

**Balance Up**

*Route Balancing  
For Solid Waste & Recycling  
Collection Services*

**SWANA**

**Old Dominion Chapter**

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## Balancing Routes *The Problem*

### Route Balancing Defined

*“Finding, deploying & managing  
an equitable distribution of work  
among crews, routes & days  
based on the unique characteristics  
of the geographic areas,  
services provided  
and resources available”*

## Balancing Routes *The Problem*

- There are a large number of variables affecting curbside collection routes & relative workload
  - Type of work (services; material type)
  - Labor – Driver/crew performance & availability
  - Equipment & technology - vehicles, automation, breakdowns
  - Road/street geography, conditions & traffic
  - Density of customers
  - Waste generation, 'put out' characteristics, container types
  - Yard location; Disposal location & time

## Balancing Routes *The Solutions*

- *Route optimization* with mapping software tools is industry-standard approach to re-routing
  - Analytical tool based on operational & geographic assumptions & data inputs
  - Difficult to take into account the unique nature of drivers/crews, collection technologies, streets/alleys, traffic & neighborhood characteristics
  - Time consuming & expensive to develop detailed maps & operational parameters
- Workload metrics based on *actual route operations*
  - Route times, mileage, tonnage & customers
  - Capturing current, accurate data & trends
  - Managing & utilizing large amounts of data for wide range of route types & areas

## Balancing Routes *Balance Up Solution*

- Search for a better understanding of the unique 'real world' conditions related to labor, equipment, waste generation, traffic, mileage, tonnage etc
- Need to monitor current conditions and trends among routes, days, crews & service types
- Need a simple, easy to understand method to review & compare routes
- Need to validate assumptions used in route optimization tools
- Need to manage crews & work on daily basis

# Balance Up

## Balancing Routes *Balance Up Solution*

- *Balance Up* combines standard route workload data into a single rating of 1-10
  - Higher scores have greater workload and lower scores have less workload
- *Balance Up* workload inputs include:
  - Route miles & hours (during collection)
  - Travel hours (to/from route & disposal)
  - Total work hours (start & stop work)
  - Customers per route
  - Tons per crew (collected for day)

## Balance Up Solution

Balance Up provides summary & detailed data for key route work measures.

Highlights for Garbage/Trash Collection	Average	Lower 15%	Upper 15%	
The mileage of a collection route is:	6.51	4.42	8.90	miles
The time spent traveling to/from route & disposal is:	1.81	1.30	2.33	hours
The daily time in the field for a crew is:	5.05	4.15	5.84	hours
The tons for a weekly route is:	11.04	8.56	13.50	tons
The number of customers per route is:	761	540	1,120	customers
The 'balance up' score for a route is:	6.27	4.06	7.88	

## Balancing Routes *Balance Up Solution*

- Goals include:
  - Providing 'standards' that can be easily compared and used in managing crews/routes
  - Reduction of deviations between the highest & lowest workload routes (e.g., <15% and >15%)
- Comparisons by:
  - Route for day
  - Day of week
  - Service/activity
  - Driver/crew
  - Ward or district

## *Balance Up and Route Optimization*

- Use of actual workload metrics complements route optimization
  - Easy to understand & use
  - Current conditions & trends
  - Helps manage daily operations
- Balance Up results can be used:
  - To validate assumptions used in route optimization
  - To adjust routes between route optimization work
  - In the absence of full route optimization exercise

## Balance Up Solution

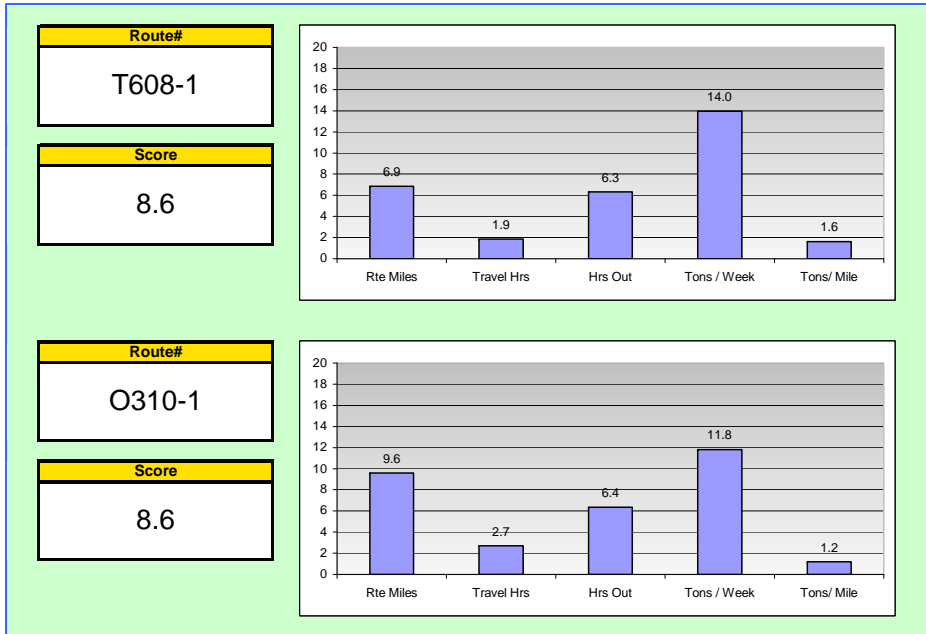
Balancing details compare and rank routes by Score. The tables below show upper and lower ranked recycling routes and metrics for each.

Day of Week	(All)					
Recycling Routes - Upper Tier						
	Data					
Route	Sum of Score (1-10)	Sum of Rte Miles	Sum of Travel Hrs	Sum of Hrs Out	Sum of Tons/Rte	Sum of Customers
RT613-1	8.7	8.95	1.93	6.64	8.79	1,080
RO317-1	8.5	12.91	2.07	6.61	7.86	859
RO320-1	8.5	12.39	2.54	6.82	7.68	850
RO322-4	8.5	10.39	2.38	6.60	7.36	812
RT615-1	8.4	8.93	1.61	5.92	9.86	1,098

Day of Week	(All)					
Recycling Routes - Lower Tier						
	Data					
Route	Sum of Score (1-10)	Sum of Rte Miles	Sum of Travel Hrs	Sum of Hrs Out	Sum of Tons/Rte	Sum of Customers
RO523-3	3.4	8.29	0.84	3.45	4.26	835
RO510-2	3.5	5.25	1.15	3.39	2.89	1,346
RO508-2	3.5	12.32	1.06	4.16	2.90	839
RO524-3	3.5	9.82	0.87	3.86	4.06	833
RO525-3	3.5	9.14	0.68	3.58	4.06	923
RO424-3	3.5	7.96	1.17	4.10	3.45	1,080

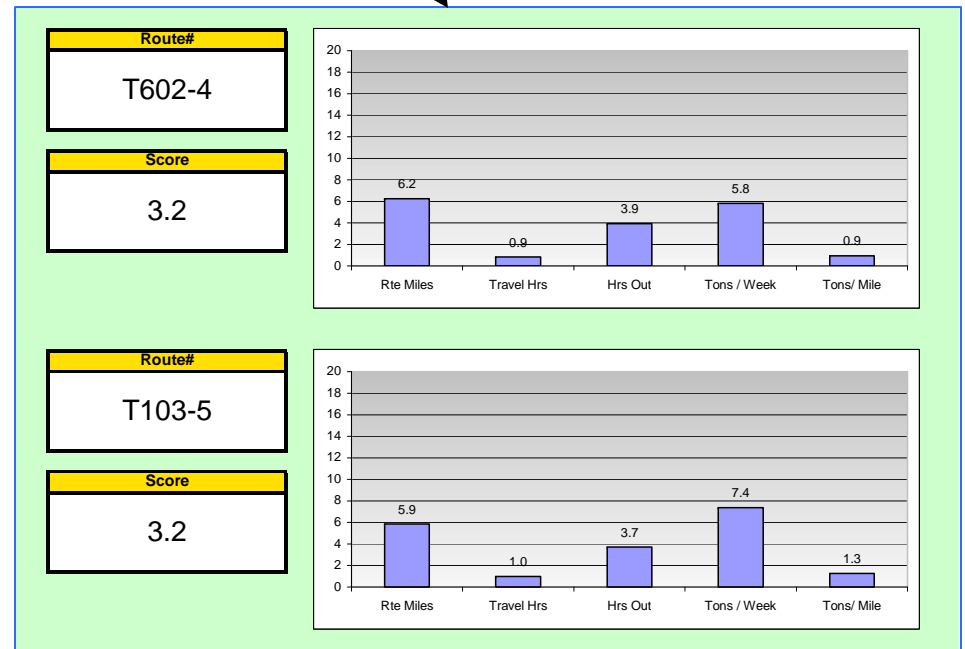
# Balance Up

## Balance Up Solution Sample High & Low Scores



These high scoring trash routes were run on Monday

These low scoring trash routes were run on Thursday & Friday



# Balance Up

## Route Balancing Results & Scores Compared by Work Day

### Summary Statistics and Scores by Day *Residential Collections & Recycling (10-09 to 4-10) (All)*

<b>Trash/Garbage</b>	<b>Mon</b>	<b>Tues</b>	<b>Wed</b>	<b>Thurs</b>	<b>Fri</b>	<b>Avg/Total</b>
Rte Miles	7.32	6.62	5.34	6.42	6.91	<b>6.51</b>
Travel Hrs	2.08	1.73	1.73	1.94	1.61	<b>1.81</b>
Hrs Out	5.72	5.12	5.11	4.90	4.52	<b>5.05</b>
Tons/Crew	10.68	11.25	12.49	8.83	9.04	<b>10.62</b>
Tons/Week	11.56	11.73	13.30	8.88	9.59	<b>11.04</b>
Tons/ Mile	1.60	1.82	2.50	1.39	1.38	<b>1.70</b>
Customers	808	815	711	708	769	<b>761</b>
Avg Score	7.5	6.5	6.3	5.9	5.3	<b>6.3</b>
Routes Run	29.00	34.00	33.00	34.00	34.00	<b>164.00</b>
Crews Deployed	31.38	35.44	35.13	34.20	36.04	<b>172.19</b>
%Crews/Route	108%	104%	106%	101%	106%	<b>105%</b>

# Balance Up

## Route Balancing Results & Scores Compared by Ward/District

### Summary Statistics and Scores by Ward Residential Collections & Recycling (10-09 to 4-10) (All)

<b>Trash/Garbage</b>	Ward 1	Ward 2	Ward 3	Ward 4	Ward 5	Ward 6	Ward 7	Ward 8	<b>Avg/Total</b>
Rte Miles	7.58	8.77	6.93	5.04	5.70	7.39	5.79	6.21	<b>6.51</b>
Travel Hrs	1.53	1.72	2.39	1.97	1.55	1.42	1.66	1.89	<b>1.81</b>
Hrs Out	4.82	5.21	5.64	5.27	4.87	4.68	4.73	4.82	<b>5.05</b>
Tons/Crew	8.88	8.15	10.19	11.62	12.49	8.97	10.96	10.60	<b>10.62</b>
Tons/Week	9.12	8.60	10.68	12.66	12.87	8.80	11.90	11.65	<b>11.04</b>
Tons/ Mile	1.20	0.98	1.54	2.58	2.27	1.24	2.04	1.87	<b>1.70</b>
Customers	997	1,043	540	674	713	1,087	653	605	<b>761</b>
Avg Score	6.0	6.9	7.1	6.6	6.0	5.8	5.6	5.8	<b>6.3</b>
Routes Run	14.00	12.00	31.00	27.00	23.00	24.00	21.00	12.00	<b>164.00</b>
Crews Deployed	14.37	12.66	32.49	29.41	23.71	23.55	22.81	13.20	<b>172.19</b>
%Crews/Route	103%	106%	105%	109%	103%	98%	109%	110%	<b>105%</b>

# Balance Up

## Data Processing by Trakster® Management System & Balance Up Tool

**FieldTrak - Daily Driver Worksheet**

Business Unit: Collection II SC Print Date: 7/8/2010

Date: 07/07/2009 Driver: Johnson, Willie Start Time: 6:30 AM  
 Equipment#: 307763 Crew 1: Stop Time: 12:00 PM  
 Route/Crew#: RT109-2 Crew 2: Start Miles: 31255  
 Activity: Recycling Stop Miles: 31278  
 Ending Status: Complete-On Sch Night  OT  OT Reason:

Other Unit1 Other Unit2

Load#: 1 Route/Crew#: RT109-2 Help Rte:  Load %: 0.00%

Time (am/pm)	Mileage	Other Measures
Start Work/Load: 7:00 AM	31259	Tons: 5.41
Stop Work/Load: 9:30 AM	31263	Disposal Site: FRTREC
Arrive @ disposal: 9:40 AM	31266	Other Unit
		Wk Miles: 4

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Wk Time: 2.30

Load#: 2 Route/Crew#: RT109-2 Help Rte:  Load %: 0.00%

Time (am/pm)	Mileage	Other Measures
Start Work/Load: 10:00 AM	31269	Tons: 3.04
Stop Work/Load: 11:25 AM	31271	Disposal Site: FRTREC
Arrive @ disposal: 11:40 AM	31275	Other Unit
		Wk Miles: 2

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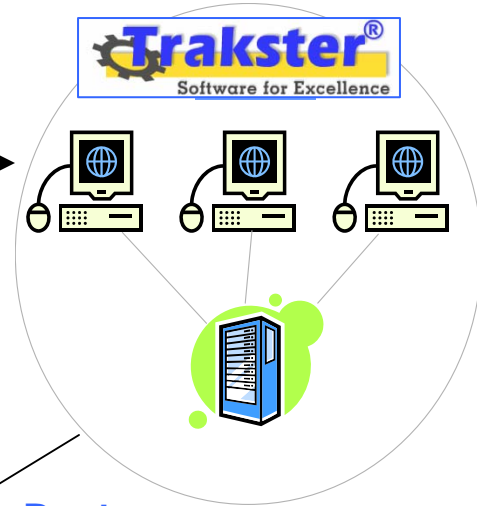
Wk Time: 1.25

Other Information

Note Please collect 3555 Holmead Place NW call when it is collected, along with 1700 blk of Newton Street NW the Alley

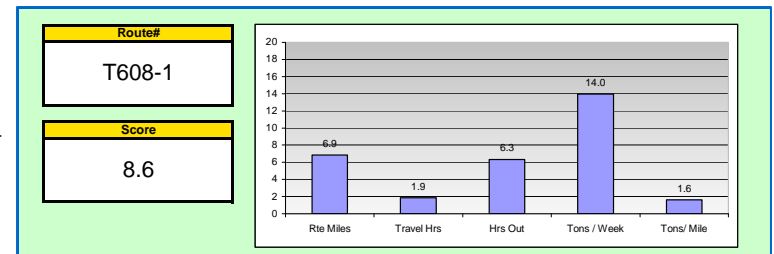
Driver Signature: \_\_\_\_\_ Supervisor Signature: \_\_\_\_\_

Data from Driver Worksheets is entered into Trakster system



Route performance data is extracted to Balance Up tool

Route Detail - Activity=Recycling													
Route	Activity	Rte Run Count	# of Crews	Total Lds	Rte Hrs	Tot Hrs Out	Rte Miles	Miles Out	Total Tons	# OT Routes	Tons / Route	Tons / Load	
3	RO314-1	REC	28	28	52	3.4	5.3	11	37	268.7	2	9.6	5.3
4	RO315-1	REC	30	44	59	3.7	5.9	9	26	245.6	4	5.6	4.2
5	RO316-1	REC	28	28	46	3.9	5.8	8	26	204.9	-	7.3	4.5
6	RO317-1	REC	30	36	62	4.5	6.6	13	36	267.3	3	7.9	4.4
7	RO318-1	REC	29	29	48	4.3	6.3	9	33	182.3	1	6.4	3.8
8	RO319-1	REC	30	35	58	4.4	6.5	12	31	248.3	4	7.8	4.3
9	RO320-1	REC	30	30	56	4.3	6.8	12	43	227.1	1	7.7	4.0
0	RO321-1	REC	28	28	34	3.4	5.0	12	27	176.0	-	6.3	5.4
1	RO322-1	REC	29	29	52	4.4	6.6	11	31	222.0	1	7.7	4.3
2	RO323-1	REC	10	10	14	3.7	7.0	6	23	45.0	2	5.4	3.7
3	RO406-1	REC	28	28	31	4.0	5.5	14	28	148.7	7	5.3	4.9
4	RO407-1	REC	28	28	30	3.3	4.9	9	26	114.8	-	4.1	3.9
5	RO408-1	REC	28	28	31	3.9	5.2	9	22	126.8	-	4.5	4.2
6	RO409-1	REC	28	28	28	3.4	4.6	9	20	112.9	-	4.0	4.0
7	RT611-1	REC	28	28	53	4.5	5.9	9	24	251.0	-	9.0	4.8
8	RT612-1	REC	30	52	75	4.0	5.5	8	19	294.5	7	6.1	4.0
9	RT613-1	REC	30	33	55	4.7	6.6	9	23	273.3	4	8.8	5.0
0	RT614-1	REC	28	28	52	3.7	5.1	7	20	261.5	-	9.3	5.0
1	RT615-1	REC	30	30	54	4.3	5.9	9	27	285.2	2	9.9	5.3
2	RT616-1	REC	30	33	61	4.3	6.2	7	21	239.0	1	7.6	3.9
3	RT617-1	REC	30	33	56	4.2	6.1	16	29	213.0	3	6.8	3.8
4	RO508-2	REC	28	28	28	3.1	4.2	12	20	81.2	-	2.9	2.9
5	RO509-2	REC	28	28	29	3.6	4.5	14	22	87.9	-	3.1	3.0
6	RO510-2	REC	28	28	28	2.2	3.4	5	12	80.8	-	2.9	2.9
7	RO511-2	REC	28	28	28	2.6	3.2	7	16	79.0	-	2.8	2.8



Balance Up scores are calculated & graphics updated

## Conclusions

- *Route balancing challenge*: create & manage an equitable distribution of work based on the unique characteristics of the geographic areas, services provided and resources available
- A *combination* of route mapping, optimization and actual workload metrics provides a comprehensive approach for route balancing.
- Routine reporting of actual workload metrics provide a sound basis for *balancing* routes and *managing* crews & workload.