From your door to ours: The flow of recyclables through the City of Ann Arbor's Materials Recovery Facility (MRF)

From your door or curb. Recycling starts with your decision to put clean recyclables (separated from trash) into a recycling bin at home, school, or work. Single-stream recycling allows all recyclables to be placed into one recycling bin, without separating papers and containers. Find specific information at www.a2gov.org/recycle.

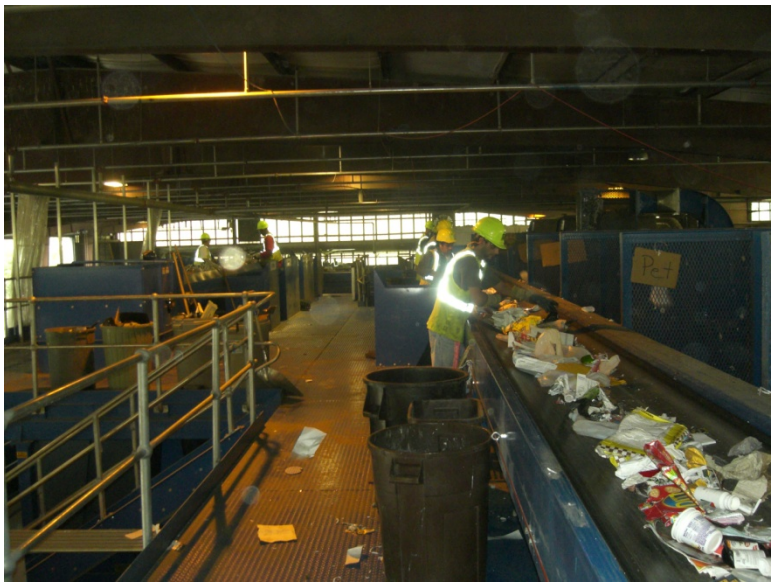
1. **Pickups.** On recycling collection day, the city's hybrid hydraulic recycling trucks with automated arms lift and empty the recycling carts. (Recycling dumpsters located at many schools and businesses are handled by front-load recycling trucks.)
2. **Weigh-in.** Upon arrival at the city's Materials Recovery Facility (MRF) at 4150 Platt Road, the truck is weighed on a giant scale and the driver collects a weight slip from the Scalehouse window. (Every truck that brings materials into the MRF for processing or that transports sorted recyclables to factories for remanufacturing is weighed. Over 20 communities and haulers deliver their materials to Ann Arbor's MRF.)

3. **The tipping floor.** The recycling truck empties the mixed papers and containers onto the floor at the start of the MRF processing line. A front-end loader continuously scoops materials from the tipping floor into a large hopper.
4. **Drum-roll.** Inside the hopper, papers and containers are tumbled over a large rotating drum to loosen compacted materials. Then the recyclables flow along a conveyor belt with rollers on the top and bottom (like a pasta machine) to provide a consistent thickness of materials for processing.
5. **First stop, bulky metal and plastic items are removed.** The first sort at the MRF is conducted by hand to remove scrap metal (such as toasters) and large rigid plastics (such as kitty litter buckets). Shredded papers placed in clear plastic bags are also pulled at this first sorting station (Bagged, shredded papers are the only acceptable use of plastic bags for recycling at the MRF).
6. **Old corrugated cardboard (OCC) stops here**. Mixed papers and containers flow over a line of thick, triangular-shaped paddles, called **screeners**, that catch and pull the pieces of corrugated paper boxes up and away from the thinner pieces of paper and shaped containers. The top OCC layer makes a 90° turn, passes by a staffed quality-control station, and then empties into a cardboard storage bunker, which is periodically routed to the baler. (See #16 Baler)

7. **Glass is removed**. The lower conveyor belt of mixed papers and containers (without cardboard) also makes a 90° turn and travels over a series of curved metal augers, called **scalping screeners**, where the heavy glass drops below the sorting line and is carried along a process where the glass is vacuumed, crushed, and stored in an outdoor bunker. Hand-sorters along the scalping screener remove office papers for recycling and pull out trash (such as plastic bags, which can clog gears and cause problems throughout the MRF) for disposal.

8. **Separating papers from containers**. Immediately following the scalping screeners, the papers are separated from the containers via a **"rubber boots" screener**, which uses smaller paddles, similar to the cardboard screener, to pull the flat, fibrous papers from the mixed materials. The heavier **containers** with a shape remain on the bottom of the boots and continue to the second-story containers processing line. The papers float on the top of the boots onto a conveyor belt directed up to the third-story paper sorting line.
9. **Hand sorting papers**. On the top deck of the MRF, papers flow along a series of west-bound conveyor belts and are hand-sorted into categories of magazines, catalogs, and boxboard (e.g., cereal boxes). The remaining newspaper automatically empties into a storage bunker at the end of the line. The sorted paper products are stored in bunkers under the paper sorting line. Each bunker is periodically emptied and directed to the baler (see #16). Stray, non-paper items on the paper belt are hand-removed, dropped into chutes, and redirected back to the appropriate recycling lines.
10. **Steel cans and small scrap items are removed by a magnet**. A magnetized rotating drum picks up ferris metals and drops them into a storage bunker.
11. **Plastic # 1/PET bottles and cups are removed by an optical scanner (see photo).** As the containers continue on the conveyor belt, a computerized scanner identifies plastic #1 items by its chemical and light properties. The computer sends a timed signal to provide a sharp burst of air to propel the specific plastic off the mixed containers line onto a separate conveyor line. The #1/PET containers are pulled up through a vacuum tube and routed to the #1 plastics bunker for storage.

12. **Remaining containers are hand-sorted on the third story sorting line.** The containers line climb up to the top third level deck sorting line and then turns 90^{o} to pass by people who separate containers by plastic types—such as #1/PET, #2/HDPE natural (milk jugs,) #2/HDPE (colored laundry, etc., jugs), and other plastics—asceptic containers (milk cartons and juice boxes), steel cans, and aluminum foil.



13. **Aluminum cans are removed by a reverse magnet process.** Aluminum cans are removed when the conveyor belt passes over a magnet combined with an electrical charge that work together to repel the aluminum. The cans appear to jump off the sort line, much like popcorn. The end of the container sorting line is a staffed check-point to capture the "good" recyclables from the trash residuals, heading for the trash bunker.

14. **Quality control and redundancy**. Throughout the MRF sorting process there are stations where people visually check the flow of materials and remove items that need to be redirected to/from papers and containers. The chutes by these sorting stations empty into a network of conveyour belts that either flow into the primary papers or containers lines or are handled by backup sorters on the second story deck.

15. **The baler** creates blocks of sorted materials at the far south-east corner of the plant. The baler operator is able to remotely open and close gates at the bottom of each storage bunker and direct the flow of sorted recyclables through a series of conveyor belts into the baler machine.
16. **Bale storage areas.** The end product of the MRF is the baled creation of sorted materials, pressed into block-shapes held together with steel bands. These bales are approximately 5'x3'x3' and weigh between 1000 to over 2000 pounds each, depending on the type of sorted material contained within the bale.
17. **Truck docks.** Throughout the day, 16-wheel semi-tractor trailers are loaded with the baled, sorted recyclables for delivery to re-manufacturing plants. Ann Arbor's recyclables are shipped to reprocessing plants such as to TABB/Clean Tech in Plymouth and Dundee, MI for #2 HDPE plastics; Budweiser in St. Louis, MO for aluminum cans; and a network of paper mills, including several in Michigan.
18. **Close the recycling loop. Buy recycled-content products.** Recycling is able to keep working when consumers choose to purchase recycled-content products. Look for the "post-consumer recycled content" label when selecting papers for printers, copiers, and greeting cards. Consider recycled-content products such as recycled plastic lumber for decks, fleece jackets and blankets made with recycled PET bottles, recycled glass tiles, etc.
19. **Back to step #1, keep recycling!**

Fun Facts: The new processing equipment installed in the MRF weighs approximately 245 tons and has 55% recycled steel content. The older equipment that could not be reused with the plant upgrade was removed from the MRF and recycled, supplying approximately 67 tons of scrap metal.

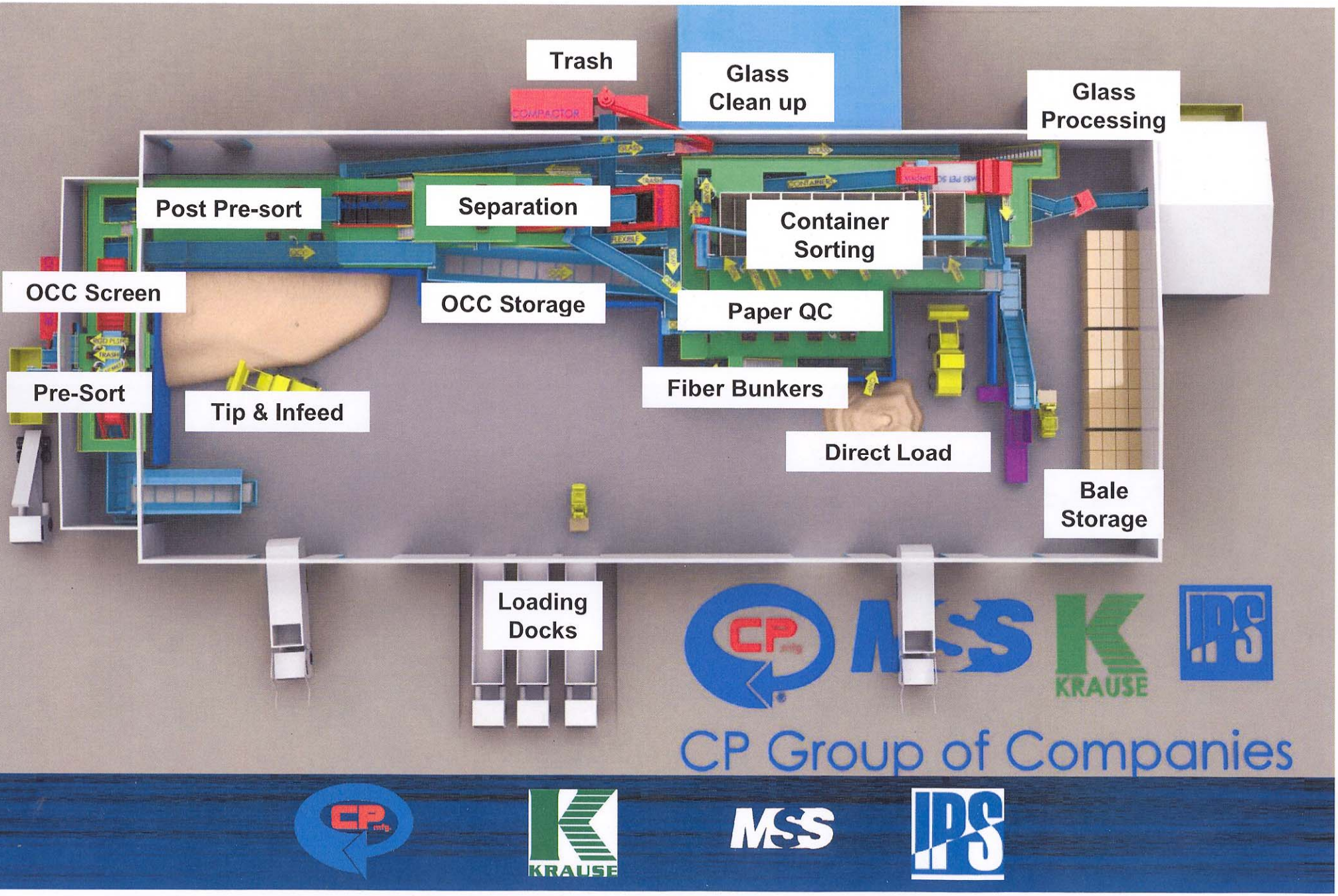
More information on recycling is posted at www.a2gov.org/recycle, www.casella.com and www.recycle.com.

CITY OF ANN ARBOR MICHIGAN

FCR Recycling
A Casella Company

Resource Recycling Systems
www.recycle.com

Printed recycled paper. August 21, 2010


Trash
Glass Clean up
Glass Processing
Post Pre-sort
Separation
Container Sorting
OCC Screen
OCC Storage
Paper QC
Pre-Sort
Tip & Infeed
Fiber Bunkers
Direct Load
Bale Storage
Loading Docks
CP
MSS
KRAUSE
IPS
CP Group of Companies