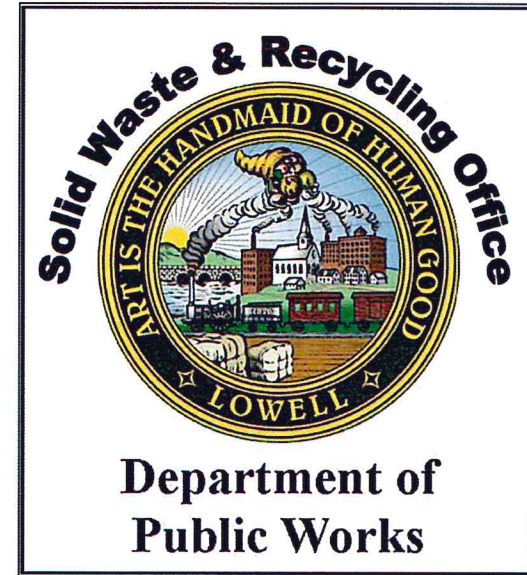


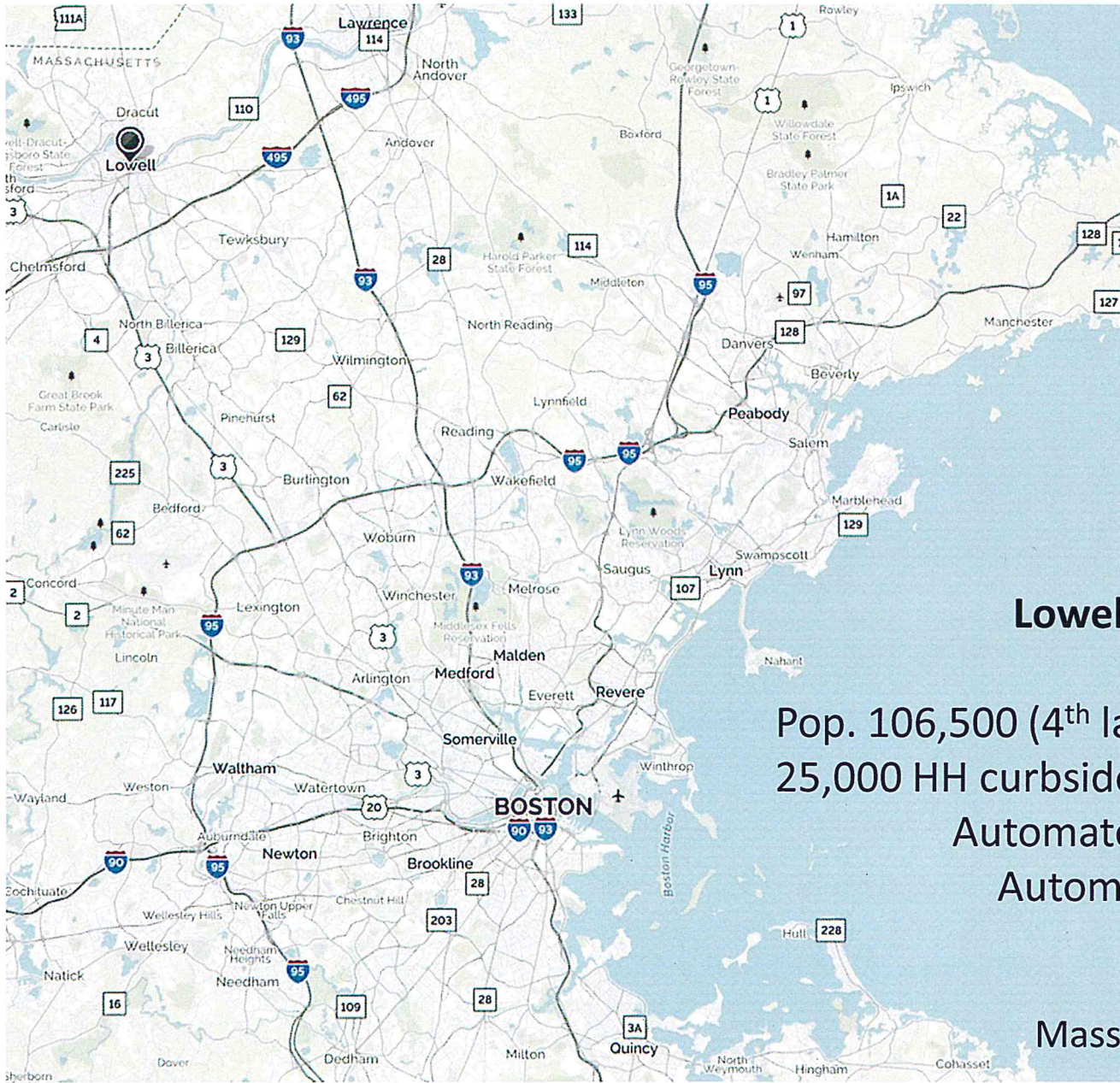
Recycling Education & Quality Control



Session 2

1:40 – 3:05 PM

MassRecycle Conference 3/29/2016



Lowell, MA

Pop. 106,500 (4th largest city) 2010 census

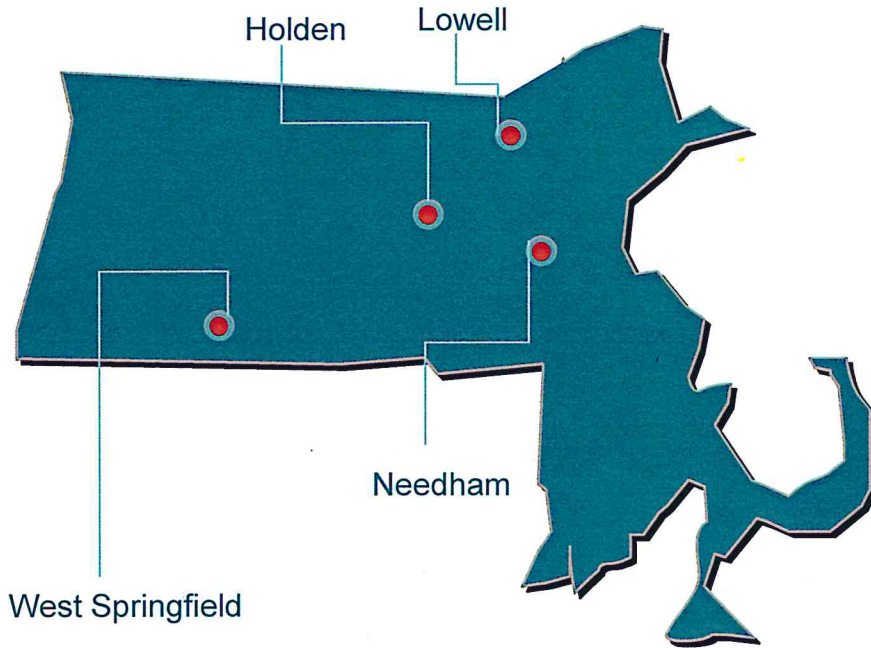
25,000 HH curbside collection

Automated MSW (Mar. '09)

Automated SSR (Jan. '14)

MassRecycle 3/29/16 (pg. 2)

Develop, Pilot, and Test Program to Fight Contamination



Goal:

- Reduce contamination rates by changing behavior at the household level.
- Reduce costs for communities.

Our SOP:

- Standardize approach.
- Make it as easy as possible.
- Communication with all players is key.
- Use data to inform methodology.

Participating Municipalities

Lowell

- Friday Blue Route (poor quality route)
- Tuesday Green Route (average quality route)

West Springfield

- Tuesday A (poor quality route)
- Monday A (average quality route)

Holden

- Representative Route

Needham

- Transfer station and recycling drop-off

The Issue

contamination

[kuh n-tam-uh-ney-shuh]

1. The wrong materials in the system.
2. The right materials prepared the wrong way.

single
stream



dual
stream



source
separate



RESIDENTIAL



bins



carts



drop-off

MRF-shed

MRF-shed

THE RECYCLING PARTNERSHIP
 recyclingpartnership.org
 emarshall@recyclingpartnership.org

ACCEPTABLE MATERIALS CHECKLIST

MRF: _____
 CITY: _____

Please go into the shed to get the checklist. You will see the building address on the back of the checklist. You will see the building address on the back of the checklist.

ACCEPTABLE MATERIALS

GLASS PRODUCT ACCEPT DO NOT ACCEPT DO NOT WANT ON LIST BUT ACCEPT

Bottles and Window
 Mugs
 Drinking tiles
 Others: _____

PAPER PRODUCT

OCCT
 Pizza Boxes
 Newspaper
 Magazines
 Hard Cover Books
 Paperback Books
 Office Paper
 Junk Mail
 Corrugated (e.g. like milk, etc.)
 Shredded Paper
 Round Cans (e.g. Gold Cups, etc.)
 Hot Cops (e.g. Paperboard)
 Kraft Bags
 Tissue Paper
 Ice Cream Containers
 Others: _____

How do you educate what plastic is accepted:
 By object shape and/or size. (e.g. bottles - neck smaller than base)
 By resin type #1-7
 By resin
 By resin
 Other: _____

ACCEPTABLE MATERIALS

PLASTIC PRODUCT ACCEPT DO NOT ACCEPT DO NOT WANT ON LIST BUT ACCEPT

Bulk plastic
 Exclusions or requirements
 Buckets (any)
 Exclusions or requirements
 Toys
 Saw or prep
 Flower Pots
 Other Drink
 Other Food (e.g. items in bags, wraps)
 Plastic bags
 EPS Foam (Block and for food service containers)
 Yard Waste
 Food Waste
 Bulky Plastics
 Wire, hose, cords, rope, chains
 Scrap metal
 Pubs and Pans
 White Goods
 Textiles/Clothes
 Flexible Packaging
 Motor oil containers
 Glass
 Fluorescent Bulbs
 Plastic toys
 Plastic furniture
 Electronics
 Cartons
 Ink/printer cartridges
 General hazardous waste
 Needles
 Pet food bags
 Mercury containing objects
 Dishes
 Wood
 Other
 Other

PROHIBITIVE ITEMS

If you could only tell citizens 5 things not to put at the curb - Rank the top five (5) unacceptable items that are causing the most problems in your facility. i.e. Degrades other commodities significantly, causes damage to MRF equipment, dangerous to staff, etc. Please rank with numbers "1" through "5" Put a "1" in the box of the worst contaminant. Only rank the top five and leave everything else blank.

| PROHIBITIVE ITEMS | TOP 5 |
|--|-------|
| Plastic Bags | |
| Shredded Paper | |
| Propane Tanks | |
| Aerosol Cans | |
| EPS Foam (Block and for food service containers) | |
| Yard Waste | |
| Food Waste | |
| Bulky Plastics | |
| Wire, hose, cords, rope, chains | |
| Scrap metal | |
| Pubs and Pans | |
| White Goods | |
| Textiles/Clothes | |
| Flexible Packaging | |
| Motor oil containers | |
| Glass | |
| Fluorescent Bulbs | |
| Plastic toys | |
| Plastic furniture | |
| Electronics | |
| Cartons | |
| Ink/printer cartridges | |
| General hazardous waste | |
| Needles | |
| Pet food bags | |
| Mercury containing objects | |
| Dishes | |
| Wood | |
| Other | |
| Other | |

Pilot & Test: What is the right action for the biggest impact?



- What are the most problematic materials for the MRF?
- Is the problem everywhere or isolated?
- Can we educate alone or must operations be included?
- Will set out rates be impacted?
- How can we narrow down options to the biggest bang for the buck?
- What determines success?

Contaminant Categories

Recyclables in plastic bags

Refuse in plastic bags

Film

Unacceptable plastics

Hose, VCR tapes, other tangles

Scrap metal, including hangers

Textiles

Wood and yard waste

All other

Food

Liquids

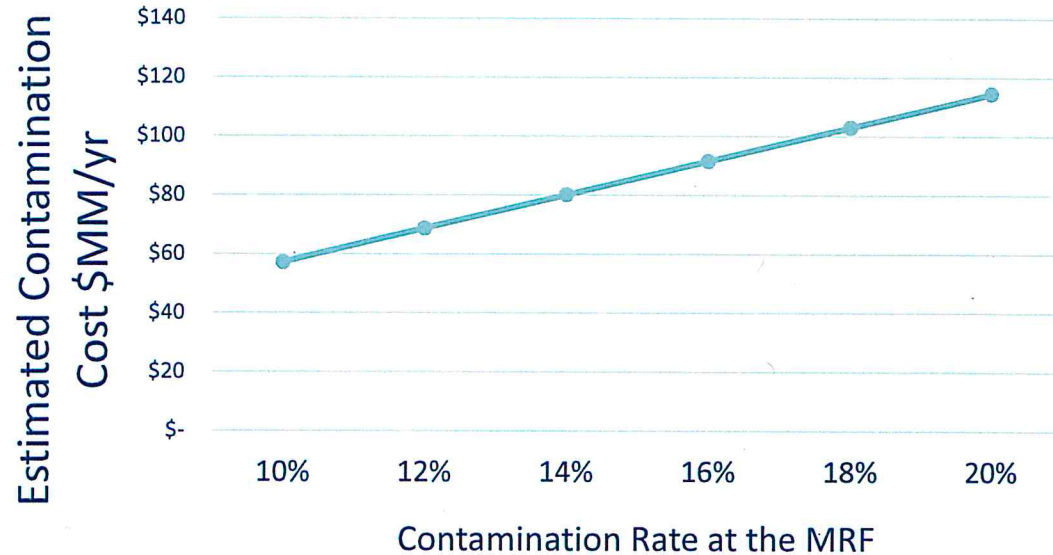
What is the cost of contamination?

Could it be that 18% = \$100,000,000/year for Massachusetts alone?

Back of the envelope considerations:

- Tipping fee
- Tons collected for recycling
- Percentage of contamination
- Collection costs for contaminated tons
- MRF processing costs
- Trucking costs disposal by MRF
- Tipping fee for disposal by MRF

Estimated Costs of Contamination for Mass



Contamination Mitigation



ConMit

Credit goes to Bill Stanwood, MREC, Lowell

- May 2014 convened group of haulers, municipalities, MRFs, MassDEP-MACs...
- Grew to include processors and State representatives from VT, NH & RI
- Facilitated by US. EPA - Boston

Lowell ConMit cont.



Summer 2015 WARNING LETTER from WM MRF

- results of a recent inspection of the material delivered to our Billerica MRF
- The entire (8/24/15) load was classified as “residue” due to the high concentration of non-recyclable materials
- The defn. of recyclables does allow for up to 5% contamination or residue
- immediate action must be taken to reduce the level of contaminants
- recycling facilities cannot absorb the cost to process and dispose of “non-recyclable materials”
- It will be necessary in the very near future to charge the City for the transportation and disposal of contaminated loads



Contamination

MassRecycle 3/29/16 (pg. 3)

1113448048

1113448105

13047000

44497

1113445954

1113041766

1113444434

1113041757

1113041755

Lowell ConMit cont.



June 2015 applied for SMRP grant.

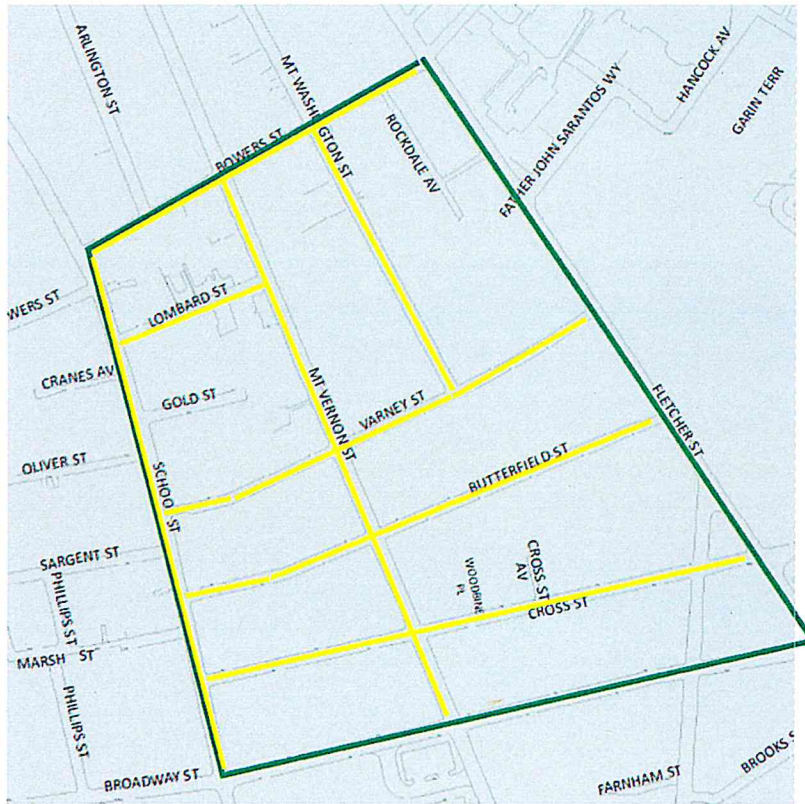
Oct. 2015 awarded \$18K MassDEP ConMit grant

Jan. 2016 TRP/MassDEP selected Lowell as pilot

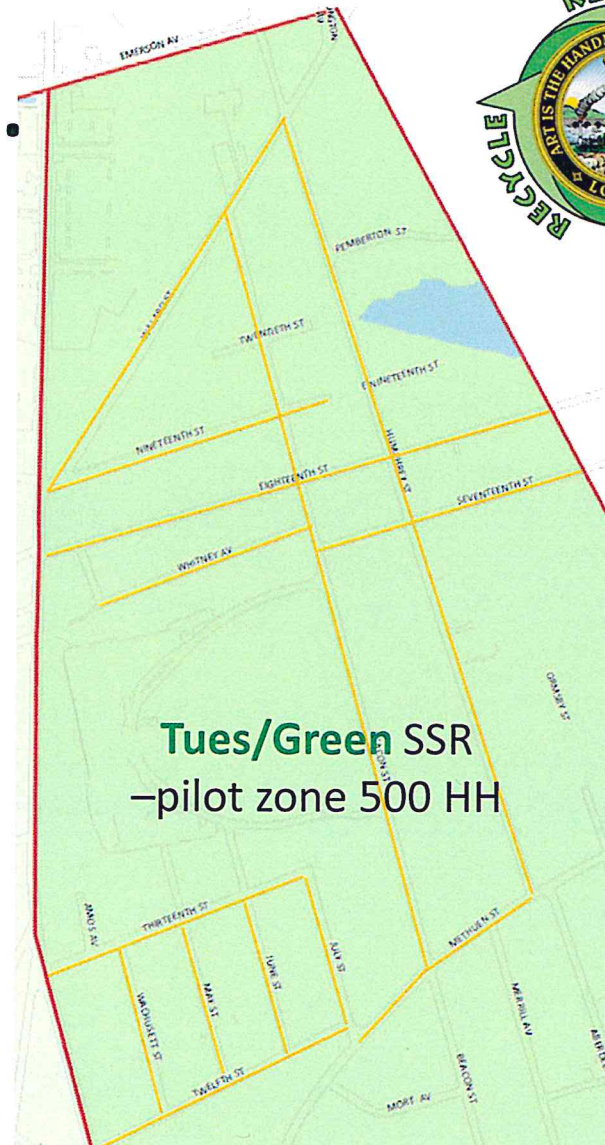
Feb. 5th & **Mar. 8th**, 2016 pilot zone waste audits

March: Create collateral to be mailed Apr. 13th

Lowell ConMit Cont.



Friday/Blue SSR –pilot zone 400 HH



Tues/Green SSR
–pilot zone 500 HH

Lowell ConMit Cont.



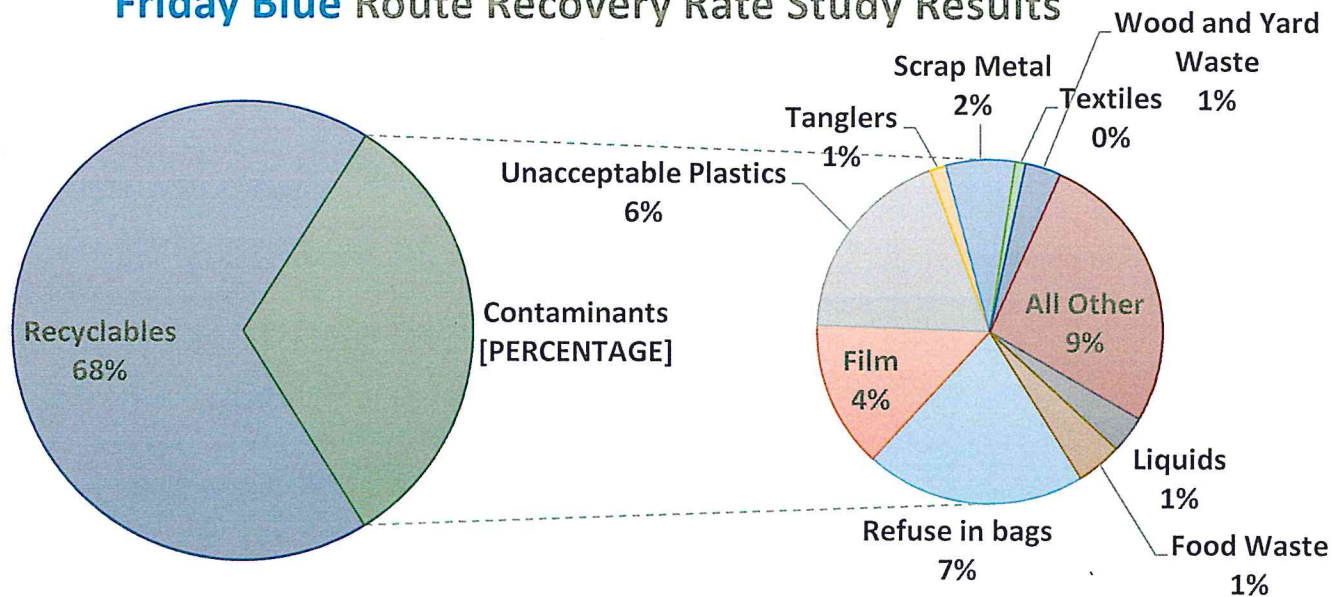
How bad could it really be?

- WM estimated 25%
 - Feb. 5th Audit (of **Fri/Blue**) found 30%
 - Mar. 8th Audit (of **Tues/Green**) found 20%

Lowell ConMit Cont.



Friday Blue Route Recovery Rate Study Results



- Refuse in bags
- Film
- Unacceptable Plastics
- Tangles
- Scrap Metal
- Textiles
- Wood and Yard Waste
- All Other
- Liquids
- Food Waste
- Recyclables

Lowell ConMit Cont.



Next Steps...

Fri. Apr. 15th begin 7 E-O-W enforcement days

Wed. Apr. 20 begin 7 E-O-W enforcement days

July 22nd & **July 26th** Final Waste Characterization

Fall 2016 expand pilot to entire **Fri/Blue** route

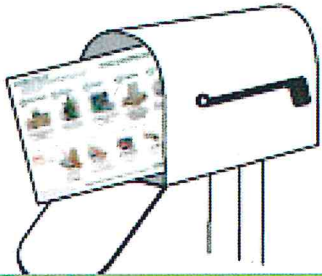
2017 expand ConMit to Citywide

curbside standard operating procedures

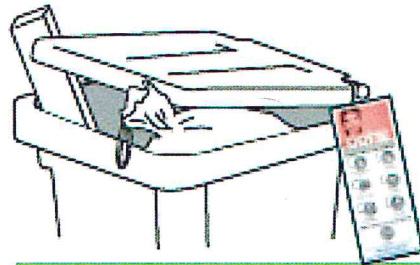


RECYCLINGPARTNERSHIP.ORG

CURBSIDE: Deploy these core tools



Annual info card mailer



Curbside feedback



Top issue mailer



Top issue signage

LOWELL (2 routes)

WEST SPRINGFIELD (2 routes)



General Promotions
Website Update

Lowell ConMit Cont.



SHINE ON. Recycle.
RECICLAJE
វត្តដែលអាចកែច្នៃប្រើម្តងទៀត

LowellRecycle.org

Cans **Cartons** **Glass** **Paper** **Plastic**

NEVER MISS COLLECTION DAY
DOWNLOAD THE FREE APP "LowellRecycle"
WEEKLY REMINDERS, ALERTS, TIPS

The project is funded in part by a grant from the Massachusetts Department of Environmental Protection.

Collateral created by TRP
Funded by MassDEP grant

2 x 3 foot "Sandwich board"

Five (5) to be deployed in each:

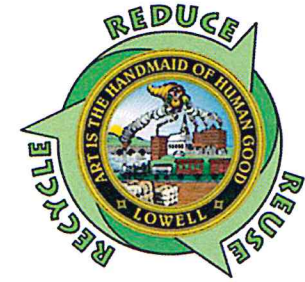
-**Fri/Blue** zone

-**Tues/Green** zone

And in 2 local Market Baskets

MassRecycle 3/29/16 (pg. 12)

Lowell ConMit Cont.



RECYCLE RECICLAJE ការកែឆ្លៃ

| | | |
|--|--|---|
|  <p>Cans</p>  <p>Aluminum and Steel Cans empty and rinse</p> |  <p>Cartons</p>  <p>Food and Beverage Cartons empty and replace cap</p> |  <p>Glass</p>  <p>Bottles and Jars empty and rinse</p> |
|  <p>Paper</p>  <p>Mixed Paper, Newspaper, Boxes, and Cardboard flatten</p> |  <p>Plastic</p>  <p>Kitchen, Laundry, Bath: Bottles and Containers empty and replace cap</p> | <p>RECYCLE THESE LOOSE IN YOUR GREEN RECYCLE CART</p>  <p>Questions? See full Yes/No list at LowellRecycle.org</p> |

NO! NO INCLUIR គ្មាន

| | | | | |
|--|---|---|--|--|
|  <p>Do not Bag Recyclables No Garbage</p> |  <p>No Bags (return to retail)</p> |  <p>YUCK No Food or Liquid (empty all containers)</p> |  <p>No Clothing or Linens (drop-off only)</p> |  <p>No Tanglers, Cords, Hoses, Chains or Electronics</p> |
|--|---|---|--|--|

Solid Waste and Recycling Office
978.674.4309 | www.LowellRecycle.org

This project is funded in part by a grant from the Massachusetts Department of Environmental Protection. Minimum 30% recycled paper

Collateral created by TRP
Funded by MassDEP grant

“Info Card” Pg. 2

Mailed to each HH

-**Fri/Blue** zone (400)

-**Tues/Green** zone (500)

To arrive Wed. Apr. 13 '16

MassRecycle 3/29/16 (pg. 13)

Lowell ConMit Cont.









REJECTION


OOPS!

PLEASE LEAVE THESE ITEMS OUT!

ក្លាស់

| | |
|---|--|
|  Do not Bag Recyclables (no garbage) |  No Bags (return to retail) |
|  No Food or Liquid (empty all containers) |  No Clothing or Linens (drop-off only) |
|  No Tanglers, Cords, Hoses, Chains or Electronics |  No Big Items (wood, plastic, furniture, or metal) |

CORRECT THIS AND WE WILL COLLECT NEXT TIME



978.674.4309
LowellRecycle.org

REMINDER

OOPS!

PLEASE LEAVE THESE ITEMS OUT!

ក្លាស់

| | |
|---|--|
|  Do not Bag Recyclables (no garbage) |  No Bags (return to retail) |
|  No Food or Liquid (empty all containers) |  No Clothing or Linens (drop-off only) |
|  No Tanglers, Cords, Hoses, Chains or Electronics |  No Big Items (wood, plastic, furniture, or metal) |










NEXT TIME WE WON'T BE ABLE TO COLLECT YOUR CART IF WE SEE THESE ITEMS





978.674.4309
LowellRecycle.org

ការកែច្នៃ

RECYCLE MORE OF THESE:

| | | |
|--|--|---|
| CANS Food and Beverage  empty and rinse | CARTONS Bottles and Jars  empty and replace cap | GLASS Aluminum and Steel Cans  empty and rinse |
| PAPER Mall, Boxes, and Cardboard    flatten | | |
| PLASTICS Kitchen, Laundry, Bath: Bottles and Containers    empty and replace cap | | |

NEVER MISS COLLECTION DAY
DOWNLOAD THE APP
WEEKLY REMINDERS, ALERTS, TIPS

978.674.4309
LowellRecycle.org

This project is funded in part by a grant from the Massachusetts Department of Environmental Protection. Minimum 50% recycled paper.

Back
(of both cards)

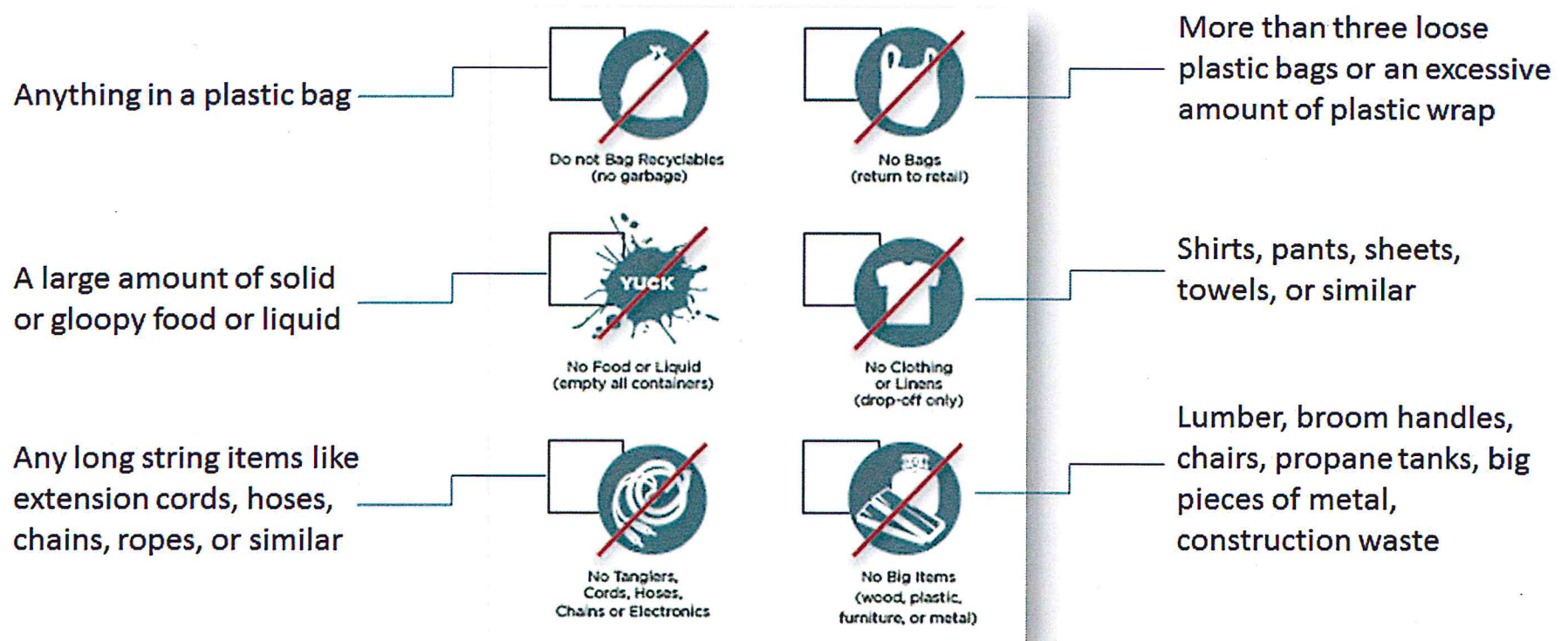
Collateral created by TRP
Funded by MassDEP grant

MassRecycle
3/29/16 (pg. 14)

Lowell ConMit Cont.



Problem Materials to Look Out For

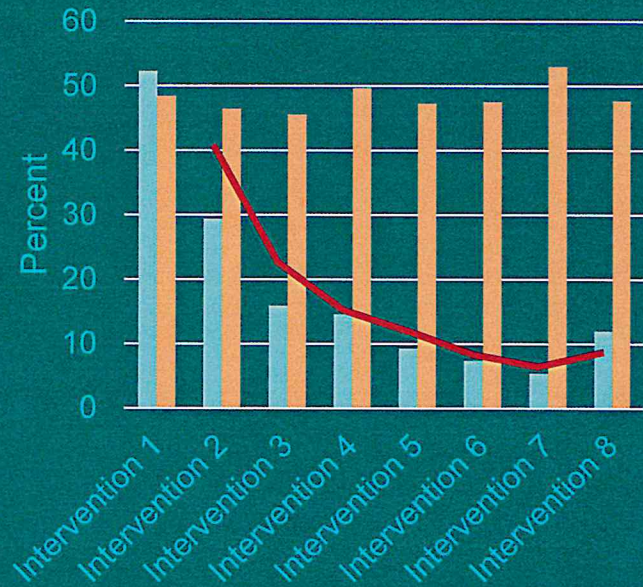
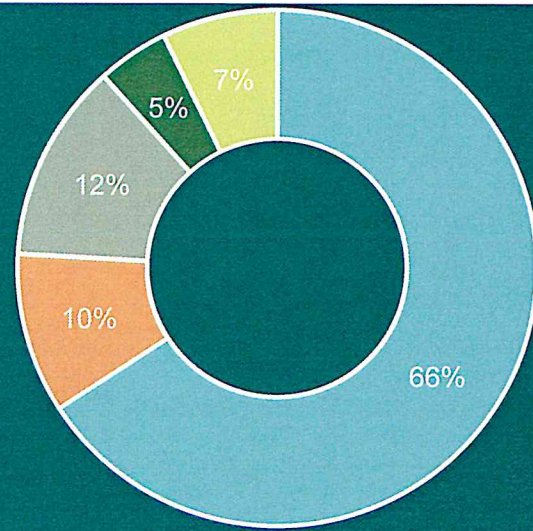


Lowell Pilot Cart Daily Protocol

1. Have rejection tags (on 4/15 and 4/20 bring reminder tags instead), thank you tags, info cards, up-to-date monitoring sheets, and a counter/clicker
2. Click the counter/clicker once for every recycling cart that is set out. Record the final count on the monitoring sheet at the end of the day
3. Give every cart a quick look – no digging in cart Look for the items noted on the OOPS/rejection tags
4. If you see any of the items noted on the OOPS/rejection tags:
 - For the first week of the pilot (4/15 & 4/20), tag cart with an OOPS/reminder tag, marking an "X" beside the problem material
 - For the remainder of the pilot, tag cart with an OOPS/rejection tag, making an "X" beside the problem material
 - Place the tag on the left side of the cart handle (when standing behind cart), then turn the cart 90 degrees to the left so the tag is visible from the street
 - Mark the monitoring sheet if a rejection tag was left
 - Report to the call center that a rejection tag was left
5. During next collection period, check every cart again
 - If OOPS/rejection tag was left at the address the previous week and the problem was fixed, leave a thank you tag and document that cart was fixed on the monitoring spreadsheet
 - If a cart is still contaminated, leave another OOPS/rejection tag
 - Remove the old rejection tag if still visible
 - At addresses that Waste Management tagged with a reminder tag the week before (as noted on the monitoring sheets), check the carts more thoroughly. If the cart is contaminated, leave an OOPS/rejection tag. If not, leave a thank you tag.

RESULTS

tagging data



Lowell

| | | Intervention 1 | Intervention 2 | Intervention 3 | Intervention 4 | Intervention 5 | Intervention 6 | Intervention 7 | Intervention 8 |
|-----------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Average Quality Route | Rejection Rate | 29.9% | 18.3% | 9.7% | 2.7% | 6.1% | 4.0% | 2.4% | 2.8% |
| | Set-out | 62% | 60% | 49% | 66% | 67% | 69% | 67% | 57% |
| Poor Quality Route | Rejection Rate | 52.27% | 29.38% | 15.94% | 14.60% | 9.30% | 7.41% | 5.45% | 11.98% |
| | Set-out | 48.35% | 46.37% | 45.49% | 49.67% | 47.25% | 47.47% | 53.02% | 47.69% |

West Springfield

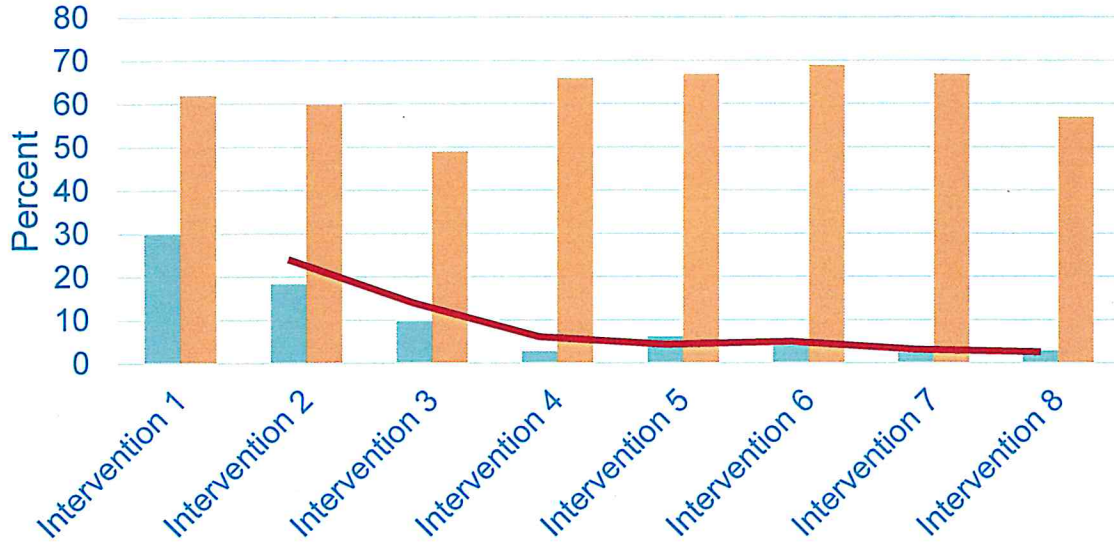
| | | Intervention 1 | Intervention 2 | Intervention 3 | Intervention 4 | Intervention 5 | Intervention 6 |
|-----------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Average Quality Route | Rejection Rate | 3.3% | 7.3% | 2.3% | 3.5% | 1.8% | 1.3% |
| | Set-out | 61% | 56% | 62% | 54% | 54% | 52% |
| Poor Quality Route | Rejection Rate | 26% | 17% | 19% | 9% | 14% | 6% |
| | Set-out | 50% | 56% | 54% | 44% | 53% | 44% |



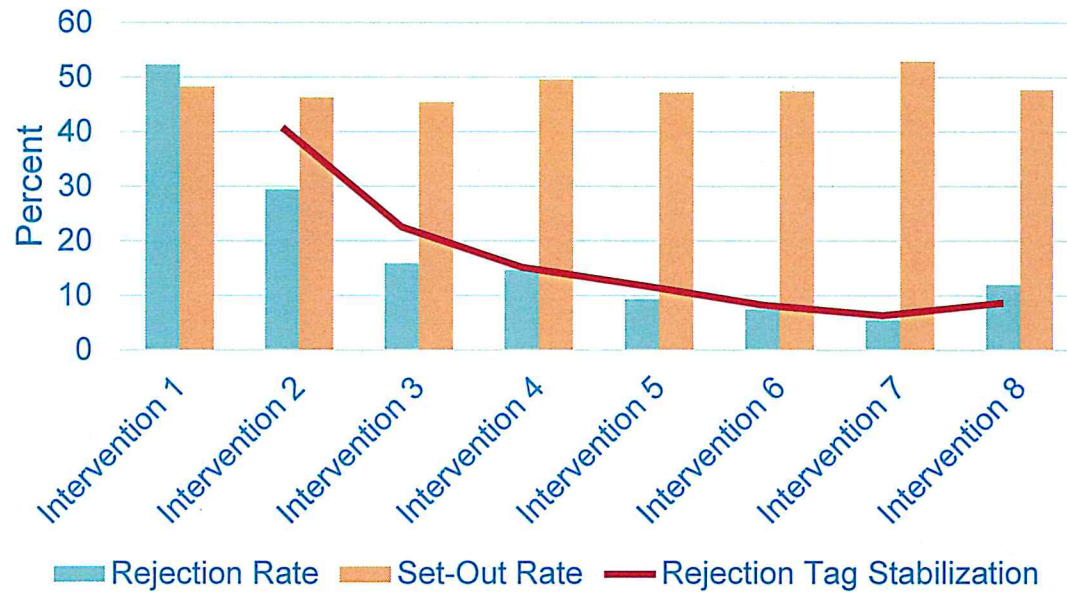
Note: All routes are single stream, every other week cart-based collection

Average Quality Route

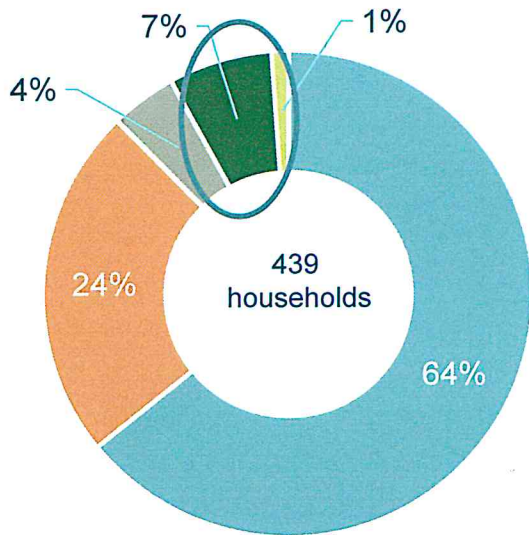
Lowell



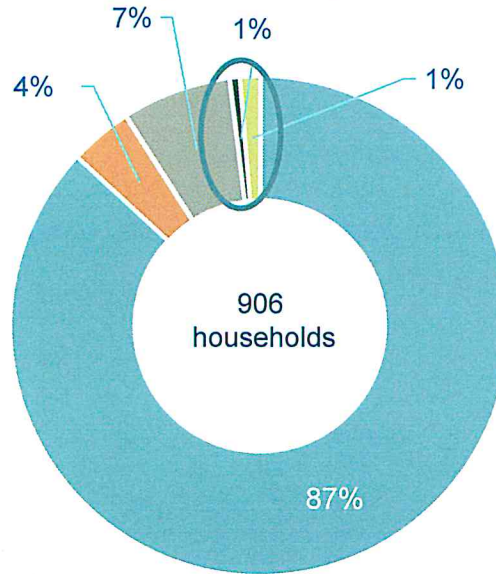
Poor Quality Route



Lowell
Average Quality Route



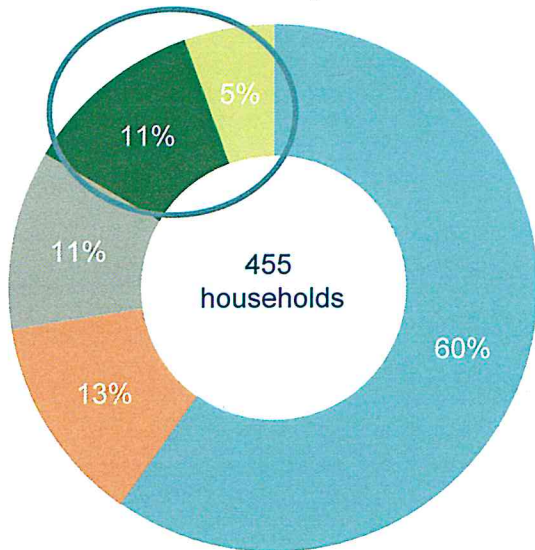
West Springfield
Average Quality Route



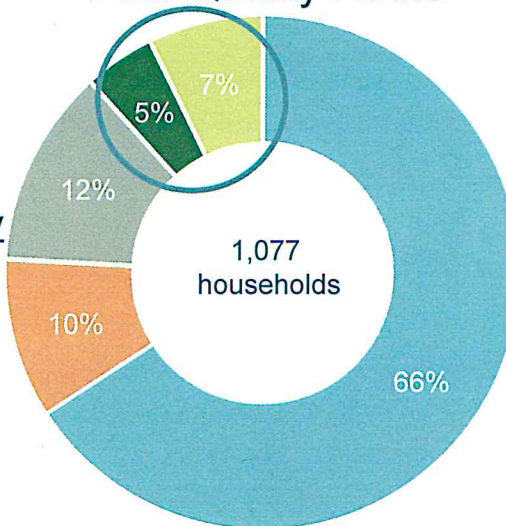
Majority
Single
Family

- No Tag
- Single Tag – Then Fixed on Next Recycling Day
- Single Tag – Inconclusive
- Repeat Tag – Fixed
- Repeat Tag – Not Fixed

Lowell
Poor Quality Route



West Springfield
Poor Quality Route



Majority
Multi-
Family

Lowell

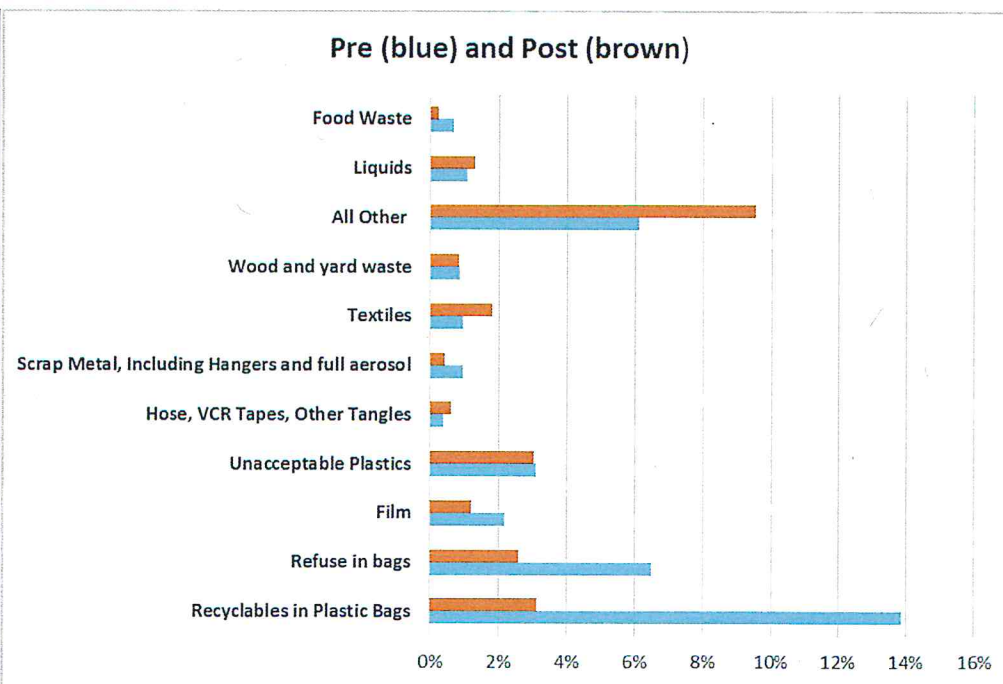
| Municipality | Lowell Friday Blue | | | Lowell Tuesday Green | | |
|---------------------------------------|--------------------|-------------|---------------|----------------------|-------------|---------------|
| | Pre | Post | Change | Pre | Post | Change |
| Recovery Rate | 58% | 58% | 0% | 66% | 66% | 0% |
| Recyclables in Plastic Bags | 16% | 5% | -11% | 8% | 2% | -6% |
| Contaminants | | | | | | |
| <u>Refuse in bags</u> | 7% | 2% | -4% | 2% | 0% | -2% |
| <u>Film</u> | 4% | 2% | -3% | 2% | 2% | 0% |
| <u>Unacceptable Plastics</u> | 6% | 5% | -1% | 2% | 2% | -1% |
| <u>Hose, VCR Tapes, Other Tangles</u> | 0% | 1% | 0% | 0% | 1% | 1% |
| <u>Scrap Metal, Including Hangers</u> | 2% | 0% | -2% | 1% | 0% | -1% |
| <u>Textiles</u> | 0% | 4% | 4% | 1% | 1% | -1% |
| <u>Wood and Yard Waste</u> | 1% | 1% | -1% | 0% | 3% | 3% |
| <u>All Other</u> | 9% | 13% | 5% | 8% | 5% | -3% |
| <u>Liquids</u> | 1% | 2% | 1% | 2% | 2% | 1% |
| <u>Food Waste</u> | 1% | 0% | -1% | 0% | 0% | 0% |
| Total Contaminants | 32% | 30% | -2% | 19% | 17% | -2% |
| Recyclables - Recovery Rate | Pre | Post | Change | Pre | Post | Change |
| <u>Fiber</u> | 70% | 70% | 0% | 75% | 75% | -1% |
| <u>Containers</u> | 41% | 50% | 8% | 45% | 47% | 2% |
| Total Recyclables | 58% | 58% | 0% | 66% | 66% | 0% |

Change in Contamination Rates by Material

Average across all routes

The good news and the bad news

| Material | Average | | |
|--|------------|------------|-------------|
| | Pre | Post | Change |
| Recyclables in Plastic Bags | 14% | 3% | -11% |
| Contaminants | | | |
| <u>Refuse in bags</u> | 6% | 3% | -4% |
| <u>Film</u> | 2% | 1% | -1% |
| <u>Unacceptable Plastics</u> | 3% | 3% | 0% |
| <u>Hose, VCR Tapes, Other Tangles</u> | 0% | 1% | 0% |
| <u>Scrap Metal, Including Hangers and full aerosol</u> | 1% | 0% | -1% |
| <u>Textiles</u> | 1% | 2% | 1% |
| <u>Wood and yard waste</u> | 1% | 1% | 0% |
| <u>All Other</u> | 6% | 10% | 3% |
| <u>Liquids</u> | 1% | 1% | 0% |
| <u>Food Waste</u> | 1% | 0% | 0% |
| Total Contaminants | 23% | 21% | -1% |



Targeted Material Trended Downward

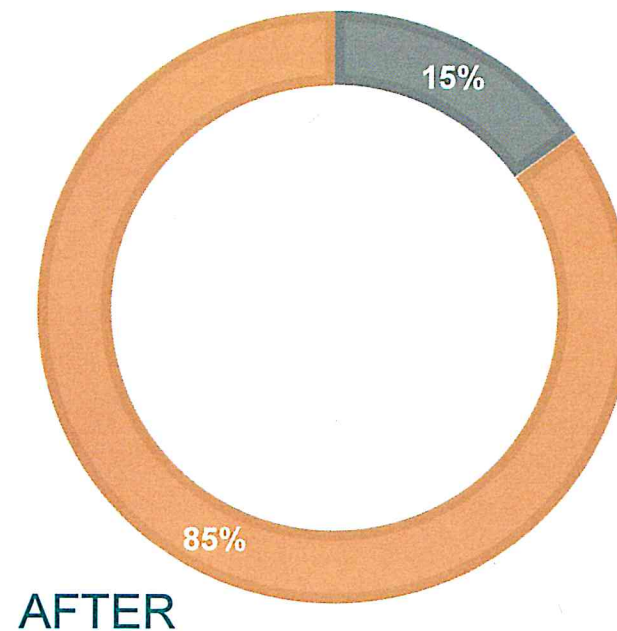
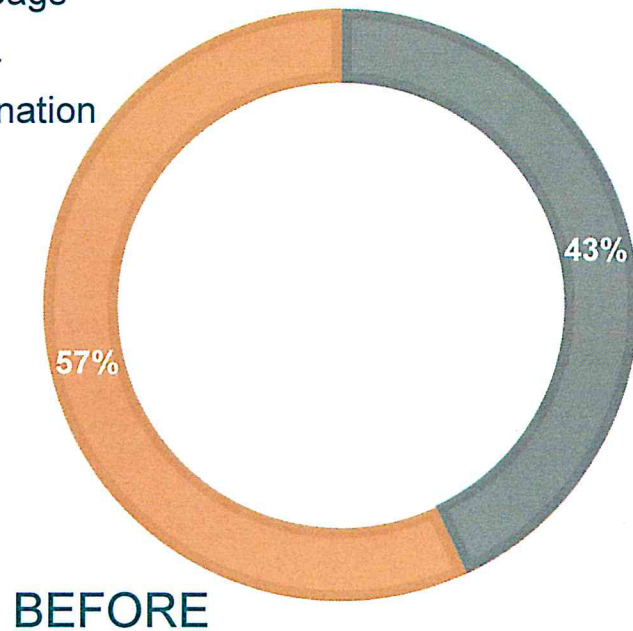
“Stuff in Bags” dropped from 43 to 15 percent of contamination by weight.

LOWELL and W SPRINGFIELD

Curbside
Entire toolkit was used

- Recyclables in bags and garbage in bags were identified as the most problematic contaminant.
- That material was specifically targeted.

● Stuff in Bags
● All Other Contamination



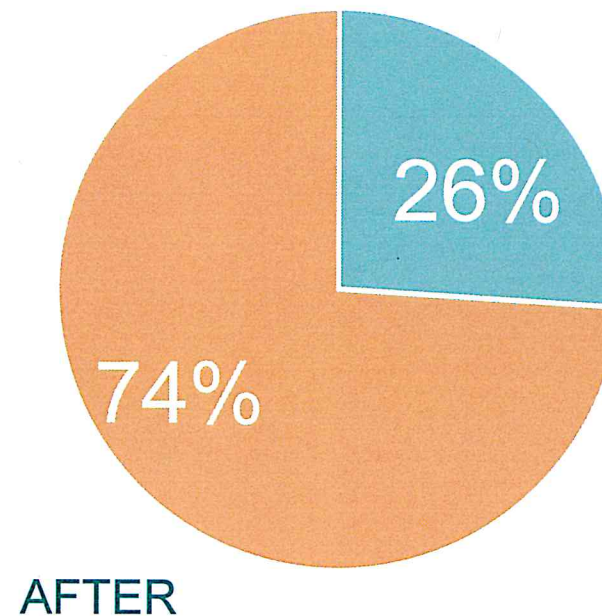
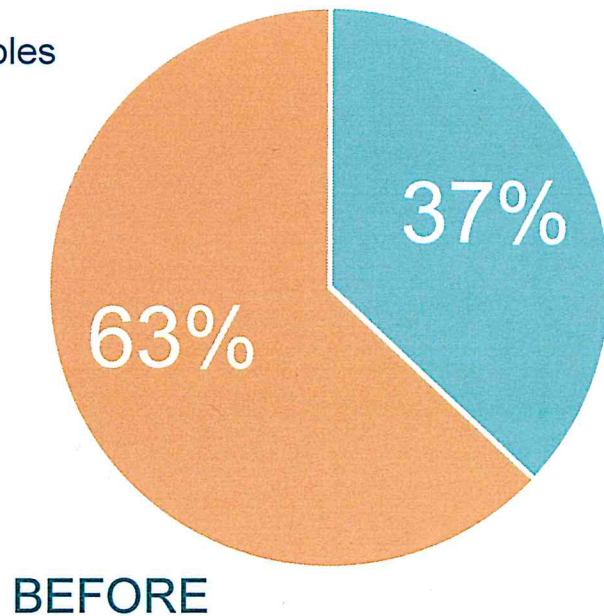
Overall Contamination Trended Downward

Total contamination dropped from 37 to 26 percent (by weight).

LOWELL and W SPRINGFIELD

Curbside
Entire toolkit was used

- Contamination
- Recyclables



- Each of the four pilot routes behaved slightly different.
- Single family routes seemed to have less contamination and better recovery rates than the multi-family routes.

Observations

Outreach program worked

It did reduce recovery of materials, but not significantly – which is good news

But we still have a significant contamination problem

It will take a sustained outreach program *and* enforcement to change behavior

- Municipal outreach and enforcement
 - Both to reinforce what we want in the carts, and what we don't want in the carts
- Hauler leaving material/carts un-emptied
 - The person collecting the material is the one with the greatest ability to leave a message

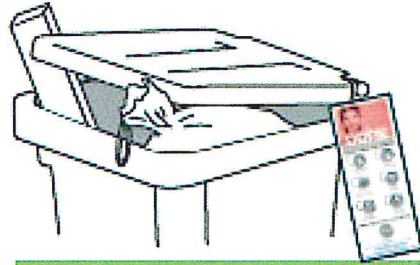
And people are very confused about what is recyclable – especially when it comes to plastic

- Example of West Hartford, CT

How much does this cost?



Annual info card mailer



Curbside feedback



Top issue mailer



Top issue signage

Volunteers or Existing Staff

$[\text{Total \# of Households in Community}] \times \0.35

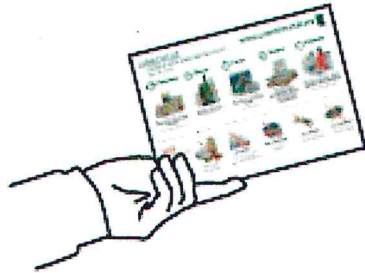
Temps or Part Time Hires:

$[\text{Total \# of Households in Community}] \times \0.65

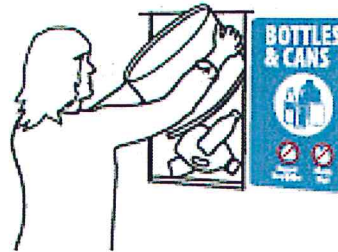
How much does this cost?



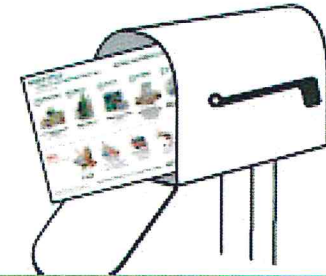
TOP ISSUE SIGNAGE



IN-PERSON FEEDBACK



SITE SIGNAGE



ANNUAL INFO CARD

Volunteers or Existing Staff

\$1,000-\$1,500

(2ppl, 2days/week, 8hr/day, 10 weeks)

Temps or Part Time Hires:

\$7,600-\$8,100

\$0-\$5,000

\$0.65 x # hh

Implications

Example:

- Population: 25,000
- Households: 10,000
- Routes: 10 (1,000 hh each)
- Problematic Routes: 20%
- Set-out Rate: 70%
- Post-program Tagging Rate: 2%
- Time to leave a tag: 1 min

10 routes x 20% problem = 2 routes

2 routes x 1,000 hh/route = 2,000 hh

2,000 hh x 70% set-out = 1,400 carts

1,400 carts x 2% tagging rate = 28 tags

28 tags x 1 min/tag = 28 min

28 households, down from 10,000

Lowell ConMit Cont.



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