

Bulky Waste Trash Program

Review of Bulky Waste Sweeps on Related Services

Miami-Dade County
Office of Management and Budget
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Calculation for Required Number of Crews

The minimum number of crews needed is based on the following formula:

Minimum # Crews = Lead time / (Planned Process Run Time / Output Demand) where:

- Lead Time - The time necessary to pick up a pile and drive to the next pile
- Planned Process Run Time - The amount of time allocated for work in minutes (600 minutes)
- Output Demand - The number of piles needed to be collected in one day

Since there is some downtime in the process, an adjustment to the number of minimum crews is necessary and is based on the following formula:

Required # Crews = Minimum # Crews x (600 minutes / Actual Field Time)

For example, assume that 50 is the minimum number of crews needed if each crew worked 600 minutes non-stop collecting bulky waste piles. But if they are working in the field for only 300 minutes, 100 crews would be required.

100 crews = 50 crews x (600 minutes / 300 minutes)

Monte Carlo Simulation

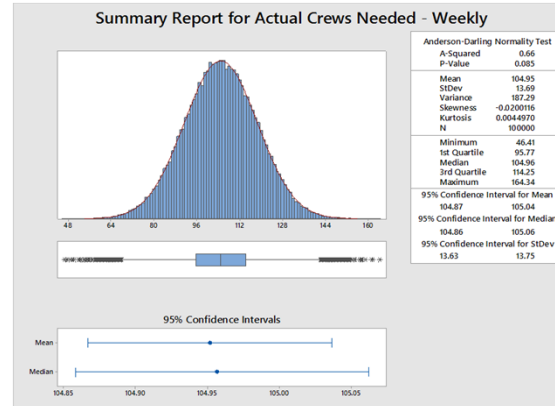
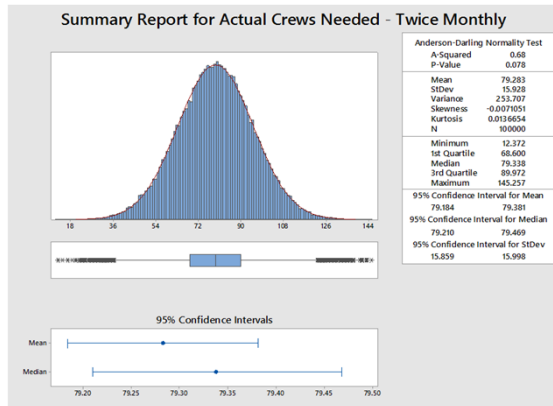
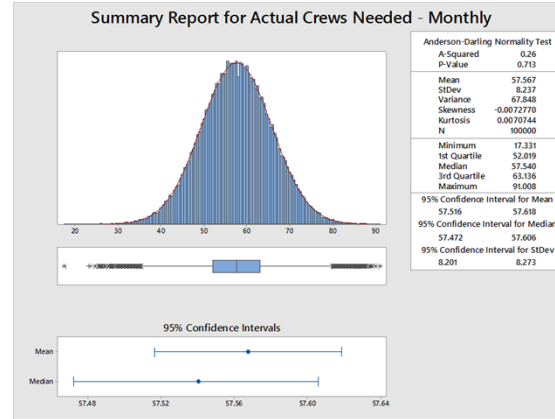
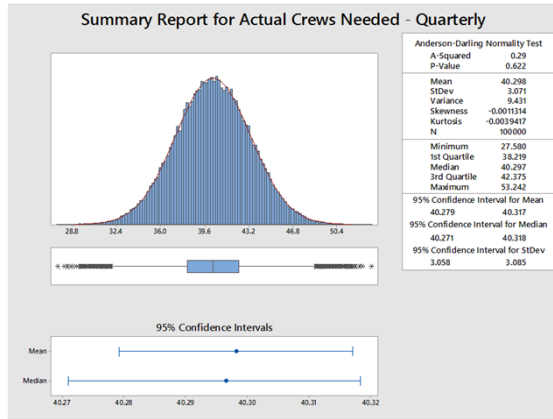
- Used to model the probability of different outcomes of a process that can be driven by several unknown variables
 - Set out rates, curbside and TRC tonnage, and diversion from TRCs to the curbside
- Creates 100,000 scenarios based on inputted assumptions
 - Random data within likely ranges used for every scenario
 - Validity of assumptions is critical
- Returns a normal distribution of outcomes and provides results with high degree of probability

Key Inputs for Sweep Model

Frequency	Set-out			TRC Diversion		
	Average	Range	Std. Dev.	Average	Range	Std. Dev.
Quarterly	35%	25% - 45%	5.77	0%	-10% - 10%	5.77
Monthly	20%	10% - 30%	5.77	20%	10% - 30%	5.77
Twice Monthly (24)	15%	5% - 25%	5.77	40%	30% - 50%	5.77
Weekly	8%	4% - 12%	2.31	80%	70% - 90%	5.77

	Set-Out Rate	TRC Diversion Rate
Definition	Percentage of customers expected to set out a pile during an individual service day.	Percentage of bulky waste tonnage currently received at TRCs that will instead be placed on the curbside under a sweep model.
Basis for Assumption	Benchmarking and research were used to develop set-out rate ranges. It is assumed that the more frequent the sweep service, the lower the set-out rate.	Benchmarking and research were used to develop TRC diversion rate ranges. It is assumed that the more frequent the sweep service, the higher the diversion rate. Staff believe that very infrequent sweeps may increase tonnage at the TRC if pile size limits are imposed.

Sweep Model Summary



Results from Monte Carlo Simulation:

1. Based on 100,000 scenarios run per frequency
2. Results provide MINIMUM number of crews required
3. Observed process times, down time waiting for trash trucks, and estimated ranges of set-out rates and diversion from TRCs to the curb used as model inputs

Frequency	Crews Required (95% Confidence Level Rounded Up)	50% of Scenarios Fall Between
Quarterly	41	38.2 – 42.4
Monthly	58	52.0 – 63.1
2x- Month	80	68.6 – 89.9
Weekly	105	95.8 – 114.3

Summary of Different Frequency Models

Frequency	Crews Required	Year 1 Costs For Current Crews ¹	Year 1 Costs For Added Crews	Annual Fee Impact ²
Quarterly	41	\$14.8 M	\$2.5 M	\$7.50
Monthly	58	\$14.9 M	\$9.1 M	\$27.16
Semi-Monthly	80	\$14.9 M	\$17.8 M	\$52.97
Weekly	105	\$15.1 M	\$28.1 M	\$83.13

1. Existing Year 1 costs reflect changing amount of fuel necessary
 2. Estimated annual fee impact is based on an assumption of 337,665 households

- Fee impact includes staffing relief factors for existing and new crews, and fleet spare ratio
- New crews divided evenly between Trash Cranes and Trash Dump Cranes
- Not included in fee impact:
 - Administration and other indirect costs associated with a greater number of crews
 - Savings from reduced support process associated with current on-demand service model

Trash and Recycling Center Data Analysis

- OMB reviewed TRC utilization data to determine:
 - Possible **impacts on TRC collection volume and costs, as well as possible vehicle congestion**, under various “sweeps” scenarios
 - Locations of **potential unauthorized commercial activity**
- OMB also combined TRC utilization and bulky waste pickup data by customer zip code to gain a **complete picture of trash collection in all geographic areas of the WCSA**, including volume and customer preferences

Data Reviewed included:

- All TRC tonnage collected, FY 2015-16 to FY 2017-18
- Budget information for FY 2017-18 and current number of bays for each TRC
- Sample of detailed TRC visit data
 - TRC visit data from handheld access control devices from FY 2015-16 to FY 2017-18 is incomplete due to inconsistent use and technical issues (e.g. wifi problems)
 - OMB requested detailed visit data corresponding to the two months with the highest number of recorded visits over the 3 year period to each TRC (a 5.5% sample); the two months are unique to each TRC
 - Overall consistency of cubic yards per pickup (except at Sunset Kendall TRC) suggests a reasonably accurate, reliable sample
- Previously received transactional data regarding all bulky waste pickups, FY 2015-16 to FY 2017-18

Summary of TRC Visits, FY2015-16 to FY 2017-18

Source: DSWM visit data, annualized based on highest 2 months at each TRC from FY16 to FY18

TRC	Annual Visits	Annual Cubic Yards*	Visits Per Day	Cubic Yards per Visit*
SNAPPER CREEK	137,172	159,783	376	1.2
EUREKA DRIVE	91,758	71,496	251	0.8
MOODY DRIVE	87,174	93,132	239	1.1
PALM SPRINGS N.	78,588	73,190	215	0.9
SUNSET KENDALL	78,258	139,122	214	1.8
W. PERRINE	72,258	68,358	198	0.9
S. MIAMI HTS.	66,516	76,112	182	1.1
N. DADE	58,662	68,965	161	1.2
W. LITTLE RIVER	50,484	64,833	138	1.3
NORWOOD	44,628	46,665	122	1.0
CHAPMAN FIELD	36,024	40,208	99	1.1
GOLDEN GLADES	30,420	38,758	83	1.3
RICHMOND HTS.	26,208	34,171	72	1.3
Grand Total	858,150	974,794	2,351	1.1

2,351 Average daily TRC visits countywide

181 Average daily visits per TRC

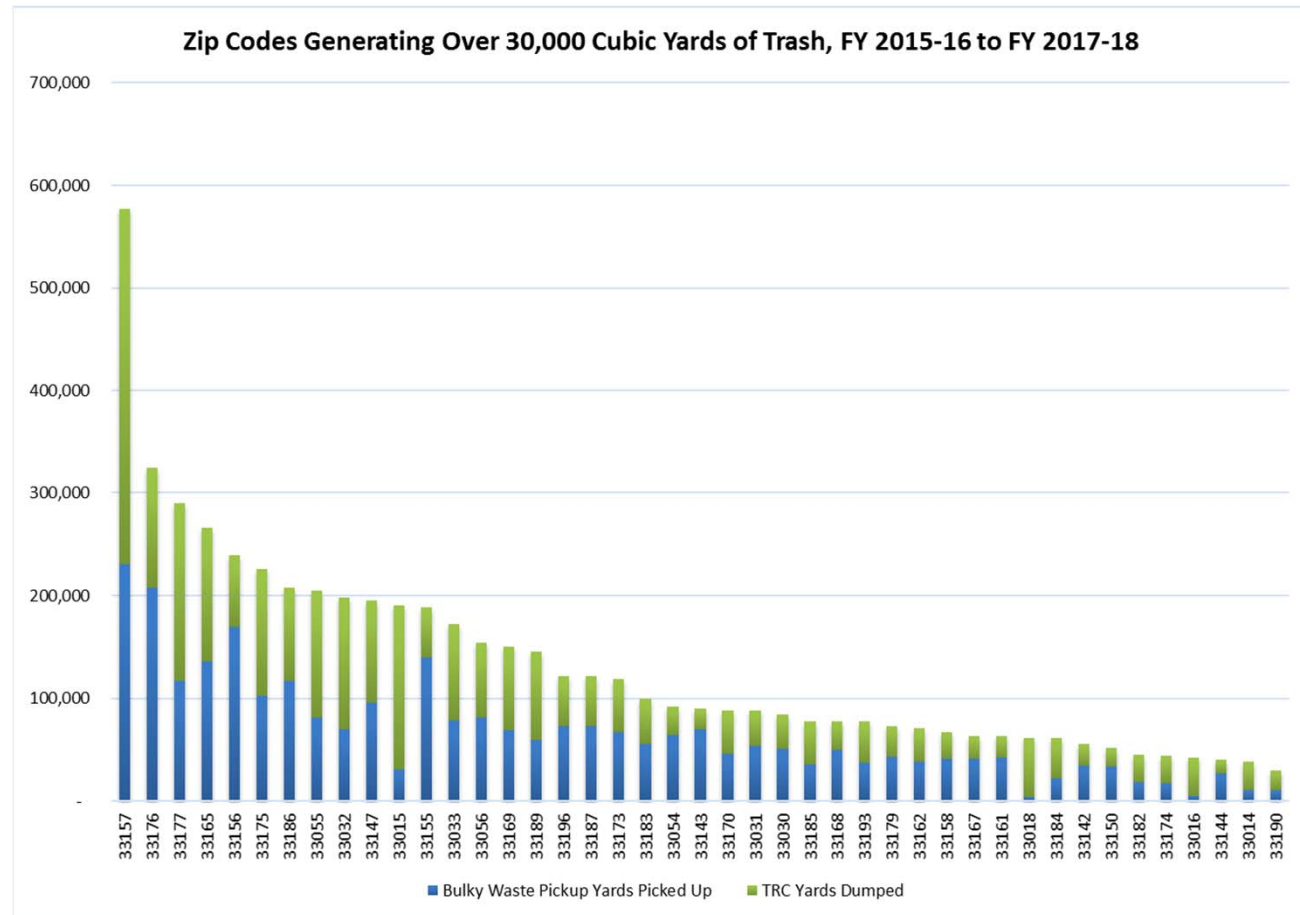
1.1 Average cubic yards dumped per visit

*Estimated based on tonnage. High volume per visit data suggests visits may have been undercounted at Sunset Kendall TRC

Where is Trash Generated?

Source: DSWM. For Bulky Waste Pickup, zip code represents pickup address. For TRC, zip code represents account holder residential address. Note: bulky pick-up service was temporarily suspended in the months of September – December 2017 due to Hurricane Irma clean-up

- A single zip code, 33157 (includes portions of Palmetto Bay, Cutler Bay and UMSA) generates 10% of the total trash collected in the WCSA
- See Map entitled *Zip Codes Generating the Most Trash (Bulky Waste & TRC)*



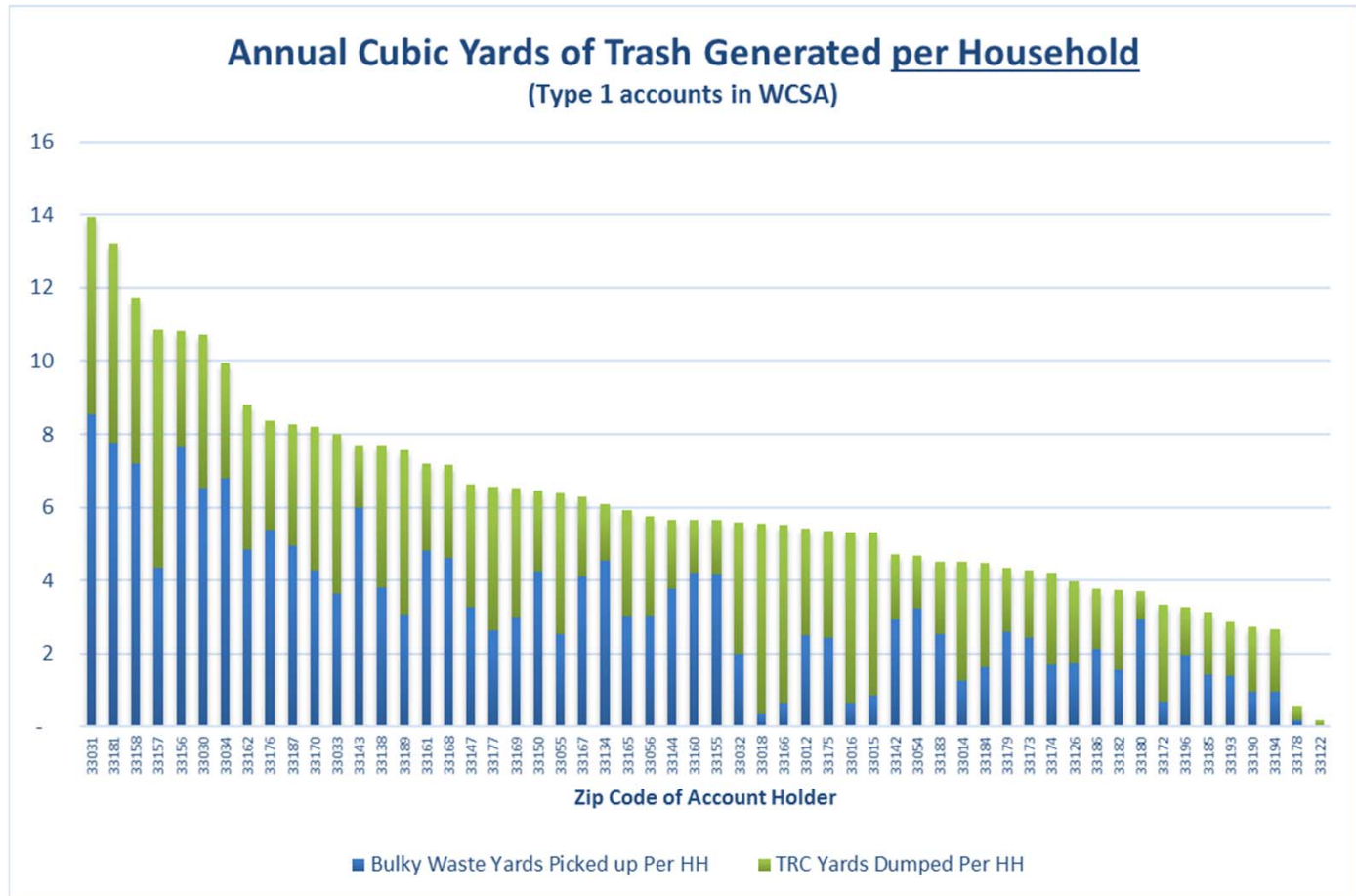
Zip codes displayed represent 97% of all trash entering the collection system



Where is Trash Generated? cont.

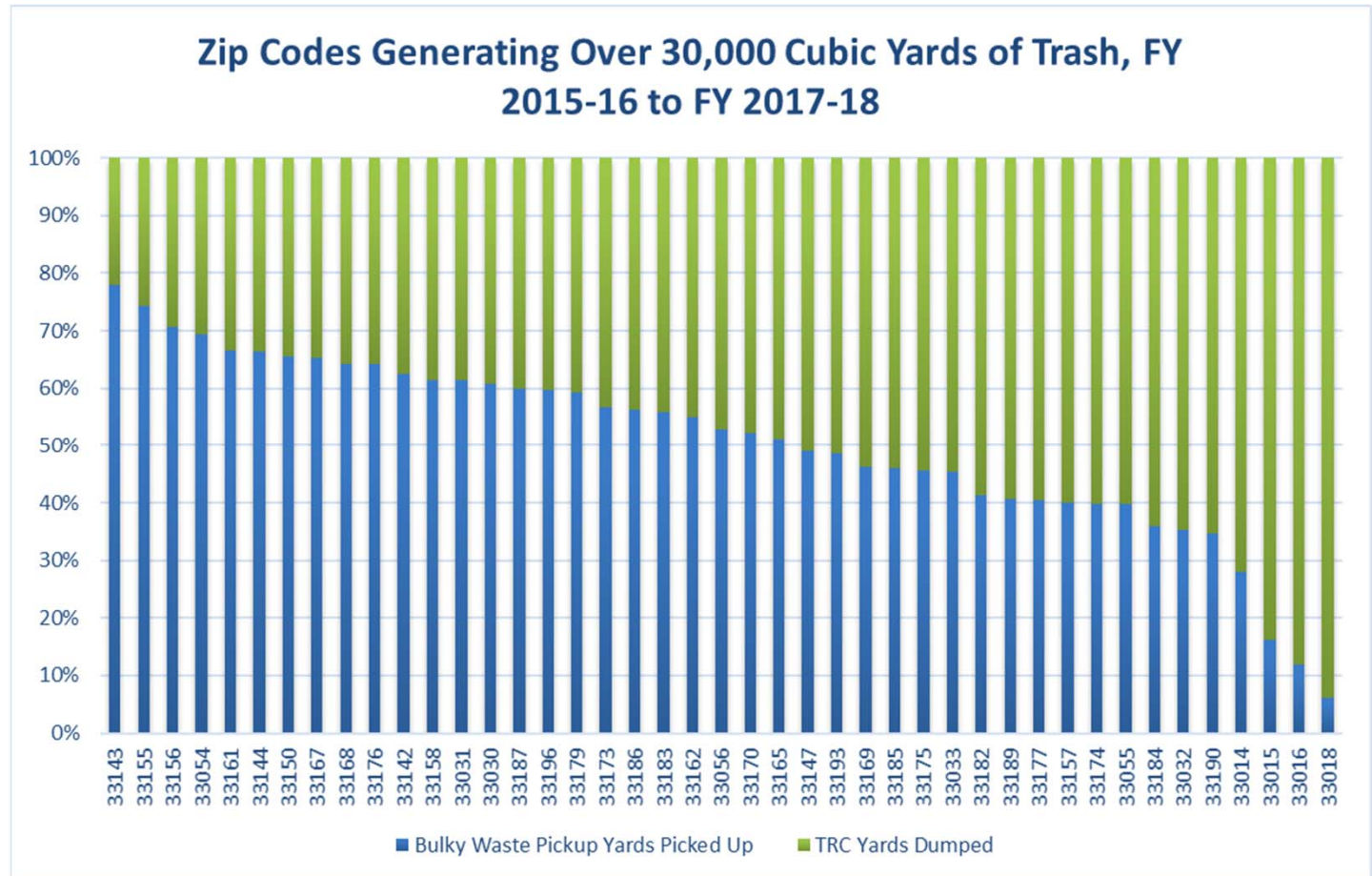
- Countywide, households in the WCSA generate an average of 6 cubic yards of trash annually
- Cubic yards of trash generated per household ranges from a high of 14 in zip code 33031 to a low of less than one in zip code 33122
- See map entitled *Zip Codes Generating the Most Trash (Bulky Waste & TRC) per Household*

Zip codes displayed represent 99% of all trash entering the collection system



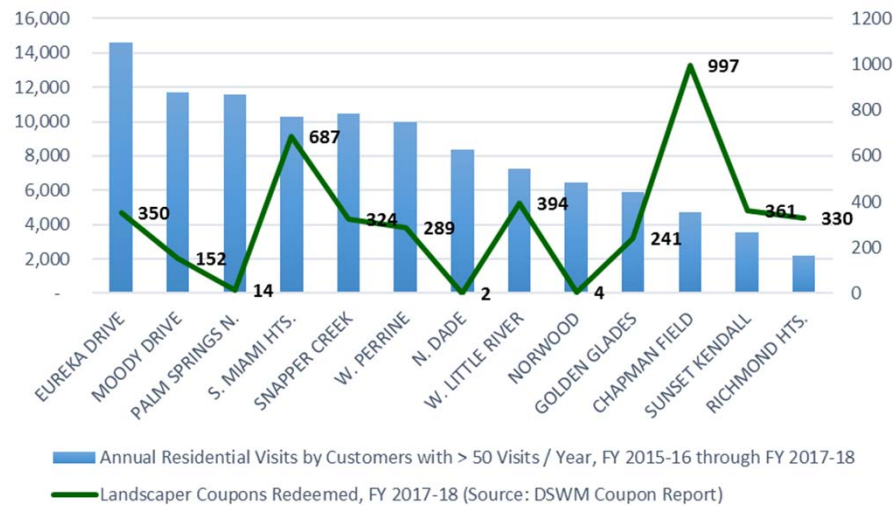
How is Trash Entering the System?

- Countywide, 50% of trash is picked up curbside; 50% is taken to a TRC
- The portion of trash picked up curbside ranges from a high of 78% in zip code 33143 to a low of 6% in zip code 33018
- Several zip codes in Northwest Dade (Miami Lakes / Country Club area) show a strong preference for TRCs



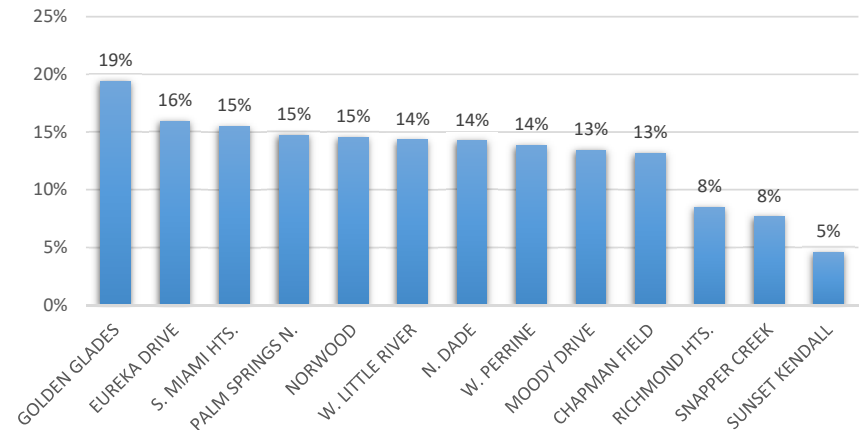
Use of TRCs by “Frequent Flyers” and Landscapers

TRC Visits by "Frequent Fliers" and Landscapers



- Very frequent TRC usage may suggest commercial activity
- Many of the heaviest residential users live in the South Dade area around Zoo Miami, Cutler Bay and Palmetto Bay as well as the Miami Lakes / Miami Gardens area. See Map, *Zip Codes with the Most TRC Customers Who have Visited a TRC more than 100 Times in One Year*

Percentage of TRC Visits Made by Residents with > 50 Annual Visits (each resident may have visited multiple TRCs in a year)



4,145 Landscaper coupons redeemed in FY 2017-18

107,184 Annual visits to TRCs made by residents with more than 50 annual visits

12 Percentage of visits to TRCs by Residents with more than 50 annual visits

Estimated Summary Impacts of Sweeps on TRC Collection Volume & Cost (assumes no TRC closures)

TRC collection cost per ton increases with sweep frequency

TRC collection cost per ton remains lower than curbside collection cost per ton at all service frequencies except, possibly, weekly

Total Tons Received at TRCs, FY 2017-18: 143,163
 FY 2017-18 TRC Collection Cost per Ton: \$ 41

Based on May 2018 forecasted operating expenses net of disposal charges and TRC tonnage data

Sweep Frequency	Estimated Diversion Rate from TRCs to Curb <i>(source: Phase 1)</i>	TRC Tons - After Diversion (Min. of Range)	TRC Tons - After Diversion (Max. of Range)	FY 17-18 Forecasted Expenses Net of Disposal Charges (May BAT report)	Collection Cost per Ton with Diversion (Min. or Range)	Collection Cost per Ton with Diversion (Max. of Range)	Collection Cost per Ton, BW Sweeps at Frequency Indicated*
Quarterly	-10% to 10%	157,479	128,846	\$ 5,862,240	\$ 37	\$ 45	\$ 100
Monthly	10% to 30%	128,846	100,214		\$ 45	\$ 58	\$ 117
Twice Monthly	30% to 50%	100,214	71,581		\$ 58	\$ 82	\$ 130
Weekly	70% to 90%	42,949	14,316		\$ 136	\$ 409	\$ 152

**Source: Average BW Pickup Collection Cost per Cubic Yard (1/2 Scorpion, 1/2 LL) (Phase 1 Down Time Analysis)*

Example: Estimated Impacts of Sweeps on TRC Tons per Bay and Collection Cost per Ton with 9 TRCs*

(closing Chapman Field, Golden Glades, Norwood and Richmond Heights)

*TRCs selected and tonnage redistributed from closed TRCs based on DSWM input.

TRC tons per bay increase with quarterly (and potentially monthly) sweeps. High tonnage per bay may result in congestion and increased customer wait times

TRC collection cost per ton decreases with quarterly (and potentially monthly) sweeps

TRC collection cost per ton remains lower than curbside collection cost per ton at all service frequencies except, possibly, weekly

Total Tons Received at TRCs, FY 2017-18:		143,163					
FY 2017-18 TRC Collection Cost per Ton:		\$ 41		Based on May 2018 forecasted operating expenses net of disposal charges and TRC tonnage data			
FY 2017-18 Tons per TRC Bay:		1,267					
Sweep Frequency	Estimated Diversion Rate from TRCs to Curb <i>(source: Phase 1)</i>	FY 17-18 Forecasted Expenses Net of Disposal Charges (May BAT report) Less Four Closed TRCs	Tons per Bay with Diversion & 9 TRCs (Min. of Range)	Tons per Bay with Diversion & 9 TRCs (Max. of range)	Collection Cost per Ton with Diversion & 9 TRCs (Min. or Range)	Collection Cost per Ton with Diversion & 9 TRCs (Max. of Range)	Collection Cost per Ton, BW Sweeps at Frequency Indicated*
Quarterly	-10% to 10%	\$ 4,322,288	1,944	1,591	\$ 27	\$ 34	\$ 100
Monthly	10% to 30%		1,591	1,237	\$ 34	\$ 43	\$ 117
Twice Monthly	30% to 50%		1,237	884	\$ 43	\$ 60	\$ 130
Weekly	70% to 90%		530	177	\$ 101	\$ 302	\$ 152

*Source: Average BW Pickup Collection Cost per Cubic Yard (1/2 Scorpion, 1/2 LL) (Phase 1 Down Time Analysis)
Note: Assumes no resources from closed TRCs are reallocated to remaining TRCs

Green highlighting represents less congestion and lower cost per ton than FY 2017-18. Yellow highlighting represents more congestion and higher cost per ton than FY 2017-18.



Example: Estimated Impact of Weekly Sweeps on TRC Collection Tons per Bay and Collection Cost per Ton with 4 TRCS*

TRC tons per bay increase with quarterly, monthly and twice monthly sweeps. High tonnage per bay may result in congestion and increased customer wait times

TRC collection cost per ton decreases with quarterly, monthly and twice monthly sweeps

TRC collection cost per ton remains lower than curbside collection cost per ton at all service frequencies

Total Tons Received at TRCs, FY 2017-18:		143,163					
FY 2017-18 TRC Collection Cost per Ton:		\$ 41		<i>Based on May 2018 forecasted operating expenses net of disposal charges and TRC tonnage data</i>			
FY 2017-18 Tons per TRC Bay:		1,267					
Sweep Frequency	Estimated Diversion Rate from TRCs to Curb <i>(source: Phase 1)</i>	FY 17-18 Forecasted Expenses Net of Disposal Charges (May BAT report) Less Four Closed TRCs	Tons per Bay with Diversion & 4 TRCs (Min. of Range)	Tons per Bay with Diversion & 4 TRCs (Max. of range)	Collection Cost per Ton with Diversion & 9 TRCs (Min. of Range)	Collection Cost per Ton with Diversion & 9 TRCs (Max. of Range)	Collection Cost per Ton, BW Sweeps at Frequency Indicated*
Quarterly	-10% to 10%	\$ 2,045,913	4,256	3,482	\$ 13	\$ 16	\$ 100
Monthly	10% to 30%		3,482	2,708	\$ 16	\$ 20	\$ 117
Twice Monthly	30% to 50%		2,708	1,935	\$ 20	\$ 29	\$ 130
Weekly	70% to 90%		1,161	387	\$ 48	\$ 143	\$ 152
<p><i>*Source: Average BW Pickup Collection Cost per Cubic Yard (1/2 Scorpion, 1/2 LL) (Phase 1 Down Time Analysis)</i></p> <p><i>Note: Assumes no resources from closed TRCs are reallocated to remaining TRCs</i></p>							

*Moody Drive, Palm Springs North, Sunset / Kendall and West Little River. TRCs retained selected according to current tonnage and geographic distribution. Tonnage from closed TRCs redistributed in accordance with geographic proximity

Green highlighting represents less congestion and lower cost per ton than FY 2017-18. Yellow highlighting represents more congestion and higher cost per ton than FY 2017-18.

Enforcement Data Collection

Objectives were to:

- Review enforcement data to understand how activity would be impacted if curbside collection of trash is handled with a sweeps method
- Identify geographic areas within Miami-Dade County with most enforcement activity

Data Reviewed included:

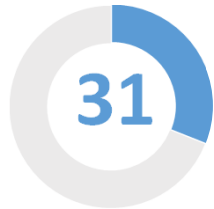
- Enforcement Officer Logs for FY 2017-18
- ITD-generated report of enforcement activity including violation type and location
- Budget information for FY 2015-16 through FY 2017-18
- Department-provided data of annual citation, warnings, and fine revenue.

Summary Enforcement Activity Data

Fiscal Years	Number of Budgeted Enforcement Officers	Total Number of Warning Notices Issued	Total Number of Citations	Total Enforcement Related Expenditures	Total Enforcement Related Revenue**	% of Expenditures Covered by Revenue	Warnings Per Budgeted EO	Citations Per Budgeted EO	Revenue Per Budgeted EO
FY 2015-16	48	20,335	1,538	\$ 5,466,347	\$ 1,822,441	33%	423.65	32.04	\$37,968
FY 2016-17	46	18,019	1,595	\$ 5,726,952	\$ 1,734,384	30%	391.72	34.67	\$37,704
FY 2017-18*	46	15,404	1,064	\$ 5,670,021	\$ 1,715,189	30%	334.87	23.13	\$37,287

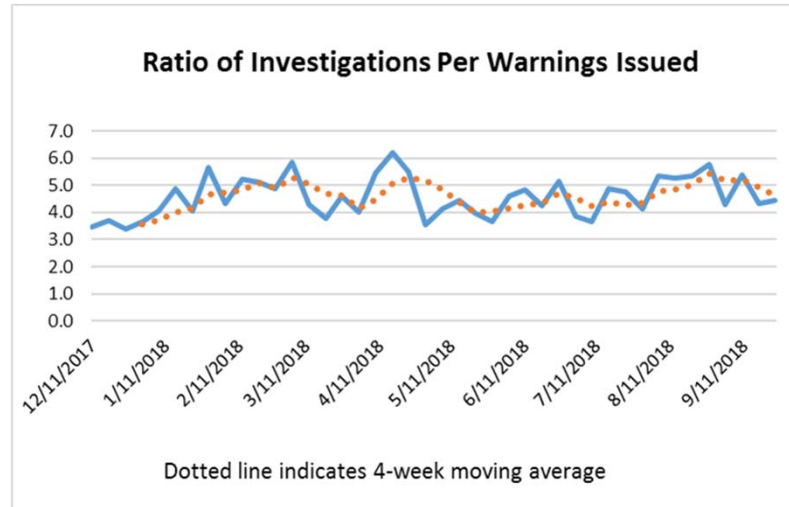
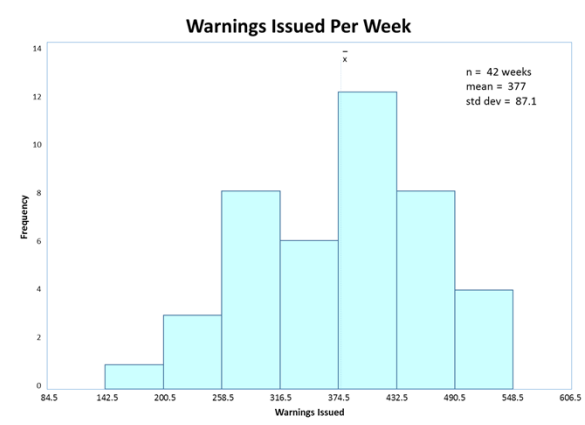
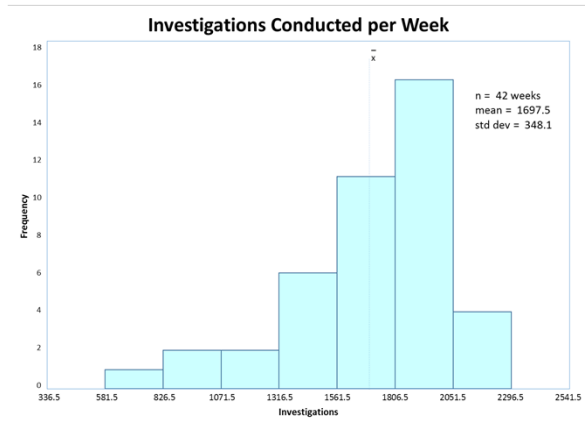
*No enforcement activity during months of October and November 2017 due to Hurricane Irma recovery.

**Revenues received in the year can be for enforcement actions from past years. Amounts shown do not include portions kept by Clerk of Court and Credit & Collection. Revenues include fines, TRC Coupon sales, permitting and cost reimbursements



Percentage of total enforcement expenditures covered by related revenues for past three years

Enforcement Activity Data

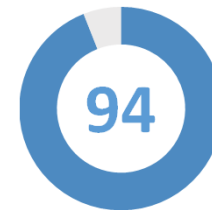
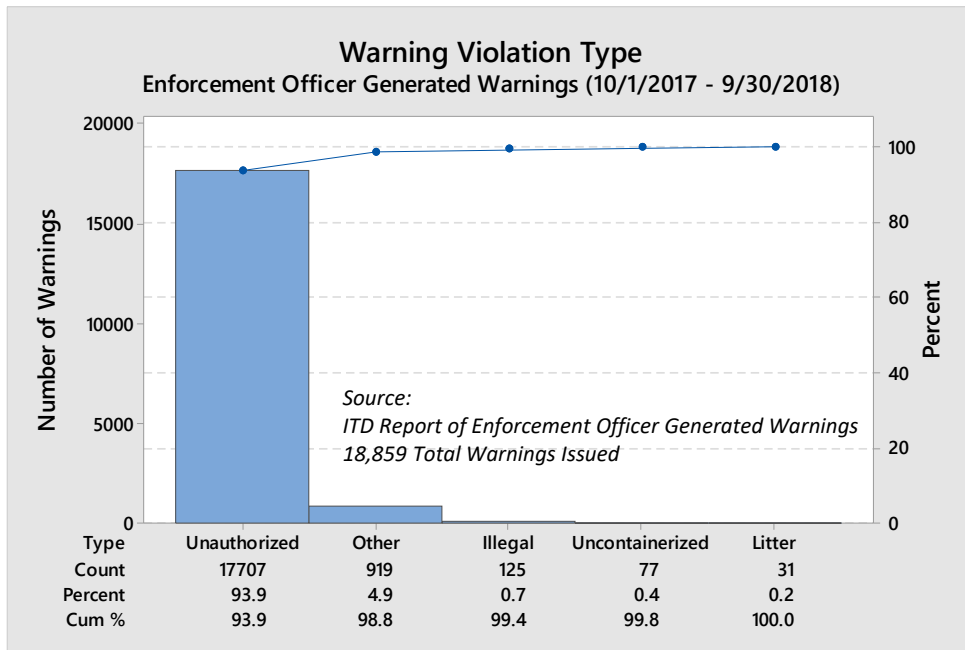


- Enforcement Officer logs kept during FY2017-18 track several activities performed including Investigations Conducted and Warnings Issued
- Enforcement activities were suspended in October and November 2017 due to Hurricane Irma

4.6 Average Number of Investigations Per Warning Issued

Source:
*Summary of Enforcement Officer Work Logs
FY2017-18*

Enforcement Activity Data



94 Percentage of warnings that are related to unauthorized set-out of trash

61 Average number of violations per 1,000 households
(Zip Codes with more than 1,000 households only)

Top 5 zip codes of warnings per 1,000 household are:

Zip Code*	Warnings / 1,000 Households
33177	191.2
33150	183.8
33142	171.5
33161	168.9
33054	160.0

Note: Includes only zip codes with more than 1,000 household customers

4.1 Curbside Bulky Waste Pickups for Every Warning Issued
77,728 BW Pickups in FY2017-18
Source: ASE

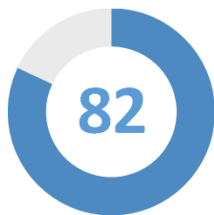
Enforcement Activity Data

CODE SECTION	CODE DESCRIPTION	FY	FY	FY	FY	FY	FY
		2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
15-5	Duty to dispose of solid waste and prevent accumulations	1301	1324	1199	1301	1280	727
15-6(b)(1)(3)	Littering, dumping	145	111	136	145	237	98
15-17	Permits required by the Department of Solid Waste Management (Non-Tire)	13	59	51	13	10	5
15-17(3)	Permits required by the Department of Solid Waste Management (Tires)	19	56	14	19	25	26
15-2	Solid waste collection services, container usage, condition and location	22	9	5	22	7	0
	All Other	38	99	45	38	36	87
Grand Total		1538	1658	1450	1538	1595	943

15 Warnings Per Citation Issued
Since FY2012-13

- Violations of Code Section 15-5 require the issuance of a warning prior to a citation.

Source:
Enforcement Officer Work Logs
FY2017-18 and other
department-provided volume
data.



Percentage of citations since FY 2012-13 were for violations of Code Section 15-5

Implication of Sweeps on Enforcement

- Most enforcement activity is related to unauthorized set-out of trash
 - Both warnings and citations
- Future enforcement model would be contingent on sweep frequency
 - As frequency increases, existing enforcement model (and requisite number of officers) scaled back
 - Possible sweep-related activities:
 - Drive sweep routes 2-3 days prior to sweep to ensure piles are not set out too early
 - Drive sweep routes 2-3 days after sweep to identify missed piles

List of Maps

- Zip Codes Generating the Most Trash (Bulky Waste & TRC)
- Zip Codes Generating the Most Trash Dumped at TRCs
- Zip Codes Generating the Most Trash Set on Curb for Bulky Waste Pickup

- Zip Codes Generating the Most Trash Per Household (Bulky Waste & TRC)
- Zip Codes Generating the Most Trash Dumped at TRCs Per Household
- Zip Codes Generating the Most Trash Set on Curb for Bulky Waste Pickup Per Household

- Zip Codes with the Highest Percentage of Waste Being Taken to TRCs
- Zip Codes with the Highest Percentage of Waste Set on Curb for Bulky Waste Pickup

- Zip Codes Generating the Most Warnings Per Household
- Zip Codes Generating the Most Warnings
- Zip Codes with the Most TRC Customers Who have Visited a TRC more than 100 Times in One Year