts for public space recycling either require a hauler to pick up recycling from a central holding location (most common) or require the hauler to collect materials from each individual container. Either way, it is important to follow existing best practices for contracted collection services that already exist. Many counties and cities have staff or consultants who assist with contract development to ensure these best practices are followed. The contract should clearly outline the reporting you require from the hauler.

It is usually the responsibility of the maintenance staff to transport the recycling from individual containers to a central holding location for servicing. This arrangement gives the maintenance staff a more intimate relationship with the public space recycling program and makes it easier to make improvements and address issues. However, if you are contracting with a hauler to pick up recycling from individual containers, you will need to be specific
about requiring reporting so that you can get the information you need. This includes:

- data on the amount of recyclables collected;
- route information (which containers are serviced on what days);
- information about contamination problems at containers;
- procedures for servicing contaminated containers and for setting up new containers;
- a requirement to place containers in locations that are convenient for the public;
- distribution of approved or provided labeling systems and educational material; and
- clear levels of expected customer service. Include language that gives you authority to charge damages for poor service (called liquidated damages).

Examples (and best practices) for public space recycling are still surfacing; Eureka Recycling will continue to explore public space recycling contract design and will make findings available as they surface.

**Identifying what materials to collect**

There are several methods and tools that can be used to identify which materials to collect in a particular public space. A *baseline study*, the documentation of what you find before implementing your program, can include waste sorts and visual audits, and gathering information from maintenance staff. This tool is crucial for designing your program, communicating with stakeholders, and evaluating its effectiveness after implementation.

**Conduct waste sorts**

Sorting the waste generally includes pulling out recyclables and measuring the potential recycling as well as the current trash generated at a potential recycling site. Waste sorts are an opportunity to look closely at the discard patterns of public spaces. A waste sort can be designed to provide detailed or vague results. Waste sorts can be conducted both before and after a recycling program is implemented. Before implementation, a simple waste sort can tell you the recycling potential, or diversion rate. After a program is in place, you can conduct a waste sort to identify what recyclables are still being discarded and to measure the contamination in the recycling. This information can inform future education efforts.

A waste sort can be designed to provide information about composition by separating the recyclable materials by type (glass bottles, cans, plastic bottle, paper, etc.) This can help inform the materials to collect in the program.

Most waste sorts measure weight, volume, or both depending on the goals of the waste sort. Measuring volume (or quantity) of recycling will give you a better view of the social implications of recycling (how many people recycle) and costs by volume. Sorting by weight will help you compare to industry standards and calculate the energy savings from the program and the costs by weight. Keep these results in mind as you plan your waste sort and determine your data collection needs.

Waste sorts can also provide information about the future diversion potential of a program. If you sort out compostable material, you can identify the diversion potential if a composting program would be implemented in the future. You can also identify other waste reduction opportunities with producer responsibility. For example, at Como we separated trash generated by vendors from the trash that visitors brought in themselves. This allowed us to understand how much Como would be able to reduce its trash by changing what it sells onsite.

Waste sorts can be used as a community-building tool. By using volunteer and stakeholder energy at waste sorts, you keep them involved in the process and build their understanding of the actual recycling potential in the public space.

It’s important to keep in mind that waste-sort
results are all just a few snapshots in time. Long-term tracking is crucial for evaluating a program. Additionally, careful planning should go into deciding when and how much waste to sort. Consider the climate of your area and the impact of seasonal fluctuation on the recycling program. For example, because of cold winters in Minnesota, most parks are used much less frequently in the winter. Those that are used throughout the winter still tend to attract fewer discards and fewer bottles and cans.

**Conduct visual audits**

A waste sort is the ideal tool used to gather information needed to build a program. However, if there aren’t resources available to conduct a full waste sort, visual audits can provide important information. A visual audit involves looking at the waste discarded in trash containers and estimating recycling potential. A visual audit can reveal if there are any recyclables in the trash at all (but can’t provide details of volume) as well as what sort of recycling is typically discarded at the location you are observing. A visual audit can also include observing behavior and identifying how people use the public space. For example, do visitors read a lot of newspapers? Do they consume many beverages?

Learning more about how the park is used can help you identify the types of recyclable materials that may be present. Is there a field for active team sports? If so, it’s likely to produce many bottles in the trash. Is it a public library where food and drink aren’t allowed? In this case, paper may be the most prominent recyclable material (unless recycling containers are at the entrance where people discard their bottles and trash before entering).

**Communicate with maintenance staff and other connections within the infrastructure**

Regardless of whether you can do waste sorts and/or visual audits, much can be learned by talking to staff who service the containers and by observing the amenities in the public space. Program managers can also make other connections within the infrastructure, such as reservation systems, maintenance programs, or volunteer programs as well as other support staff such as security guards, maintenance staff, or gardeners for additional program support. It’s important to know about these connections because they can affect your program in ways you may not be aware of, or may have valuable information you can tap into.

Maintenance staff can provide invaluable information about the current collection infrastructure, collection methods, and opportunities for tracking and monitoring the recycling collection. They have the experience to identify a feasible

**NOTES FROM THE FIELD**

At both Como and Mears Park, the staff who empty the trash containers made excellent recommendations regarding where we should place new recycling containers. They were familiar with traffic patterns, materials discarded and the containers that fill most frequently.

Beyond the development of the program, maintenance staff continued to provide valuable feedback. By staying in contact with the staff who collect recycling in Mears Park, we learned that they pull contamination out of the recycling when they empty the containers. Now we know that as long as the recycling is being collected by hand, there will be minimal contamination. We can also get feedback from staff concerning whether there is much initial contamination.
infrastructure for the recycling program. They can also identify other public space maintenance programs that might be available to help manage the recycling program—for example, can staff who pick up litter also be asked to remove contamination from recycling containers? Lastly, they can be instrumental in developing tracking tools to measure the daily volumes of trash and recycling once the program is in place. Your public space recycling program will have more success if you have support from the people who interact with the program and are crucial to its operation.

**Determining the collection method**

Most public space recycling programs focus on collecting bottles and cans, because this is the most prominent recyclable material we discard in our on-the-go lifestyles. Conducting a baseline study can help inform the choice of materials you target for collection. If you are considering single-stream collection to include paper, contamination will compromise the quality of the materials you collect. Single-stream collection, where cans, bottles, paper and cardboard are all collected in the same container, adds to the confusion about recycling vs. trash. A whole container of mixed recyclable materials looks much more like trash than separated items. This confusion is even more problematic when the containers for recycling aren’t easily distinguished from the trash containers or information about the program is not clear, labels are not obvious, or information is not well designed. When you design a program to capture recyclables in public spaces, collecting more trash is not the goal. If you do choose single stream, make sure to design signs, labels, outreach, and education that is simple, clear, and ongoing to help residents discern between trash and recycling.

**Selecting containers**

Public space containers have similar characteristics and challenges to multifamily recycling containers and drop-off sites. The primary issue to address is contamination. To best address contamination, recycling containers must be:

1. easily distinguished from trash containers;
2. consistent in visual appearance;
3. easily and regularly serviced;
4. designed with restricted openings (this design yields lower levels of contamination);
5. at least as convenient as trash containers (an equal ratio of trash containers to recycling containers; if this is not feasible, pair two trash containers with each recycling container so that recycling is an option at each discard location).

In an ideal world, we could pair every trash container with a recycling container (or containers), but few communities have the resources to add a complete recycling program at once. Consider purchasing fewer containers that are well-designed and well-monitored. This phasing-in method provides several benefits:

- Purchasing fewer containers and tracking success helps justify the investment in more containers in the future.

### NOTES FROM THE FIELD

The budgets of our three pilot locations required that we install fewer recycling containers than there were existing trash containers. This ratio varied from 1 recycling container for every 2 trash containers at Mears Park to 1 recycling container for every 12 trash containers at Como. In all cases we found that the amount of recycling collected was higher than expected, considering the simple ratio of containers. Based on this learning, we believe that if you have to limit the design of your program because of budget constraints, focus first on design elements 1 through 4 above and then work on number 5 to implement more containers over time. Education about the program and visitor interest can go a long way in raising awareness and increasing participation in the meantime.
By phasing in the program, you provide maintenance staff with an opportunity to work out the challenges of the transition, before the program is more widely implemented.

Monitoring and servicing fewer containers may require fewer resources at the onset, but it’s also important to recognize the possibility for inefficiencies until the program is more widely implemented.

You can maximize the use of the containers by investing in additional education so visitors are more aware that recycling is available. When the public is aware that recycling containers are available, they can make the choice to hold on to their discards until they make their way to a recycling container.

A phase-in plan allows you to budget for the program over a number of years.

If considerably more trash is generated in a park than recycling, consider placing two trash containers next to a single recycling container.

Designing education

Unlike trash containers that need little accompanying education, recycling containers need lots of accompanying education to help people understand how to use the container, and inspire them to do so!

Due to the unsupervised nature of public spaces, education for public space recycling programs is similar to multifamily (apartment) recycling education. The containers are unsupervised, and the users are fairly anonymous (compared to curbside recycling). Designing clear and motivating education on and around the containers is the most effective way to help the public understand how to use the containers at the “moment of discard.”

Create effective labels and signage

Every trash container everywhere accepts the same materials, but recycling programs differ from place to place. However, people will not learn a lot of detailed information about what is recyclable and what is not from a label, so this is not the place for an extensive “Yes & No” list. Labels are intended to keep large amounts of trash out of the containers.

Signs are an effective tool for identifying recycling areas and distinguishing between garbage and recycling containers. It is well worth the investment to make your signs permanent and high quality, such as an aluminum sign or a weatherproof banner. You can use these signs to demonstrate ownership and support for your program and reinforce the sense of community involvement in recycling. Signage throughout the area can even direct visitors to recycling stations, especially if you have a limited number of recycling containers available.

Essential elements for any recycling signs and containers

- The recycling “chasing arrows”
- The word “recycling” (and translations if appropriate)
- Images of recyclable materials
- Color coding that distinguishes the recycling (usually blue) from the trash
Additional tips

- Consider messages such as “We Recycle” and “Do Not Put Trash in Our Recycling Containers” to create a sense of community.
- Signs should be simple, with few words, clear messages, and widely recognized symbols such as the recycling icon of the chasing arrows.
- You can add a bit more detail by showing pictures of specific recyclable items.
- Consistent labeling is necessary to visually distinguish the recycling containers from trash containers, which are typically unmarked.
- Pictures or illustrations can be used to provide simple instruction for people on the go, and can communicate to those who do not read (children) and those who do not read English.
- Education can be tailored to reflect the specifics of your recycling program. For example, use single-serving beverage containers as images on labels’ and signs’ pilot locations. Other types of public spaces may have different compositions, which you can learn through waste sorts as you build baseline data.
- We know from our years of experience in recycling that the most motivating factor for people to recycle is the environmental benefit. Recycling containers and accompanying education that are designed to remind people of the environmental benefit of recycling can be much more inspiring than containers that closely resemble trash containers and are generically labeled.

Educating the public beyond the container

As mentioned above, it’s ideal to make recycling just as convenient as trash by pairing every trash container with a recycling container. However, if you don’t have the resources to install an abundance of recycling containers, you will need more education with motivating messages to encourage the public to use the recycling containers that are available. Look for additional education opportunities away from the container to raise community awareness, minimize contamination, and maximize the recyclable material you can capture from the waste stream in your public spaces.

By adding education at additional locations where visitors interact with the space, you can further increase awareness and community ownership of your program. The following areas provide opportunities for additional recycling education beyond the container:
- Literature or other means of informing the public: websites, maps, reservation forms, brochures, etc.
- Banners on poles can add height to education at a recycling location, so visitors can see them from afar.
- If the public space includes a lobby, gathering space or reception area, this can be a great place to display information about your recycling program.
- Educating staff who work in the public space can empower them to share information with park visitors. Staff will also further understand the importance and unified support for the project. Recycling education should be included in new employee orientation as well.

Measuring the success of the program

Implementing a public space recycling program isn’t enough. Simply having recycling containers out in a public space cannot be the sole measure of success. To truly understand the impacts of your program, to support those involved and to inform improvements, you must gather more information. When you value recycling and elevate it above garbage, you can take measurements to justify your public space recycling program. These will help you demonstrate the larger benefits to stakeholders, including the environmental benefits and community support for your program.
Ongoing permanent tracking

Perhaps most crucial is the ongoing measurement of the weight of the recycling collected throughout the life of the program. This can be used to regularly update stakeholders about the benefits of the program. These benefits include the environmental or economic value of diverting this material from the trash, as well as the community participation in the program.

A garbage collection infrastructure doesn’t usually involve detailed tracking systems and is generally set up to gain efficiencies. If you design a recycling program just like your garbage infrastructure, you may prioritize efficiency over the design of a system that can easily be tracked and measured. Without tracking the results and costs of your efforts, you won’t be able to advocate for your program.

Waste sorts and recycling sorts

A detailed material analysis involves waste sorts and recycling sorts to learn more about recycling potential and composition at recycling locations. This is much more labor intensive and tends to involve more community support through planning, staff time, volunteers, and actually sorting the materials. The results of a detailed analysis can be applied for future projections when combined with the results of ongoing permanent tracking. Also, by using these two measurements together, you can calculate social and environmental benefits of your programs and communicate success.

While measuring pounds is crucial to evaluating environmental and economic benefits of a program, an additional measurement and calculation can give you an estimated total number of bottles and cans collected, which helps demonstrate community participation. Essentially, each bottle or can collected in your program was recycled by an individual. Knowing the number of residents, citizens, or visitors who were able to recycle at a public space can be very moving.

You can estimate the number of bottles and cans collected using a measurement tool called a recycling sort combined with the total weight of recycling collected to date. A recycling sort measures the material placed in the recycling container by weight and can include sorting by material type (aluminum can, glass bottle, plastic bottle, trash). Once you find your program’s average composition, you can either use industry standard weights for bottles and cans or count them yourself to find the average number of aluminum cans, glass bottles and plastic bottles collected per pound. Recycling sorts can

NOTES FROM THE FIELD

We encountered this challenge in our park pavilion pilot. Seeing an opportunity for efficiency, Parks and Recreation manually hauled the recycling collected at park pavilions back to a central location where it was combined and collected with all other recycling generated at the central facility. While this strategy may seem more efficient for collection, it limited our ability to track the quantity and quality of materials that were collected at the individual pavilion locations. We have applied our learning from waste sorts and recycling sorts to provide information about general materials and quantities at each location, but moving forward we will work with our partners to balance the value of tracking additional information with the need for efficiency.

NOTES FROM THE FIELD

From our ongoing permanent tracking at Como, we calculated that in the first 15 months of the public space recycling program we collected 2.47 tons of recyclable material. By combining this tonnage amount with composition data learned from our waste sorts, we estimate that Como’s 13 containers allowed guests to recycle more than 50,000 times. By providing this opportunity for visitors to recycle, we send a message of environmental and community stewardship and encourage visitors to recycle on the go, as well as at home.
be done a few times to ensure you are getting an accurate average composition. However, once you arrive at the average, this information can be applied throughout the life of your program to update information you share with stakeholders.

A recycling sort can also measure the contamination of trash in the recycling and help you assess if it is a problem (based on program goals). Other measurements you employ can be tailored depending on what you want to learn about your program.

Another common measurement used when evaluating recycling programs is the diversion rate. A diversion rate measures percentage of recycling diverted from the total amount of materials collected, which includes both recycling and trash. For example if you have collected 2 pounds of recycling and 8 pounds of trash, the diversion rate would be 20%. However, it can be difficult to measure the success of emerging programs by diversion rates. In order to calculate an accurate diversion rate, you need to measure both the trash and recycling collected in your program, which can be challenging, particularly if tracking is not already a part of your trash collection infrastructure. Furthermore, for emerging programs, where the infrastructure is still being built, the diversion rate can be minimal. If you aren’t able to measure the trash produced in your public space, tracking recycling alone can still provide information needed to measure the benefits of your program.

### Tracking staff time

In addition to understanding the type of materials and the amount of materials you are collecting, another important measurement is the staff time required to support the program. Not only is this helpful for budgeting purposes, but to measure the success of any program, you need to balance the cost against the benefits. With this knowledge, public space stakeholders are able to move forward and make informed decisions about how the program can continue and expand.

### Calculating the environmental benefits of your program

There are many models to convert the environmental benefits of recycling to terms of energy saved, pollution reduced, water saved, or greenhouse gas emissions reduced. Carbon and carbon dioxide, common greenhouse gases, are emerging as a common currency in measuring the beneficial environmental impact of recycling. The most recognized and standard model for measuring carbon equivalents is the Environmental Protection Agency’s Waste Reduction Model (WARM). For more information on WARM and calculating greenhouse gas reductions, visit [www.eurekarecycling.org](http://www.eurekarecycling.org) to read.

#### NOTES FROM THE FIELD

Using WARM, we were able to calculate that the 5,000 pounds of recycling we collected over the study periods at Mears Park and Como Park Zoo and Conservatory are the equivalent of 7.3 metric tons of carbon dioxide (MCTO2). Using the EPA’s Greenhouse Gas Equivalencies Calculator, we are able to translate this number into everyday examples that people can relate to such as the energy equivalent of 821 gallons of gas.

By stating the impact in carbon equivalents, we have a standard language for people to compare recycling with other environmental impacts such as transportation and energy conservation efforts. These environmental benefits of public space recycling projects are a powerful message to share with staff, stakeholders, and the broader community.

Whichever measurements you decide to use, think carefully about the feedback loop and who should hear about the impacts of the recycling programs. One of our key audiences was the maintenance staff who helped us during the pilot. They will continue to work on and improve the recycling program as it continues and grows. Knowing the results of their efforts can both help motivate them in their work and inform their decisions as they move forward.
Conclusion

Public space recycling programs take much more than just putting out recycling containers to be successful. Working in collaboration, involving the community, investing in infrastructure, and setting clear, realistic goals can lead to a program in which everyone benefits, including the environment. The benefits of public space recycling are measured more than just in tons of recyclables. There is value in increasing public awareness about waste reduction, an increased culture of recycling, and the massive environmental benefits of recycling the material we do collect. Public space recycling also brings us further down the road to zero waste by setting the stage for composting and furthering waste reduction efforts. Public space recycling highlights the community’s commitment to the environment, and increases the livability of a community.

What we learned through our pilot projects has led to recommendations to the City of Saint Paul to build on the current pilot areas and allocate resources for expanding public space recycling throughout the city. We will support Saint Paul in implementing our recommendations, as a step toward becoming a zero-waste city. To learn more about Eureka Recycling and Saint Paul’s approach to zero waste and for updates on public space recycling in Saint Paul and other zero-waste initiatives, please visit www.eurekarecycling.org.

This report reflects Eureka Recycling’s learning about public space recycling to date, but there is always more to learn! Please share your comments, feedback, and ideas with us.

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Summary of Eureka Recycling’s pilot projects

Como Park Zoo and Conservatory

The Como Park Zoo and Conservatory is located in Saint Paul’s Como Park. Como Park is a 300-acre multi-use public park owned by the City of Saint Paul. It includes a wide variety of landscapes and attractions.

For our pilot, we focused on collecting materials within the zoo area, which welcomes nearly 2 million visitors a year. The zoo is a Saint Paul tradition; if you grew up in the area, you’ve been there. It is a standard destination place for countless school field trips and daycare centers. Admission to the zoo is free, with voluntary donations to help care for the plants and animals. Conservation is part of the mission of Como. Staff members are dedicated to preserving resources and operating in an environmentally responsible, safe, and sustainable manner. An established Green Team meets monthly to monitor environmental efforts and maintain a sustainable workplace. Como’s existing commitment to the environment and established Green Team was a strong base for our partnership in this project.

Public space recycling at Como is viewed as a gateway to other waste reduction initiatives, such as composting. The infrastructure existed for trash collection, where maintenance staff serviced containers and hauled bags of trash to a holding area with a golf cart. This trash collection system was easily adapted for recycling collection, because bags of recycling could be pulled by hand and easily kept separate from trash.

With the launch of this program in June 2008, visitors gained access to recycling for their bottles, cans, milk cartons, and juice boxes. This pilot project focused on testing the educational and logistical aspects of the recycling program as Eureka Recycling and Como Park Zoo and Conservatory monitored the materials collected through the recycling program, gathered feedback from park visitors and maintenance staff, made adjustments, and documented results.

Mears Park

Mears Park is a Saint Paul treasure. This award winning park was co-designed by artist Brad Goldberg and landscape architect Don Ganje in the 1990s and has been honored by the America Society of Landscape Architects as a national landmark for outstanding landscape and architecture. The park covers a one-block area in the high-density mixed-use Lowertown area of Saint Paul and is frequented by business people on their lunch breaks and dog-walkers who live in nearby apartment and condominium buildings.
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A working group of stakeholders included the City of Saint Paul, Eureka Recycling, and Public Art Saint Paul. The group set parameters and goals and worked in collaboration to design and implement all aspects of the program. Because Lowertown is home to many artists and the community values public art, local artists were commissioned and brought into the working group to incorporate a community feedback process into an artistic design of recycling containers and an education ritual for the program.

Composition studies showed that the diversion potential for recycling in Mears Park is not very high. (The majority of waste in this park is from to-go food packaging and dog waste.) However, this park was chosen as a priority for public space recycling because the visibility and public perception is high. Permanent recycling at Mears Park is also viewed as a gateway for the City to implement event recycling for the many events held in the park, and shows the potential for zero waste through the addition of composting in the future.

The highly automated waste collection infrastructure at Mears Park was more difficult to adapt to recycling than at Como Park Zoo and Conservatory. The design of the recycling containers was constrained by Saint Paul Parks and Recreations’ automated collection vehicles, and additional holding and transportation methods needed to be developed to get the collected materials to a recycling facility.
Urban park pavilions

Saint Paul Parks and Recreation maintains park pavilions throughout the city. These pavilions may be reserved, and they provide a covered shelter, picnic tables, and a kitchen space. In June 2008, Parks and Recreation, with help from Eureka Recycling, launched public space recycling at six park pavilions in Saint Paul.

Park pavilions have less infrastructure and accountability to park users than Como Park Zoo and Conservatory, but more infrastructure than an open park like Mears Park. Pavilion spaces must be rented ahead of time through a reservation process, with the exception of holidays when they are open to the public on a first-come-first-served basis. Groups that rent the pavilions are as diverse as the city inhabitants and include families, churches, school groups, businesses, and other groups that come together in celebration.

Eureka Recycling provided container and label recommendations for Saint Paul Parks and Recreation, as well as pickup service for recycling collected at the parks. With the launch of this program, visitors to the pavilions were able to recycle their bottles and cans. After one year of service and nearly 1 ton of recyclables collected, Eureka Recycling conducted waste sorts to evaluate the success of the program and make recommendations for increasing diversions and expanding it to other public spaces in Saint Paul.
Pilot Project: Como Park Zoo and Conservatory

Como Park Zoo and Conservatory is a well-known and well-loved public zoo. A tradition for Saint Paul residents, entrance to the zoo is free, and it is frequented by area school groups, day cares, and families. Como receives nearly 2 million visitors throughout the year, most of those during the summer months. The attraction areas include a zoo, a conservatory, and an amusement park.

Saint Paul Parks and Recreation Department (which manages Como Park Zoo and Conservatory) and Eureka Recycling partnered to establish a permanent recycling program at Como.

Conservation is an important part of Como’s mission, and Como had a well established Green Team already committed to lowering the environmental footprint of the facility. The Green Team is composed of staff members who meet monthly to monitor Como’s environmental efforts and maintain a sustainable workplace. The full Green Team was kept abreast of the recycling project process, but a more agile and functional “recycling working group,” which included two interested representatives from the Green Team, was established to implement the program.

The working group included the facility’s Operations Manager, Maintenance Team Supervisor, the Marketing and Public Relations Manager, the two representatives from the Green Team, and two representatives from Eureka Recycling. This group was able to make informed decisions about budgets, collection logistics, education and promotions, and the community process at Como.

Identifying what materials to collect

Visitors to Como generate up to 282 pounds of trash per day on average, but the amount varies greatly with the seasons and holidays. A busy summer holiday can produce more than 2,300 pounds of trash in one day.

Baseline waste sorts

The chart to the bottom illustrates the composition of waste by weight from Como’s baseline waste sorts. About 25% of public discards could be diverted

![COMO ZOO & CONSERVATORY BASELINE WASTE SORT](chart.png)
through recycling bottles and cans. Paper was a minimal percentage of the waste stream (3%), often contaminated with food, and primarily consisted of maps handed out at Como. To reduce waste, Como had already implemented a system for visitors to reuse maps. Results of the baseline waste sorts revealed an opportunity to capture even more maps for reuse. Rather than adding a recycling infrastructure for this minimal amount of material, staff may instead revisit the current map reuse system to identify an effective, non-invasive alternative to encourage map reuse.

By far the most diversion could come through composting (45% of the waste at Como), but introducing a new practice such as composting before the more familiar sorting system of recycling is introduced would present challenges for collection and education. Como began its program focusing on recycling bottles and cans with the intent to build systems, education, and a culture of waste reduction that will move Como closer to composting collection in the future.

The chart at right illustrates the composition of bottles and cans by weight from Como’s baseline waste sorts. The baseline data revealed that the bottles and cans at the zoo primarily consisted of plastic bottles, as well as a considerable amount of milk cartons and juice boxes, all of which are sold onsite as well as brought in by the public. Considering the many children who visit, the amount of milk cartons and juice boxes was not surprising.

### Identifying the current infrastructure

Como has up to 120 trash containers spread throughout the grounds. They are serviced throughout the day. These containers are easily moveable, which enables maintenance to wash under them and rearrange them as necessary. All public trash containers throughout the park are 33 gallons or less in size and are emptied frequently to prevent the trash bags from being too heavy for employees to lift out of the containers. Trash at Como is collected by hand-pulling bags and transporting them with golf carts to the nearest dumpster. Seven dumpsters behind the scenes around the facility collect waste generated by the public, vendors, and the animals.

During the slower winter months, the majority of these trash containers are put into storage. The remaining containers are placed in locations that are accessible to the public but out of the way of the snow removal paths.

### Designing the collection infrastructure

The garbage collection infrastructure at Como was easily modified to incorporate recycling collection. Bags of recycling are collected by hand from the containers in the same way as trash and are then transported to the holding area with golf carts. The facility added 90-gallon carts in the holding area to store public space recycling for collection by recycling trucks. The carts holding materials from the public space recycling program were kept separate from carts that hold recycling generated by the facility’s office buildings. This was intentional to allow for the recycling truck drivers to track the public space recycling volumes separately from the office building recycling.
Selecting containers

Como selected new recycling containers that both worked within the current collection infrastructure and looked significantly different from trash in order to prevent contamination and inspire recycling. The recycling containers have a bright blue, restricted-opening lid and room for an education label. Trash containers, matching the recycling container but without a lid, were also purchased to place alongside the new recycling containers as a paired station.

Ideally, every one of Como’s 120 trash containers could be paired with a recycling container, but this was financially unrealistic. Instead, the facility began a transition by purchasing and installing 10 new paired stations in June 2008 (each pair consisting of one recycling container and one trash container), with the plan to add more each year in the coming years. In spring 2009, three additional paired stations were purchased and installed. Containers were placed at high traffic and high visibility areas, and clearly labeled with education. The cost of all 13 sets of containers was approximately $10,250, excluding educational labels or signs on the containers.

Designing education

The labels and signage for both containers were designed to fit within the facility’s aesthetics as well as provide education via words and pictures of recyclable items typically found at Como (identified through the waste sorts).

Launching the program

On June 25, 2008, Eureka Recycling, the City of Saint Paul and Como Park Zoo and Conservatory launched the new permanent public space recycling at Como, with the help of Sparky the Sea Lion and a large crowd of visitors. Sparky’s trainers worked in messages about recycling, making the connection to climate change and habitat preservation, and Sparky showed the crowd how easy recycling is by taking a plastic bottle out of the water and putting it in the recycling container. Additional speakers included Susan Hubbard, CEO for Eureka Recycling; Peder Sandhei from the Minnesota Pollution Control Agency; Mike Hahm, the Director of Como Park Zoo and Conservatory; and Lee Helgen, Saint Paul City Councilmember.

Leading up to the press event, guests were asked to contribute to a poster with their thoughts on why it is important to recycle at Como. Thoughts recorded on the poster included:

“Recycling keeps our air and water clean and healthy.”

“It helps stop global warming.”

“If you litter an umos get sick.”
Tracking recycling and trash rates at new containers

Data to measure the results of Como’s recycling program was collected in two ways, by Como’s maintenance staff and by our recycling collection driver. We used these two forms of data to compare and ensure we were getting a consistent and accurate measure of material collected. This method helped us to identify discrepancies in the data and clarify tracking methods with Como’s maintenance staff and our driver. After a year we had a good picture of the trends in material collected, so we just continued with tracking by our recycling collection driver and discontinued tracking by maintenance staff.

Tracking by recycling collection driver

As part of regular collection service, each time our driver collected materials at Como, he tracked the volume of the recycling carts. For each 90-gallon cart of bottles and cans that was collected, he recorded that it was one-fourth full, half full, three-fourths full, or full. These amounts were totaled and then multiplied with average cart weights (identified by waste sorts). This tracking system is a regular practice for all of our collection routes and thus is a sustainable way for us to continue tracking and reviewing the public space recycling program at Como for years to come.

Tracking by maintenance staff

For a little over a year, daily data collection was implemented by the facility’s maintenance staff at the new paired recycling and trash stations. Eureka Recycling provided tally sheets for staff to use as they tallied each time they collected a trash bag or recycling bag from the paired stations. To determine recycling rates at the new paired stations, these sheets were faxed to us and we converted the tallies to pounds collected, by multiplying by the average weights (identified by waste sorts).

This tracking system was a new addition to staff responsibilities, and it took several weeks before all the kinks were worked out. We identified several challenges that prevented the collection of accurate and consistent data about the program at the onset, and worked with staff to develop solutions.

Frequent communication with maintenance staff: We worked with maintenance staff to develop a schedule for them to fax us the daily tracking sheets every week. This helped us catch questions and confusion about the new tracking system and address them right away. Maintenance staff also provided feedback for how we could make improvements to the tracking sheets, and we incorporated the changes.

Sharing the results of the data collected: To reinforce the importance of daily data collection, after a few months of tracking, we came back to the maintenance staff with a summary of the data collected so far, and what we were able to learn from it. This feedback loop helped the maintenance staff understand the importance and impact of the effort they put in to tracking every day, and it further motivated them to go above and beyond to do more than they were previously required to do.

Acknowledging and simplifying additional responsibilities: At the launch of the public space recycling program at Como, many maintenance staff were involved with servicing and tracking the materials collected and there were inconsistencies in how staff interpreted the tracking responsibilities. One way Como addressed this issue was by designating one staff person to champion the recycling program. Each day one staff person was designated to empty and track the materials collected at the paired recycling and trash containers. Staff with this responsibility were previously trained on how to track the materials and where to bring them. This is an efficient and sustainable way for Como to track and service its public space recycling program while it is in its beginning stages.
Program evaluation

Recycling collected

The data collected was used as an evaluation tool. We calculated diversion rates every month. In the first 15 months, more than 4,900 pounds of bottles and cans were diverted from the waste through Como’s public space recycling program. This data was important because it gave valuable information of the potential recycling being captured (and how much wasn’t...yet). It also gave us the ability to use an environmental calculator to determine the greenhouse gas reductions achieved through the program.

Using the EPA’s Waste Reduction Model (WARM), we were able to calculate that recycling 4,900 pounds of bottles and cans is the equivalent of 6.7 metric tons of carbon dioxide or the equivalent of:

- taking a passenger vehicle off the road for 14.4 months;
- electricity use for one residential home for 11 months;
- energy use for one residential home for 7.2 months.

We estimate that we are currently capturing about one-quarter of Como’s recycling with the existing 13 recycling containers, so the CO2 diversion potential at the zoo is equal to multiplying these results by four! It should also be acknowledged that Como Zoo’s public space recycling program demonstrates further environmental benefit by promoting environmental stewardship and encouraging a culture of recycling with all zoo visitors.

Visitor questionnaires

Questionnaires were used as another evaluation tool in order to obtain meaningful feedback from the people who visited Como Park Zoo and Conservatory. We conducted two rounds of questionnaires. The initial round of 208 questionnaires not only offered measures of what people were recycling, but also what they thought of the new program. Because the goals of launching public space recycling at Como were about public perception as well as diversion, this data provided a way to measure success in that context as well. After we rolled out some additional education and infrastructure to help increase awareness about the recycling program, we slightly revised the questionnaires and polled 141 visitors to measure the impact of the additional education on visitor awareness of the recycling program.

The results of the questionnaires showed that 93% of visitors to Como care about recycling in their personal lives and are glad when it is an option in public spaces. Visitors also widely recognize the environmental benefit of recycling: 88% identified one or more reasons why they believe Como is offering recycling. Of those responses,

- 62% indicated that recycling improves and saves the zoo and the planet by reducing waste and conserving resources, space, and energy;
- 27% indicated that recycling is the responsible thing to do, and it sets a good example for the public while teaching them about the benefits of recycling;
- 11% indicated that recycling helps protect animals and keeps their habitats safe.

Overall, 74% of the visitors brought or purchased food and/or beverages to consume at the zoo. The biggest finding here is that 68% of the recyclable items visitors brought from home included plastic bottles, and 80% of the recyclable items visitors purchased included plastic bottles. Visitors were 28% more likely to bring recyclables from home than purchase them at Como. This is indicative of the large number of concessions on sale that do not come in recyclable packaging such as French fries, cotton candy, hamburgers, popcorn, snow cones, ice cream, fountain drinks, etc.

When asked to identify what they had recycled, 60%
said plastic bottles (which are the most prominent recyclable item that visitors both bring and purchase at the zoo), 19% said aluminum cans, 8% said aseptic containers (milk cartons and juice boxes), 5% said glass bottles or jars, and another 8% indicated they recycled something other than the listed categories.

**Recycling sorts**

While questionnaires measure visitors’ perception of the new program in a more qualitative way, sorting the recyclables collected can measure their actions in a quantitative way. Seven recycling sorts were conducted after the launch, which verified plastic bottles as the number one item recycled at Como. It also showed that contamination was minimal (5% to 6% on average).

However, liquid in the bottles was much higher than anticipated. During hot months it was over a quarter of the recyclables by weight while in colder months it reduced to about 11%. This generated discussion about including the liquid weights in the overall recycling rates. Because industry standards include liquids in recycling rates, our results included liquid weights.

See chart below for exact composition by weight.

**Waste sorts**

We then conducted two waste sorts in the trash containers next to the recycling containers (“paired stations”) compared with material discarded at trash containers without a recycling container nearby (“solo trash”). These waste sorts demonstrated that significant amounts of recyclables were being placed in the trash even when a recycling container was next to a trash container. During the busy season, nearly a third of the recyclable material at paired stations was being thrown in the garbage. During the slow season, this increased to half.
These waste sorts also revealed that the percentage of recyclables found (in the trash and recycling) at paired stations dramatically exceeded those found at solo trash containers (with no recycling container nearby), which indicated that some visitors preferred one of the ten paired recycling/garbage stations among the 120 trash containers.

Our containers were both more successful than we had planned in capturing a higher percentage of all recyclables at the park, yet some visitors were still throwing away their bottles and cans even when recycling was convenient and available.

### Recycling program improvements

To address the challenge of recyclables being placed in the trash receptacles next to the recycling containers, we tested the assumption of making the trash receptacle less convenient by placing a lid on trash rather than leaving it open. Our assumption was that this would cause people to pause just enough to make a different decision when discarding their bottles and cans. By adding lids to trash containers stationed next to a recycling container we were able to increase the capture rate from 62% to 72%. However, the additional cost of maintenance staff time to add a lid (estimated at about 30 seconds per container) needs to be balanced against the benefits of increased recycling. This additional time seems minimal for only 10 trash containers, but labor would increase considerably if incorporated for all 120 trash containers, especially during the busy season when trash containers are emptied several times per day.

#### Education beyond the containers

Of the hundreds of visitors who answered our questionnaire, 58% knew that recycling was available during their visit and 26% of all the visitors reported using the new recycling containers. Visitors who discarded items were 34% more likely to know about the recycling program than those who did not discard anything. However, about half (46%) of visitors who didn’t discard anything still reported that they knew Como offered a recycling program. Would increased awareness increase recycling rates?

<table>
<thead>
<tr>
<th>Category</th>
<th>BUSY SEASON</th>
<th>SLOW SEASON</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of trash recyclable</td>
<td>9%</td>
<td>7%</td>
</tr>
<tr>
<td>Recycling rate (percentage of discsards recycled)</td>
<td>19%</td>
<td>0%</td>
</tr>
<tr>
<td>Total Recycling rate potential</td>
<td>28%</td>
<td>14%</td>
</tr>
</tbody>
</table>
education at the zoo beyond what is on the recycling containers. By including information on the website, setting up a temporary lobby display, and adding signs to most point-of-purchase locations for bottles and cans, we were able to inform visitors about Como's new recycling program at different points during their visit. The waste sorts performed before and after this additional education was implemented demonstrated a slight increase in the amount of recyclables being recycled at paired stations—the capture rate went up from 68% pre-education at the paired stations to 71% post-education.

Following the placement of the additional education, a second round of slightly revised questionnaires helped us understand how the additional program elements may have impacted visitor awareness of the recycling program. We also measured if noticing the recycling program was dependent on whether a visitor discarded or recycled an item.

After the additional education, visitors were 8% more likely to know about the recycling program. This questionnaire identified that the majority (64%) of the visitors became aware of the program by noticing a recycling station, but many had also seen the lobby display (17%), the information on the website (9%), and the signs on vendor concession carts (7%).

This confirms the waste sort data indicating the proper education at the point of discard is crucial for a functioning system and that supporting education at a facility can increase recycling awareness. There may be cumulative benefits to this type of education as Como builds a culture of recycling and repeat visitors learn of recycling availability and importance.

**Summary and next steps**

Como Park Zoo and Conservatory has made a significant first step in implementing a recycling program. A large amount of recycling is already being captured at Como. Purchasing more recycling containers and increasing recycling education and outreach will only improve the capture rate at Como. As Como moves ahead with its recycling program, we recommend continuing to add recycling containers each year in order to build on the environmental benefits of recycling at the facility. Though difficult to calculate due to seasonal and other fluctuations, we currently estimate the potential average recycling rate at the facility to be 18%. Currently, the Como is recycling about 4% of its total discards. By capturing all recyclable bottles and cans, more than 19,000 pounds could be diverted annually from the garbage (vs. current diversion of 3,500 pounds).

This material can be captured by building on and expanding the current infrastructure—both the collection and education. As part of the collection infrastructure, Como can consider the cost/benefit of adding lids to trash containers. Lastly, expanded education, such as banners on recycling stations to give them more visibility, or a permanent or periodic lobby display, can continue to increase recycling awareness at the facility.

Furthermore, the recycling infrastructure developed now (collection, containers, and education) will help when Como is ready to expand into diverting compostable animal and public waste from the garbage.