



## Multifamily Complex Recycling Pilot

### Overview

Recycle Colorado partnered with Swire Coca-Cola, Coca-Cola North America, the Safeway Foundation and the City and County of Denver to administer a six-month multifamily complex recycling pilot. The pilot provided six months of free recycling services to eight selected apartment complexes in downtown Denver that did not have recycling.

The goal was to increase tenants' access to recycling, which could help Denver reach its waste diversion goal of 50 percent by 2030 (currently at 23 percent in 2019). Denver's Solid Waste Management Division estimates that approximately one-third of the city's population live in multifamily complexes that are not eligible for city recycling collection services. Part of the pilot was to understand how much material could be captured if single-stream recycling was installed.

The pilot also sought to overcome barriers to implementing and managing recycling services for apartments. Such barriers included space constraints, lack of tenant recycling knowledge, and added financial expense. Recycle Colorado addressed these barriers during the pilot by covering the added expense of recycling for the first six months, providing recycling coaching and collateral, and offering a door-side recycling collection approach to apartments with space constraints. We hypothesized that if a successful recycling program were launched to the satisfaction of tenants and property management, recycling would remain as an amenity after completion of the pilot.

### Design

The six-month pilot project ran from November 2019 to May 2020. During this period, Recycle Colorado provided:

- Free single-stream recycling services
- Free six-gallon recycling baskets for each apartment
- Tenant outreach and education
- Property management consulting and support
- Public recognition for participating in the pilot

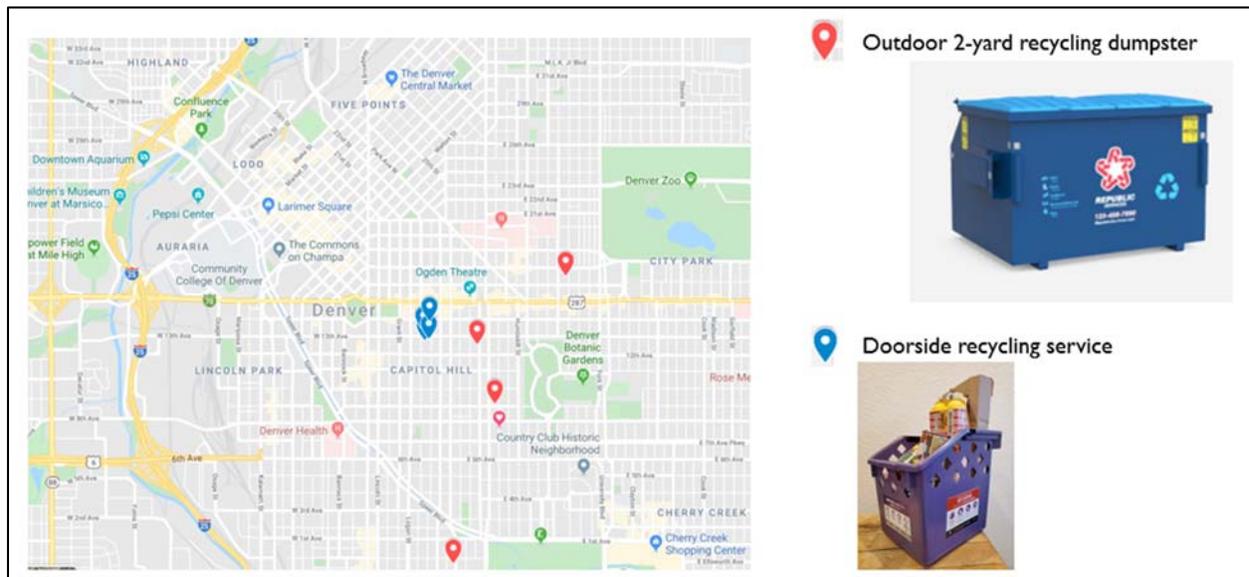
## Methodology

### Traditional vs Door-side Recycling

Eight multifamily complexes (MFCs) participated in the pilot. Half (4) of the MFCs were outfitted with two-yard outdoor recycling dumpsters and the other half (4) of the MFCs were provided door-side “valet” recycling service. With door-side recycling, tenants placed recycling baskets at the front door a couple of times per week and a service collected the recycling and returned an empty basket. Door-side recycling eliminates the need for an outdoor recycling dumpster or cart.

We conducted this “A/B” test for two reasons. First, a common obstacle for MFCs is lack of outdoor space for a recycling dumpster. We overcame this barrier by providing door-side recycling. Second, we wanted to understand how individualized messaging (using sticky notes) could improve contamination rates. We hypothesized that individualized messaging provided through door-side recycling would be more effective than blanket emails or posters provided to the tenants using the traditional shared outdoor recycling dumpsters. Contamination is the number one reason why recycling programs are terminated at MFCs, as it is difficult to monitor which tenants put contaminants in shared outdoor recycling dumpsters.

### Site Identification



**Figure 1.** Location of the eight participating multifamily complexes in Denver

Recycle Colorado outreached to more than 250 multi-family complexes to solicit participation in the pilot. We used a list of apartments in the downtown Denver area and received suggestions for best candidates from entities such as trash, recycling and compost haulers, the City and County of Denver, the Apartment Association of Metro Denver, Eco-Cycle Eco-Leaders,

consultants and HOA management associations. After six and a half months of multiple emails, phone calls and onsite visits, eight participating properties were secured.

Contacting individual property owners was difficult and often failed. The participation of the properties that are part of the pilot is largely due to one eco-motivated property manager who owns four of the properties, and to an accounts payable manager at a large property management company who championed the pilot within their organization.

Promoting and “selling” the value of the recycling pilot was more challenging than expected. While individuals contacted generally value recycling, there were numerous reasons why decision makers opted not to participate.

Common reasons why properties would not participate in the traditional recycling (outdoor bins) option of the pilot:

1. Cost to continue recycling service after free pilot is finished
2. Space constraints
3. Illegal dumping
4. Upsetting residents if recycling is removed after six months
5. Inconvenience of walking to recycling bin outside when there is an indoor trash/trash shoot
6. Contamination concerns
7. Hauling contracts: waste haulers will not allow for any decrease in revenue or services
8. Third party billers are difficult to work with; direct communications proved difficult
9. Building is being put on market for sale, no changes are allowed
10. More work for janitorial staff and management
11. Just renewed hauling agreement and included recycling
12. Property managers get bonuses on cost savings and implementing a program that will cost money jeopardizes their bonus
13. With income-qualified properties, no additional charges can be passed along to the tenants; therefore, it will not work post-pilot
14. Ill-feelings linger from previous experiences

Since space constraints presented a legitimate obstacle for several downtown Denver properties, Recycle Colorado provided an option for door-side recycling collection. Even with door-side recycling, property owners still had significant concerns.

Common reasons why properties would not participate in the alternative recycling (door-side collection) option of the pilot:

1. Concern with reduced security by having recycling service provider entering the building to collect the recycling baskets
2. Potential damage to carpet in common areas if people do not properly rinse containers
3. Safety/tripping issues when bins are out in common areas
4. Extra expense when the program no longer is free
5. Potential for fire code concerns with recycling baskets in the hallway

A few property managers who decided not to participate in this pilot provided their ideas on how to best accommodate multifamily buildings:

- “Find a common area in the alley on our block where you could put a large recycle dumpster that tenants from all buildings on the block could dump in.”
- “Use a dual collection system provided by the trash company. In other words, keep our same size dumpster but have one side of it be for recycling.”

## Data Collection

### *Traditional Recycling*

Data collected from the properties using the traditional outdoor shared recycling dumpster was limited to observational data. We visually estimated how full the two-yard recycling dumpster was and how full the three-yard trash dumpster was. Figure 2 shows the table we used to track visual data estimates. Special attention was given to increases in recycling volume, decreases in trash volume, contaminants found in the recycling and recyclables still disposed of in the trash. This supplementary information helped us target specific recycling messaging.

The form is titled "Recycling Pilot Data Collection Sheet" and features logos for Safeway, Coca-Cola, Swire Coca-Cola, Recycle Colorado, and Denver. It includes a header for "Name/Address of Building:" and a table with columns for Date, Container Size, Recycling metrics, Notes, Trash Dumpster Size, Trash metrics, and List recyclable items found in trash. The table rows cover dates from 11/1/19 to 4/7/20.

Name/Address of Building: _____									
Recycling Pilot Data Collection Sheet									
Date	RECYCLING				TRASH				
	Container Size	% of Recycling Bin Filled	Contamination Items	Notes of GOOD recycling	Trash Dumpster Size	% of Trash Dumpster Filled	% of recyclable items found in trash	List recyclable items found in trash	
	2 yards				2 / 3 yard?				
11/1/19									
11/5/19									
11/12/19									
11/19/19									
11/26/19									
12/10/19									
12/24/19									
1/7/20									
1/21/20									
2/4/20									
2/18/20									
3/3/20									
3/17/20									
4/7/20									

**Figure 2.** Data collection form for traditional recycling.

### *Door-side Recycling Collection*

Data for properties using door-side recycling was compiled directly by the service provider, The Trash Gurus. Since this service was able to isolate only the recycling originating at these four properties, we were able to collect empirical data on recycling weights and volumes as well as waste diversion rates. Additional data available with the door-side service included tenant participation, contamination rates and types of contaminants.

## Volunteers

The original goal was to build a coalition of on-site volunteers at each property to act as recycling ambassadors. That goal was never realized due to a lack of response to our request for volunteers.

Recycle Colorado did bring together a coalition of volunteers for the pilot kick-off when we delivered recycling bins and printed recycling collateral to properties participating in door-side service. This offered the opportunity for personal interaction with the tenants and a chance to explain the pilot. Tenants received a friendly and personalized introduction to Recycle Colorado and the pilot. Seen here is the advertisement used to build volunteer interest in what we called the “Recycling Welcome Wagon” door-to-door bin delivery.

Tenants were notified in advance of the “Recycling Welcome Wagon,” which was described as an opportunity for Recycle Colorado to give a warm and friendly face-to-face welcome to new recyclers while delivering free in-home recycling baskets and recycling guidance and tips. See the Appendix for a sample of the correspondence that was emailed to tenants in advance.

Recycle Colorado issued a press release on November 5, 2019, in advance of the pilot. See Appendix.

## Collateral

At the start of the pilot, and as part of the Recycling Welcome Wagon, each rental unit received:

- One free six-gallon recycling basket with affixed recycling decals for each apartment
- Welcome letter explaining the recycling pilot
- Flyer indicating what can and cannot be recycled.

Two educational posters were hung at each property in common areas. Each property manager was provided with extra recycling baskets and collateral to serve as “move-in” ready kits to distribute to new tenants.



**Figure 3.** Flyer announcing delivery of the bins for use in the pilot.



**Figure 4.** Recycling basket provided to tenants.

Two weeks after distributing the bins, Recycle Colorado revisited each property and dropped off a thank-you note along with a reusable shopping bag made from recycled plastic (rPET or polyethylene terephthalate).

Each month Recycle Colorado provided the property managers with a recycling tip they could share with tenants. The messages included details on what not to recycle and helped serve as a monthly reminder to continue proper recycling habits. See Appendix for examples.

## Schedule

The pilot started in November 2019. The traditional recycling service began November 7 and the door-side recycling service began November 18. The dates flanked America Recycles Day, celebrated nationally November 15, possibly providing tenants with a broader perspective and extra motivation to recycle.

**Table 1.** Schedule of traditional and door-side recycling services.

	<b>Baskets delivered</b>	<b>Start date</b>	<b>First recycling collection</b>	<b>End date</b>
Traditional recycling (outdoor two-yard dumpster) provided by Republic Services	November 7	November 8	November 12	May 12
Door-side recycling collection provided by The Trash Gurus	November 18	November 19	November 20	May 15

## Mid-Pilot Check-In

In late January and early February, Recycle Colorado conducted on-site visits with the property managers. A progress report was provided on recycling volumes, trends and any contamination or similar issues. This was also an opportunity to interview the property managers and collect their feedback. Pre-identified questions for this in-person interview included:

1. Have you gotten positive feedback from tenants on recycling collection?
2. Has the pilot been easy for you to manage?
3. Have there been any hiccups or negative consequences?
4. Have the progress reports been helpful? Have they been distributed to tenants? Have there been any inquiries/feedback after sending?
5. Suggestions for improvement? Anything to change ½ way through?
6. Likelihood of continuing post-pilot?
7. Any questions you would like us to add to the survey for residents?

## **Traditional Recycling Properties**

All three managers with Cornerstone were very happy with the recycling pilot. Their tenants were happy to have recycling as an amenity. One property manager said he had tenants move out before because recycling was not provided. Receiving recycling tips once per month was their preference. They wanted to share this info even with properties not included in the pilot. They all seemed highly likely to continue the recycling service afterward. One property manager considered decreasing the trash service to once per week (instead of twice per week) and using the savings to pay for recycling collection.

A mid-progress report was shared with the Cornerstone property managers that showed early inconsistencies with the data. These inconsistencies, as explained by the property managers, could have been due to fluctuations during the holidays and possibly due to scheduling challenges with the timing of trash and recycling collection.

Throughout the duration of the pilot, Recycle Colorado found challenges coordinating the timing of data collection with the trash/recycling pick-ups. We are not confident we were able to collect data just prior to trash and recycling pick-ups by the hauler. Recycling and trash collection was scheduled for Tuesdays, and we sent a Recycle Colorado representative onsite to collect data Tuesday mornings before 6:00 AM with the goal of collecting data on peak volumes of trash and recycling. However, two weeks into the pilot we were perplexed by the low recycling and trash volumes at some locations. We hypothesized that the hauling trucks were coming in the early hours of Tuesday mornings before our data collector was able to get onsite. For that reason, we switched our onsite data collection (starting November 25) to Monday evenings to capture more consistent data. Unfortunately, the timing challenges persisted resulting in inconclusive data results. We believe the recycling volumes of all four properties was abundant despite the data not reflecting this success.

## **Door-side Recycling Properties**

The manager for Terra Firma Property Management was pleased with door-side recycling service and reported that it worked well for the most part. There were a few tenants leaving the recycling baskets permanently by the front door. No one left trash outside which was the biggest fear. Recycling served as a good selling point when giving potential renters tours of their apartments. There was reported overall satisfaction with the progress reports and recycling tips. Once per month was the correct timing for updates.



**Figure 5.** Photos of Cornerstone’s traditional recycling two-yard dumpsters show the need to break down cardboard boxes to conserve space in the dumpster, contaminants found in the recycling dumpster, and an example of what we hoped to see: a full recycling dumpster and less trash.

## Resident Recycling Survey

An online recycling survey was sent (via property managers) to tenants participating in the pilot. We distributed the survey three months into the pilot (and pre-COVID-19) to gather tenant feedback and to make any adjustments. From the 152 total apartment units, 17 tenants responded. The response rate of 11% was enough to adequately represent the larger population. (A response rate of 30% (47 responses) was the lowest preferred benchmark.) Due to the low response rate, the results from the survey were treated as non-conclusive. Nonetheless, if the reader wishes to see the survey questions and results, they can be found here:



Residents Recycling  
Survey.pdf

## COVID-19

Four months into the pilot, on March 25, Governor Polis issued a statewide stay-at-home order through April 11 and which was then extended through April 26. The City of Denver was under a stay-at-home order through May 8. Recycling services were deemed essential, and therefore recycling collection for the properties participating in the pilot continued with only slight alterations:

- Outdoor dumpsters for the traditional recycling collection at Cornerstone properties stayed in place and regular trash and recycling service continued. However, Recycle Colorado postponed data collection until after the stay-at-home order was lifted on May 8.
- The Trash Gurus notified Recycle Colorado that “Effective Monday, March 23, we will not be providing Door-side recycling services door to door. Trash Gurus will still collect recycling materials. However, we will provide Trash Gurus marked outdoor totes for residents' recyclables. We ask that you bring your recyclables to these locations. Trash Gurus will collect these containers every Friday until further notice. These changes are to limit the number of touches on bins by collectors in an effort to prevent the possibility of spread within communities. Additionally, the virus has been tested and is believed to be capable of living on surfaces, like metal, plastic, and cardboard, for up to three days. The Trash Gurus are taking precautionary measures of frequent sanitization of equipment and proper PPE for collectors. We also are disinfecting all community totes at this time.”
- Property managers at the traditional and door-side recycling properties all indicated that their tenants were being inundated with messages and asked Recycle Colorado to refrain from distributing any recycling tips in April to reserve communications to only essential messaging.

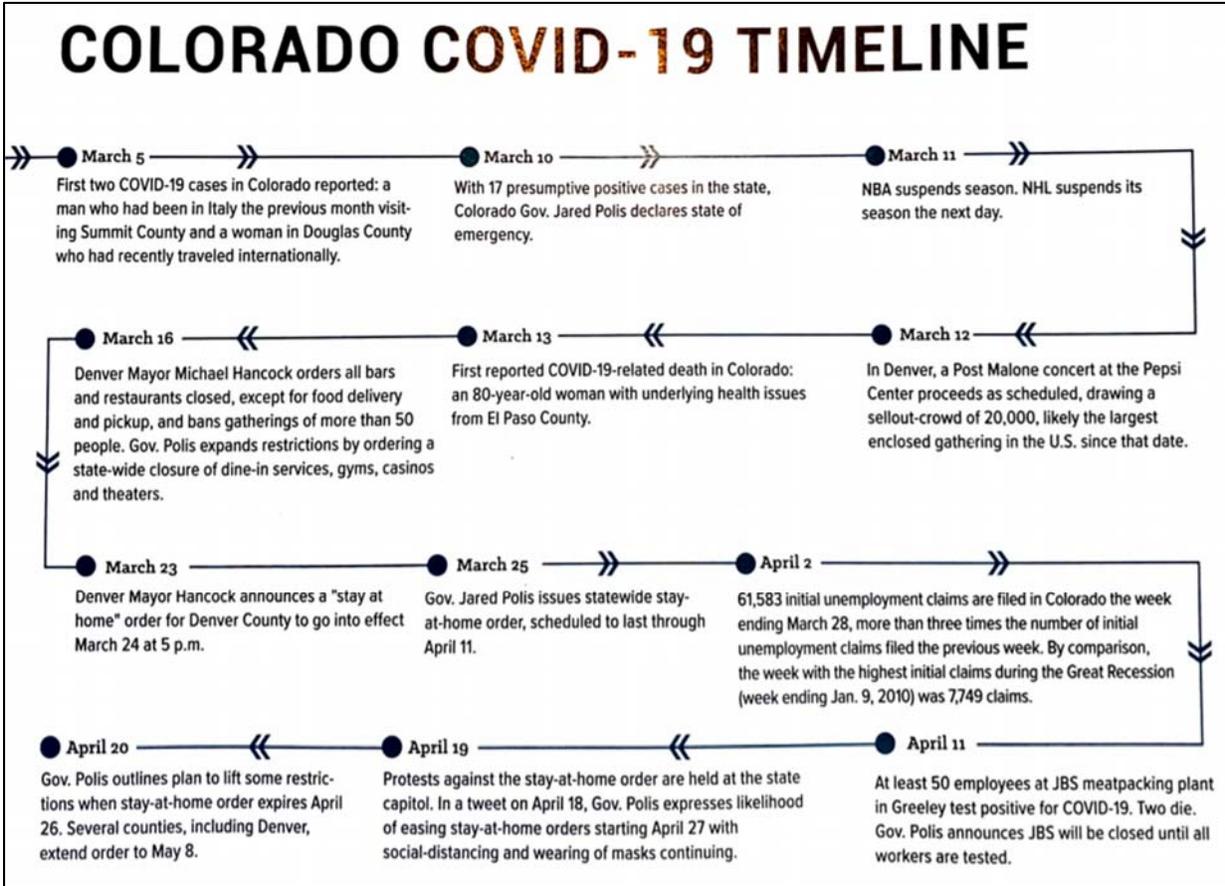


Figure 6. COVID-19 timeline produced by ColoradoBiz Magazine, May/June 2020.

## COVID-19 Updates from Recycling Service Providers

### *The Trash Gurus:*

On April 1, one and a half weeks into the change to outdoor bin collection, The Trash Gurus reported that "Everything has been fine. Ran into a small issue last week where maintenance moved some of our containers at one of the properties from outside to inside due to some of the homeless people around there attempting to move the cans, but they are secured now. The volume was smaller during the last collection on Friday." There was a slight increase in contamination from 2% to 4%, but overall there was clean recycling collection.

### *Republic Services:*

Republic Services reported that, as of April 1, service remained consistent with usual scheduled pick-ups for recycling and trash. "Our commitment is to sustainability and reducing materials from landfill and working towards a blue planet."

## COVID-19 Updates from Property Managers

### *Terra Firma (door-side recycling):*

On April 3, the property manager decided to continue with door-side collection service on their own, and had the maintenance crew collect the recyclables on Mondays and Thursdays and aggregate the material into the outdoor recycling bins for Friday collection. This decision was made to lessen any regression in recycling habits, mitigate possible contamination of trash in the recycling bin and to prevent any homeless individuals from using the outdoor recycling bins for trash.

### *Cornerstone (traditional recycling dumpster):*

The property managers did not see any changes in recycling behaviors. They diligently sprayed a bio-kill product on the dumpsters and lids and communal surface areas. Tenants were obeying the stay-at-home order. There was little interest in moving or prospective new move-ins.

## Results

**A total of 239 yards of recycling was collected for the eight properties during the six-month pilot.**  
The equivalent of 112 pick-up truck loads.

**Table 2.** A total of 152 rental units for the eight properties participated in the pilot.

<b>Door-side Recycling Service</b> Provided by The Trash Gurus Managed by Terra Firma		<b>Traditional Recycling Service</b> Provided by Republic Services Managed by Cornerstone	
Address	# of units	Address	# of units
1260 Pennsylvania St	30	25 S Emerson St	17
1320 Pennsylvania St	25	1245 N Corona St	18
1275 Pearl St	21	1225 E 9 <sup>th</sup> Ave	13
1375 Pearl St	16	1639 Race St	12
<b>Total Rental Units</b>	<b>92</b>	<b>Total Rental Units</b>	<b>60</b>

**Table 3.** Comparison of door-side vs traditional recycling.

	<b>Door-side Recycling</b>	<b>Traditional Recycling</b>
Recycling collected	123 yards	116 yards
Average recycling rate (waste diversion rate)	29%	N/A
Average fullness of recycling dumpster	N/A	53%
Contamination rate	2.76%	10-15%
Tenant participation rate	78% of units averaged 1 put out per week	N/A
Average recycling per rental unit	1.34 yards	1.93 yards

### Notes on variances of data collection methods:

Since two different types of recycling services were used, it impeded the ability to collect all the same data points.

- Data collected from the properties with traditional recycling service (using outdoor shared recycling dumpsters) was limited to observational data. We visually estimated the fullness of the 2-yard recycling dumpster and the 3-yard trash dumpster. Data in the above table is based on those visual estimates.
- Data collected from the properties with door-side recycling service includes weights, volumes and composition of recyclables.
- Cardboard collected with door-side recycling was restricted to *flattened* boxes. Cardboard collected from the four properties with traditional outdoor recycling dumpsters was not flattened. A whole cardboard box versus a flattened box conversion was calculated using the EPA conversion model:  
<https://www.epa.gov/sites/production/files/2016-03/documents/conversions.pdf>

## Summary of Traditional Recycling

The four MFCs managed by Cornerstone had a total of 60 rental units. A total of 116 yards of materials was recycled, the equivalent of 54 pick-up truck loads.

**Table 4.** The average fullness and total recycling collected by traditional recycling service at the four Cornerstone buildings with a total of 60 units.

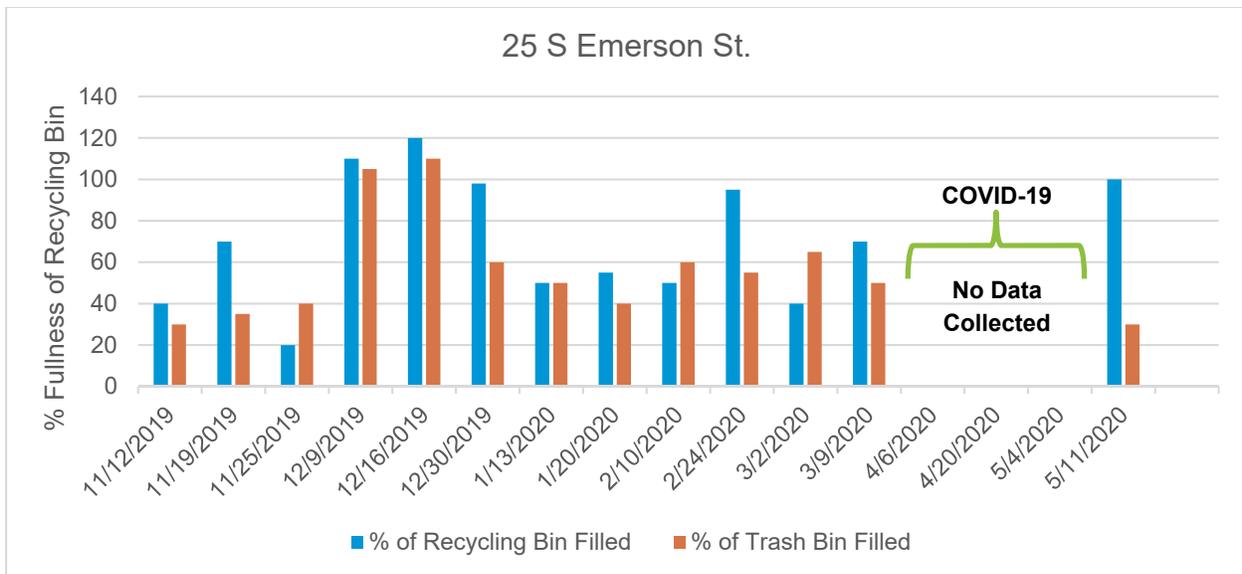
	<b>Average % fullness of 2-yard recycling dumpster</b>	<b>Estimated yards of recycling collected</b>
25 S Emerson St	71%	38
1225 E 9 <sup>th</sup> St	20%	11
1245 Corona St	51%	28
1639 Race St	73%	39
	<b>Average of four properties: 54%</b>	<b>Total for four properties: 116</b>

- The recycling dumpsters were 54% full on average.
- Approximately 116 yards of recyclable materials were collected between December 12 and May 1.

## Summary of Each Traditional Recycling Property

### 25 S Emerson Street

- Recycling bin on average was 71% full.
- Approximately 38 yards of recyclable materials were collected.



**Figure 7.** Percent fullness of recycling and trash bins by week. Note lack of data collection during COVID-19 stay-at-home order.

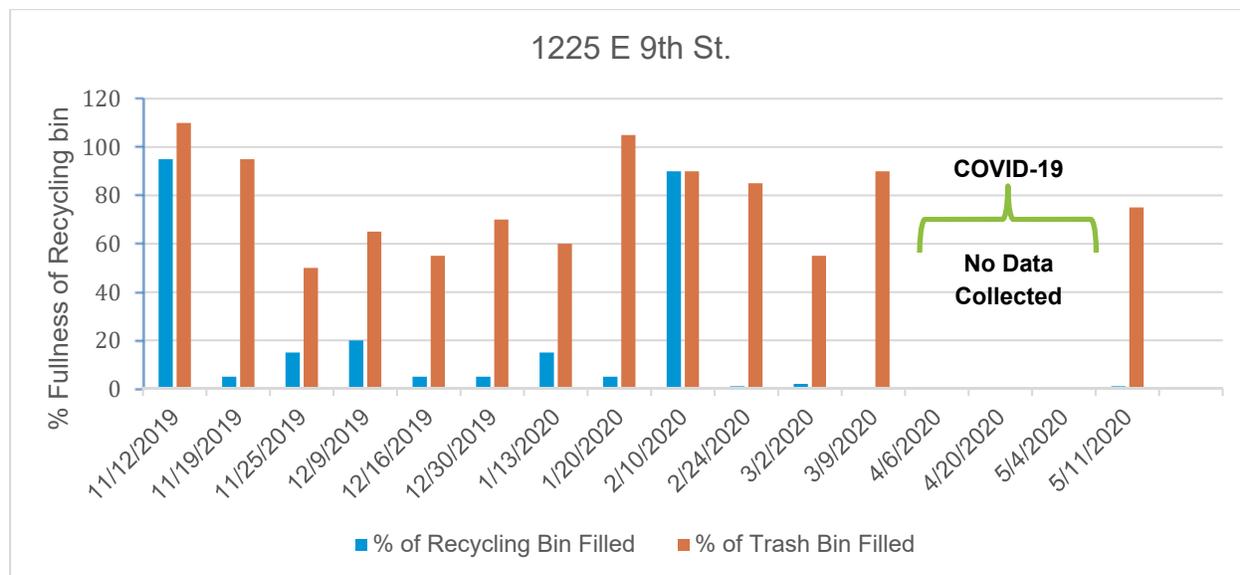
**Table 5.** Estimate of materials observed in the dumpsters at 25 S Emerson St.

Date	% of Recycling Bin Filled	% of Trash Bin Filled	% of Recyclables in Trash
11/12/2019	40	30	30
11/19/2019	70	35	20
11/25/2019	20	40	N/A snow
12/9/2019	110	105	10
12/16/2019	120	110	20
12/30/2019	98	60	5
1/13/2020	50	50	1
1/20/2020	55	40	2
2/10/2020	50	60	10
2/24/2020	95	55	5
3/2/2020	40	65	5
3/9/2020	70	50	5
4/6/2020	COVID-19		
4/20/2020	COVID-19		
5/4/2020	COVID-19		
5/11/2020	100	30	20



### 1225 E 9<sup>th</sup> Street

- Recycling bin on average was 20% full.
- Approximately 11 yards of recyclable materials were collected.



**Figure 8.** Percent fullness of recycling and trash bins by week. Note lack of data collection during COVID-19 stay-at-home order.

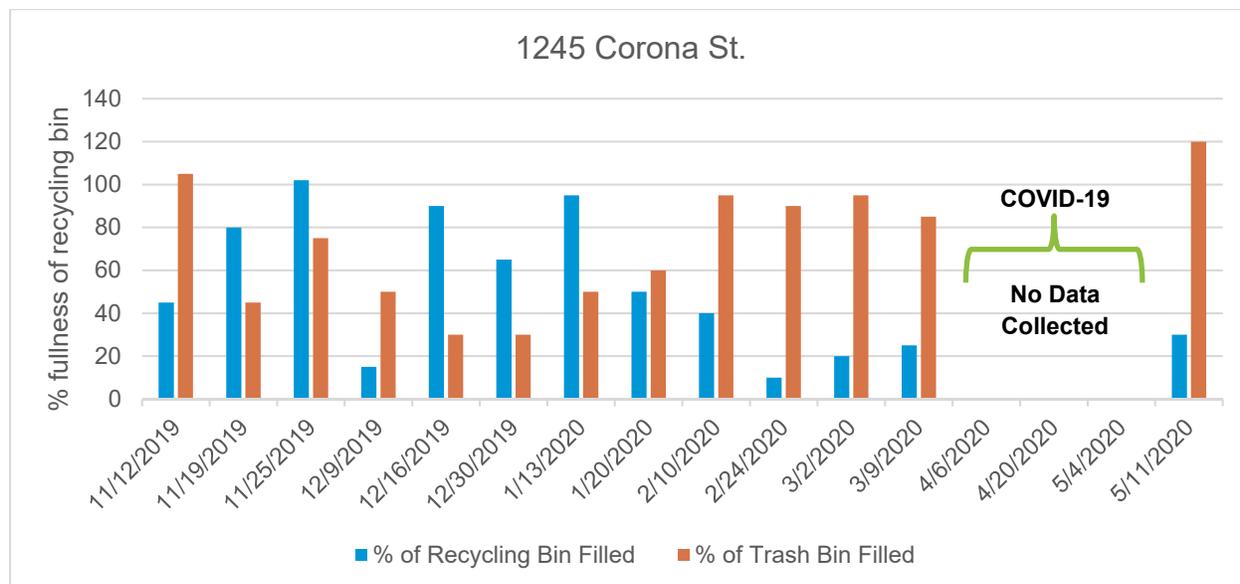
**Table 6.** Estimate of materials observed in the dumpsters at 1225 E 9<sup>th</sup> St.

Date	% of Recycling Bin Filled	% of Trash Bin Filled	% of Recyclables in Trash
11/12/2019	95	110	5
11/19/2019	5	95	10
11/25/2019	15	50	2
12/9/2019	20	65	20
12/16/2019	5	55	10
12/30/2019	5	70	2
1/13/2020	15	60	20
1/20/2020	5	105	25
2/10/2020	90	90	10
2/24/2020	1	85	15
3/2/2020	2	55	5
3/9/2020	0.5	90	10
4/6/2020	COVID-19		
4/20/2020	COVID-19		
5/4/2020	COVID-19		
5/11/2020	1	75	5



### 1245 Corona Street

- Recycling dumpster on average was 51% full.
- Approximately 28 yards of recyclable materials were collected.



**Figure 9.** Percent fullness of recycling and trash bins by week. Note lack of data collection during COVID-19 stay-at-home order.

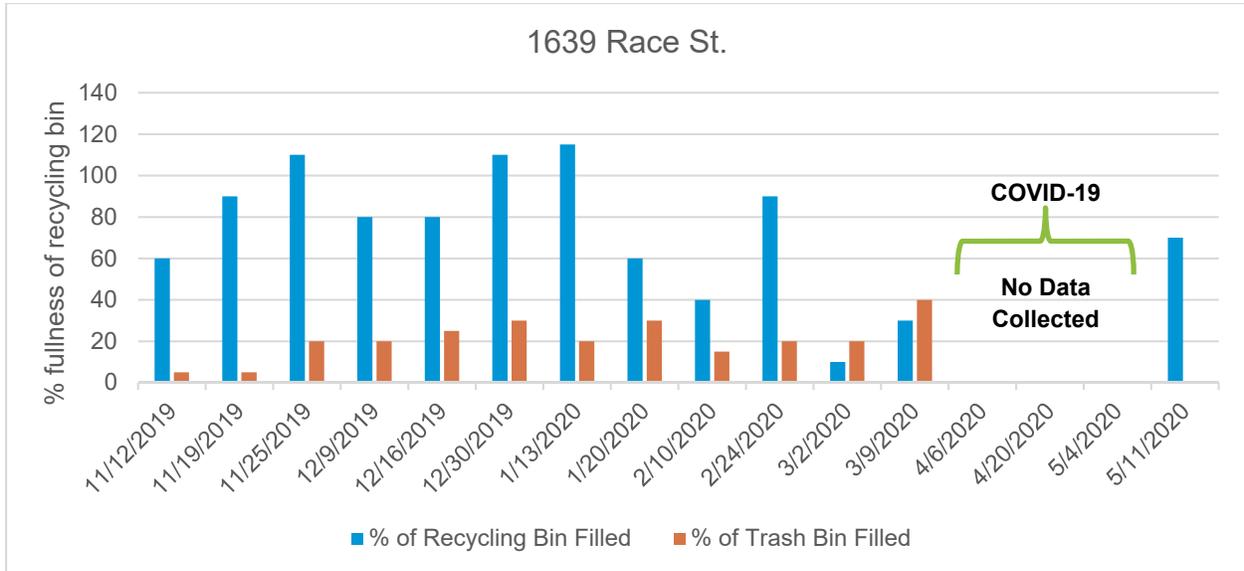
**Table 7.** Estimate of materials observed in the dumpsters at 1245 S Corona St.

Date	% of Recycling Bin Filled	% of Trash Bin Filled	% of Recyclables in Trash
11/12/2019	45	105	unknown
11/19/2019	80	45	5
11/25/2019	102	75	5
12/9/2019	15	50	5
12/16/2019	90	30	5
12/30/2019	65	30	5
1/13/2020	95	50	10
1/20/2020	50	60	10
2/10/2020	40	95	5
2/24/2020	10	90	15
3/2/2020	20	95	5
3/9/2020	25	85	10
4/6/2020	COVID-19		
4/20/2020	COVID-19		
5/4/2020	COVID-19		
5/11/2020	30	120	5



**1639 Race Street**

- Recycling dumpster on average was 73% full.
- Approximately 39 yards of recyclable materials were collected.



**Figure 10.** Percent fullness of recycling and trash bins by week. Note lack of data collection during COVID-19 stay-at-home order.

**Table 8.** Estimate of materials observed in the dumpsters at 1639 Race S.

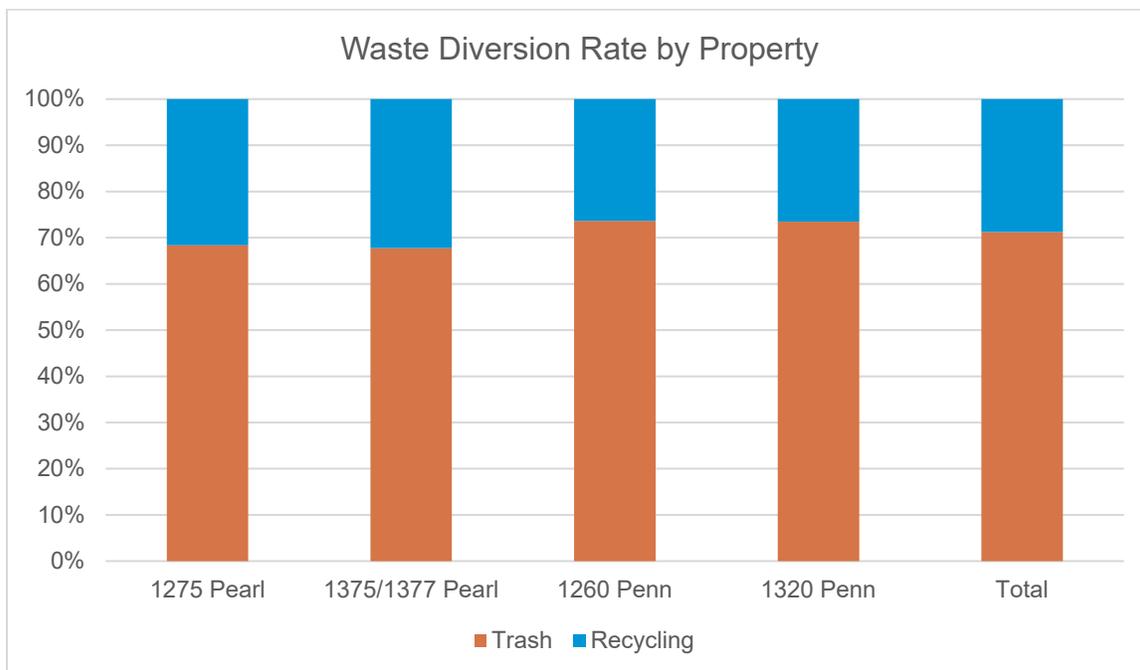
Date	% of Recycling Bin Filled	% of Trash Bin Filled	% of Recyclables in Trash
11/12/2019	60	5	50
11/19/2019	90	5	0
11/25/2019	110	20	N/A
12/9/2019	80	20	5
12/16/2019	80	25	2
12/30/2019	110	30	2
1/13/2020	115	20	10
1/20/2020	60	30	10
2/10/2020	40	15	N/A
2/24/2020	90	20	2
3/2/2020	10	20	5
3/9/2020	30	40	5
4/6/2020	COVID-19		
4/20/2020	COVID-19		
5/4/2020	COVID-19		
5/11/2020	70	0	0



Note: Prior to the pilot, two 96-gallon Denver recycling carts were unofficially accessible to tenants. Recycle Colorado was originally unaware of the pre-existing recycling collection, which may have contributed to the 73% fullness of the recycling dumpsters provided during our pilot.

### Summary of Door-side Recycling

The four MFCs managed by Terra Firma have a total of 92 rental units. A total of 123 yards of recycling materials were collected, the equivalent of 57 pick-up truck loads.

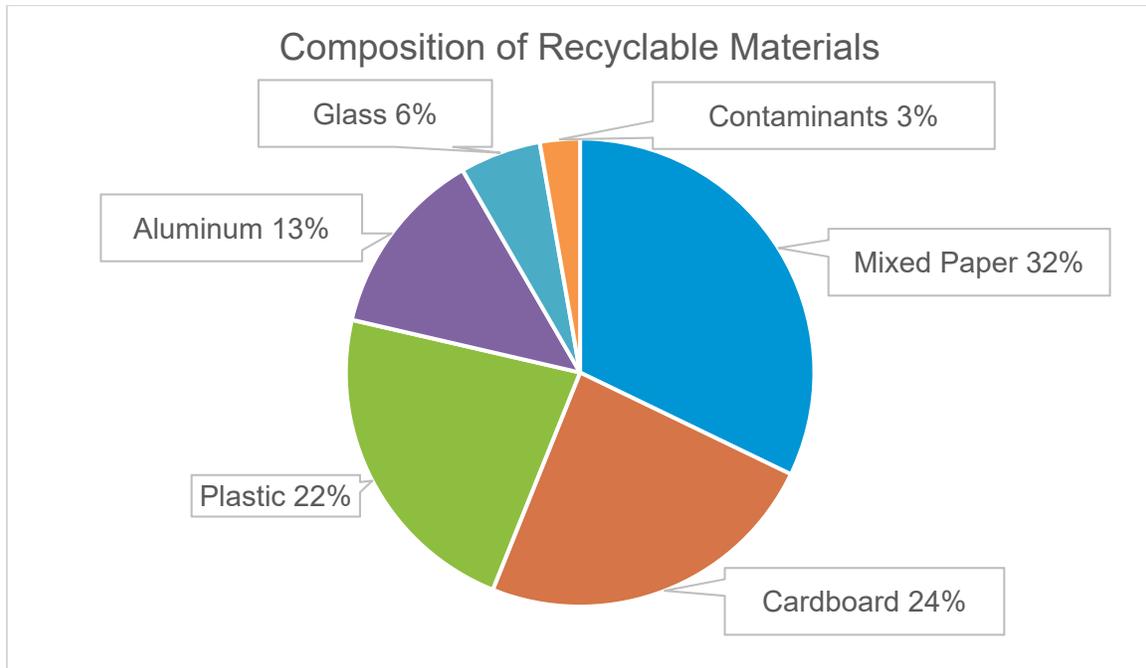


**Figure 11.** Waste diversion rate by property for the door-side recycling service.

Note:

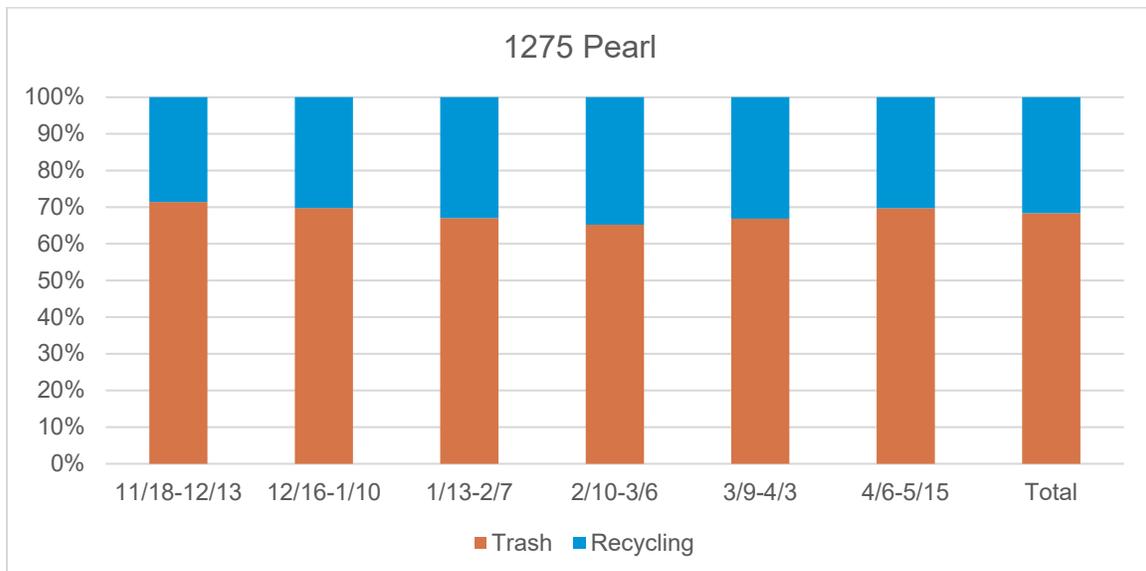
- The data collected by The Trash Gurus provided empirical data on collection weights, volumes and composition of recyclables collected.
- Cardboard collected with door-side recycling was restricted to *flattened* boxes. Cardboard collected from the Cornerstone properties with traditional recycling were not flattened. A whole cardboard box versus a flattened box conversion was calculated with the EPA conversion model: <https://www.epa.gov/sites/production/files/2016-03/documents/conversions.pdf>.
- Weight of recycled material was the primary data collected. Recycling volumes were tracked by placing the aggregated recycling in 96-gallon carts (203 gallons in a yard). The average pounds/yard conversion for the duration of the pilot was 57.99 pounds for each yard.
- 4,879 pounds of recyclable materials were collected between November 19 and May 15.
- Average tenant recycling/waste diversion rate was 29%.

- Average door-side recycling contamination rate was 2.76%.
- With 92 rental units, each unit recycled an average of 1.34 yards of recyclable materials.

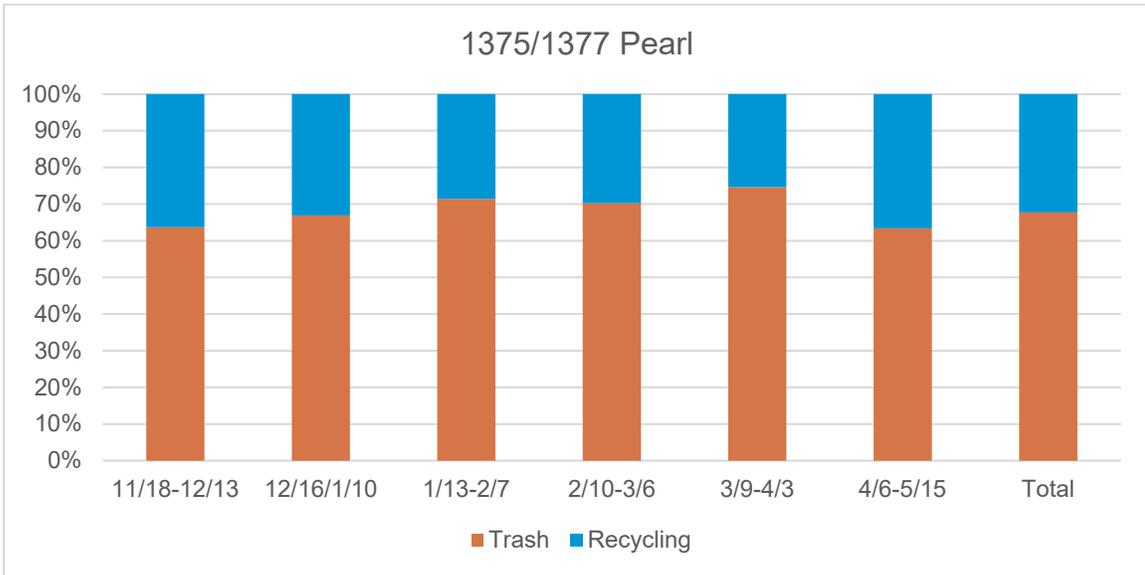


**Figure 12.** The composition of recyclable materials collected in door-side recycling.

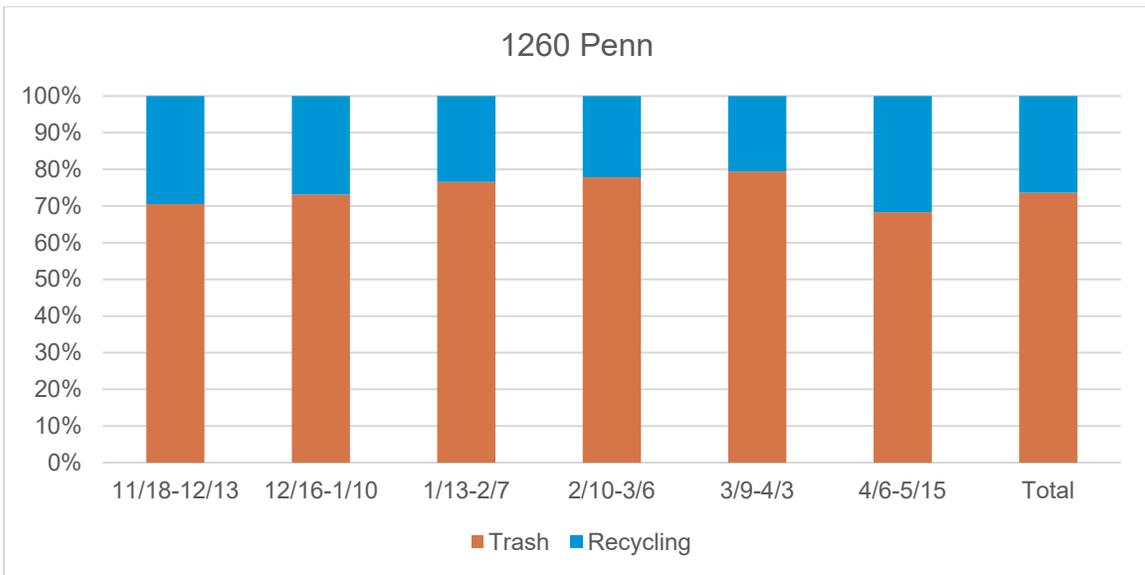
### Summary of Each Door-side Recycling Property



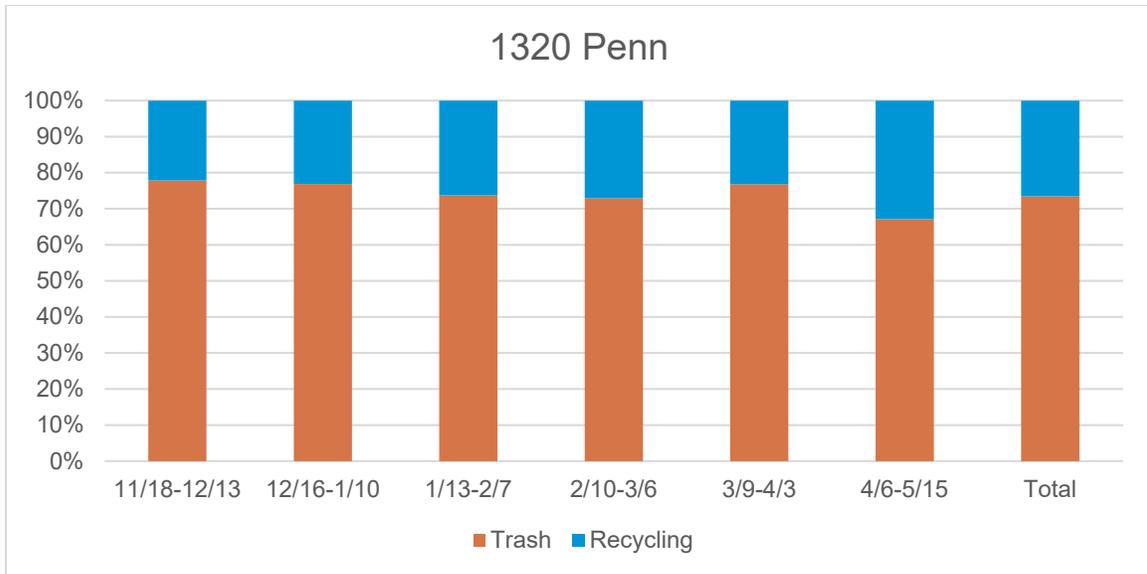
**Figure 13.** The property at 1275 Pearl had a recycling/waste diversion rate of 31.62%



**Figure 14.** The property at 1375/1377 Pearl St had a recycling/waste diversion rate of 32.25%.



**Figure 15.** The property at 1260 Pennsylvania had a recycling/waste diversion rate of 26.37%.



**Figure 16.** The property at 1320 Pennsylvania had a recycling/waste diversion rate of 26.54%.

## Conclusions & Recommendations

The six-month multi-family complex recycling pilot was an overall success. All parties involved including tenants, property managers, recycling service providers and sponsors derived much value and education from the pilot. Overall, the eight properties (representing 152 rental units) collected 239 yards of recyclable materials (the equivalent of 112 pick-up truck loads).

All properties are continuing with their recycling collection programs. One property reduced its trash collection service from two pick-ups per week to one as a result of the increase in recycling.

An early challenge in recruiting property owner and property management participants was a lack of outdoor space for a recycling dumpster. Many downtown Denver apartments have space restrictions, which is why Recycle Colorado chose to provide a door-side recycling service for four of the eight properties. Comparing two different recycling collection methods (traditional recycling with outdoor shared dumpsters and door-side recycling) provided an excellent opportunity to identify the advantages and disadvantages of each method.

From the beginning, tenants consistently utilized the recycling services. More detailed data was collected for the door-side collection service, which tracked tenant participation, recycling volumes, weight, contamination rates and types of contaminants. The door-side collection model also had the unique ability to provide individualized feedback to each resident. Contaminants were left in the recycling basket affixed with a note explaining why that item was not accepted for recycling. This communication strategy helped achieve a low 2.76% contamination rate. The most common contaminants were greasy pizza boxes and plastic packaging films. The door-side collection service was convenient for tenants and provided an effective reinforcement of correct recycling behavior; however, the additional cost of the service

presented financial challenges after the pilot was complete. To lessen the financial strain of door-side service, we recommend that a property's maintenance or janitorial staff perform the door-side collection.

Data from the four properties using traditional recycling dumpsters was limited to observation data. We recorded a visual estimate of the fullness of both recycling and trash dumpsters. We found challenges coordinating the timing of data collection with the trash/recycling pick-ups. We are not confident we were able to collect data just prior to trash and recycling pick-ups by the hauler. We believe the recycling volumes were greater than what is reflected in our data, but with so many real-world variabilities, it is difficult to ascertain concrete conclusions.

The propensity for contamination with traditional recycling using shared outdoor recycling dumpsters is much greater than the door-side service. Multiple non-recyclable materials were placed in recycling including clamshells, tissue, shipping pouches, bagged recycling/trash, plastic salad bags, nesting of boxes (putting a smaller box or materials inside a larger box) plastic bags, food, plastic film, nesting, paper towels, wipes, Ziplock bags and soiled paper/cardboard. The average contamination rate was estimated between 10-15%. Educational opportunities were limited to posters in communal areas and a monthly e-mailed recycling update.

## **Recommendations**

Recycle Colorado found that a modified door-side collection model was the best option for providing individualized communication and education. The model also mitigated the majority of space constraints, attained the lowest contamination rates (only 2.76% during the pilot), and offered a reasonable cost option for a highly successful multi-family recycling program. With a modified door-side model, tenants are provided a recycling basket that they put outside their door twice per week. The recycling is collected by a porter service which is trained to identify acceptable recycling materials. Any contaminants are left in the recycling bin with an "Oops" tag explaining why that material is not acceptable. The porter service transports the aggregated recycling to a locked outdoor recycling dumpster (or cart, stored in an out-of-the way area such as a utility or storage room). Keeping the recycling dumpster (or cart) locked mitigates contamination from external sources.

The cost for door-side service requires upfront purchase of recycling baskets (to be distributed to each rental unit), recycling signage on the baskets, supplies such as sticky notes, door-hangers or maintenance tags to communicate non-acceptable materials, recycling training for staff, and weekly recycling collection. When the property maintenance staff provides the door-side collection, these costs (from our experience) are less than that of an outsourced door-side recycling service.

This modified model was inadvertently put into practice when COVID-19 impacted the door-side collection service for the four Terra Firma apartment buildings. The service provider altered the door-side collection service to outdoor recycling carts, which were placed in the alley. The carts

were not locked and within one week non-recyclable materials contaminated the collection. Property management made the decision to use its own maintenance crew to perform the door-side collections and wheeled the carts to restricted utility areas of the buildings to prevent possible contamination. This successfully resulted in keeping the door-side collection service unchanged and highlighted a viable hybrid solution of door-side collection combined with a one-week regular aggregated recycling cart pick-up schedule.

The property manager at Terra Firma reported at the end of the pilot that they are continuing with this hybrid model and offered additional advice:

- Include a recycling addendum to the lease. The act of signing one's written agreement to participate responsibly in a recycling program reinforces a tenant's commitment to recycle properly.
- Provide ongoing training to the maintenance staff/porter service. A bi-lingual training manual for apartment staff would be valuable.
- Keep a supply of "oops" tags (for recycling contaminants) in the form of Post-It notes, door-hangers or maintenance tags. A simple checkmark next to the reason why the material is considered a contaminant is preferred. A door-hang notice is preferred since it is the most visible and has the added bonus of alerting other residents as they walk by that recycling is being monitored and that non-compliance will be publicly noted with a door-hanger.

## Highlights

- All participating properties will continue with recycling collection after the pilot.
- Although not a statistically significant result, of the 17 tenants (out of 152) who responded to the survey, most found it convenient to recycle and 88 percent thought recycling was an amenity that should be continued.
- The door-side recycling collection provides direct communication with each rental unit and facilitates individual recycling education. This model resulted in a very low 2.76% contamination rate and a much-appreciated clean recycling stream.
- The one property that had unofficial access to recycling collection prior to the pilot outperformed the other properties. It is an indication that education and continued recycling habits over time may show significant impacts.
- One property reduced its trash collection service from two pick-ups per week to one as a result of the increase in recycling.
- The two most dominant contaminants were plastic film (bags, shipping pillows, bubble wrap, envelopes) and greasy pizza boxes.
- When the COVID-19 pandemic altered the door-side collection service, property managers made the decision to perform the door-side collection with the property maintenance crew to keep the service unchanged.

## About Recycle Colorado

Recycle Colorado is a registered 501(c)(3) nonprofit organization. We are an action-oriented and member-driven organization that works on projects that are tangible, actionable and measurable related to infrastructure and end markets for material recovery, reuse and manufacturing. We also work to advance both local and state policy that supports keeping valuable material resources out of our landfills.

## APPENDIX Collateral



Hello Residents,

**Recycling at your apartment building:**  
Starting on Nov. 8<sup>th</sup>, your apartment building will begin a 6-month recycling pilot with Recycle Colorado and its partners Swire Coca-Cola, Coca-Cola North America, and the Safeway Foundation.

**The goal:**  
Residents of apartments, such as yourself, have a vital role to play in contributing to the City of Denver's waste diversion goal of 50% by 2030. With your help, we'll learn how to overcome recycling challenges that may exist in apartment buildings and expand recycling programs to other apartments.

**Nov. 7<sup>th</sup>:**  
On the evening of Nov. 7<sup>th</sup> you will be provided with a purple recycling basket by Recycle Colorado representatives who will deliver the baskets door to door and be available to answer questions.

**Nov. 8<sup>th</sup>:**  
The official start to our 6-month recycling pilot is Nov. 8<sup>th</sup>. Please collect your household recyclables (bottles, boxes, paper, plastics) in the provided purple recycling baskets. Bring recycling to the outdoor recycling bin which will be located next to the trash bin. Recycling collection will be every Tuesday morning.

**Recycling matters...here's why**  
By recycling you directly help:

- **Create jobs** (recycling creates 9 times more jobs than landfilling)
- **Save energy** (recycled materials use less energy in the manufacturing process)
- **Reduce pollution** (less waste in landfills reduces greenhouse gas emissions)
- **Protect the environment** (reduce the need to mine/extract virgin materials)

**Seeking recycling ambassadors:**  
Help improve your building's recycling rates and reduce contamination in household recycling bins by becoming a recycling ambassador. You'll be an onsite resource helping to make this recycling pilot a success. To volunteer, send an email to [contact@recyclecolorado.org](mailto:contact@recyclecolorado.org)

**Recycle. The whole city is doing it, now YOU can too!**

For additional recycling information, please visit the City of Denver's Multi-Family recycling website:  
<https://www.denvergov.org/content/denvergov/en/trash-and-recycling/resources/apartment---multi-family-recycling.html>

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**RECYCLE**  
**RECICLAJE**

 <p><b>Paper, Mail and Magazines</b> <i>Papel, correo basura y revistas</i></p>	 <p><b>Flattened Cardboard Boxes</b> <i>Cajas de cartón aplanados</i></p>	 <p><b>Paper Towel Tubes and Flattened Food Boxes</b> <i>Tubos de toallas y cartulina aplanada</i></p>
 <p><b>Cartons</b> <i>Cartones</i></p>	 <p><b>Empty Laundry and Bath Bottles</b> <i>Botellas de detergente y champú vacías</i></p>	 <p><b>Rigid Plastic Containers</b> <i>Los envases plásticos rígidos</i></p>
 <p><b>Empty Aerosol, Aluminum and Steel Cans</b> <i>Latas de aerosol, aluminio y de acero</i></p>	 <p><b>CLEAN Aluminum Foil</b> <i>Papel de aluminio LIMPIO</i></p>	 <p><b>Glass Bottles and Jars</b> <i>Botellas y frascos de vidrio</i></p>

 For more information, go to [DenverGov.org/Multifamily](https://denvergov.org/Multifamily). 

Flyer

# DON'T WASTE THE GOOD STUFF

HANG ME ON YOUR FRIDGE!

## RECYCLE THESE IN YOUR PURPLE BASKET

 <b>Bottles &amp; Cans</b>	 <b>Boxes</b>	 <b>Paper</b>	 <b>Plastics</b>
			
Aluminum and Steel Cans, Glass Bottles, Plastic Bottles and Aerosol Cans empty	Cardboard, Food Boxes, Paper Towel Tubes flatten	Mixed Paper, Newspaper, Magazines, Food and Beverage Cartons empty	Kitchen, Laundry, Bath: Bottles, Tub and Containers empty

## THESE MATERIALS ARE **NOT ACCEPTED** IN YOUR PURPLE BASKET

				
<b>No Bagged Recyclables</b> (do not bag recyclables)	<b>No Plastic Bags</b> (return to store)	<b>No Plastic Cutlery Straws or Lids</b> (throw in trash)	<b>No Scrap Metal</b> (no bulky metals, cookware or hangers)	<b>No Tangles</b> (no cords, hoses or chains)

 To learn more, go to [DenverGov.org/Multifamily](https://denvergov.org/Multifamily). 

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**THANK YOU FOR  
RECYCLING**



Your recyclable materials can be made into new items, like this shopping bag made from recycled plastic bottles.

Please accept this reusable bag to use for trips to the grocery store or other activities.

Reusable shopping bag made of rPET



## APPENDIX Collateral

Press Release

For Immediate Release  
November 5, 2019

Media Contact:  
Laura Levesque, Senior Director  
Recycle Colorado  
[Laura.Lc@recyclecolorado.org](mailto:Laura.Lc@recyclecolorado.org)

### **RECYCLE COLORADO EMPOWERS APARTMENT RESIDENTS TO START RECYCLING**

(Denver, Colo.) – Recycle Colorado launched a six-month free recycling pilot for eight apartment buildings in downtown Denver this week. The goal is to increase tenants' access to recycling which could contribute significantly to Denver's waste diversion goal of 50 percent by 2030. The City's Solid Waste Management Division estimates that approximately one-third of the city's population live in multifamily complexes that are not eligible for city recycling collection services. This pilot assists and incentivizes multifamily properties to start their own recycling programs.

Recycle Colorado partnered with Swire Coca-Cola, Coca-Cola North America, the Safeway Foundation, and the City and County of Denver to provide six months of free recycling services to selected apartment complexes in Denver that do not currently have recycling. The project will identify how to overcome barriers to implementing and managing a successful single-stream recycling program for apartments and how much material can be captured if single-stream recycling is installed. "We are actively working with property managers, owners, and tenants to overcome barriers like space constraints, right-sizing for trash and recycling receptacles, and recycling education to ensure a successful program that will continue after the six-month pilot concludes," said Laura Levesque, senior director at Recycle Colorado.

Industry giants like Coca-Cola Company also recognize the importance of recycling. Coca-Cola is helping communities increase recycling rates as part of its "World Without Waste" initiative with the goal of collecting and recycling the equivalent of every bottle or can it sells globally by 2030.

Recycle Colorado will host volunteer "Recycling Welcome Wagons" to give a warm and friendly face-to-face welcome to new recyclers while delivering free in-home recycling baskets and recycling guidance and tips. For more information, contact Laura Levesque at [contact@recyclecolorado.org](mailto:contact@recyclecolorado.org).

Recycle Colorado is committed to actively working to advance infrastructure, end markets and state and local policies so that Colorado's waste stream is recycled, composted or diverted to reuse or remanufacturing.

###

## APPENDIX Collateral

### November Recycling Tip:

**Please - no plastic bags in the recycling.**

Return your plastic bags to the grocery store and keep recycling free of plastic bags. Watch the below video for an explanation of why bags need to be kept out of recycling. Thank you!

Date	Sum of Recycling Volume (%)	Sum of Trash Volume (%)
12-Nov	40	30
19-Nov	70	35
25-Nov	20	40
9-Dec	110	105
16-Dec	120	110

### December Recycling Tip:

Hello Residents,  
Recycle Colorado wanted to pass along a progress report of the recycling pilot. They are pleased with your recycling of empty bottles and cans, flattened boxes and paper. However, they ask PLEASE - no plastic bags or plastic film (like bubble wrap & packaging air pillows) in the recycling. Thank you for participating in the recycling pilot and enjoy your holidays!

**Recycling progress report for 1260 Penn St.**

Week	Recycling (%)	Trash (%)
Week 1	50	50
Week 2	55	45
Week 3	50	50
Week 4	50	50

**Recycling tip: Holiday lights**

**RECYCLE Your Holiday Lights**

- Free seasonal collection
- Mid-November - Mid-January
- String lights collection at Cherry Creek Recycling Drop-Off

**Where should I bring them? ...to the**  
**Cherry Creek Recycling Drop-Off**

7752 Cherry Creek S Dr.  
Denver, CO 80231

Hours:  
Tuesday - Friday 10 AM to 5 PM  
Saturday 9 AM to 2 PM  
Closed Sunday & Holidays, and on all city holidays.

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January Recycling Tip:



February Recycling Tip:



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March Recycling Tip (coronavirus stay-at-home order began):



April Recycling Tip:

**Please do not put Styrofoam in your recycling**



Styrofoam can not be recycled in our program because it is often contaminated with food and drink. Since the foam is 95% air, it is not cost effective to recycle.

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May Recycling Tip:

