



Creating a Leaner Campus Recycling Program:

Maximizing Operational Efficiencies to Recover More Material in the Era of Tight Budgets

November 13, 2014



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Your Panel



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Creating a Leaner Campus Recycling Program *Operational Efficiency at UC Santa Barbara*

Matthew O' Carroll

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Facilities Management

University of California, Santa Barbara

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Overview

- **UCSB at a glance**
- **Departments Involved in Waste Management**
- **Outdoor Waste Infrastructure**
- **Indoor Waste Infrastructure**
- **On-board Scales**
- **Managing the Data**
- **Research as a means to achieve efficiency**

University of California, Santa Barbara

- 1,000+ acres
- 188 buildings
- 22,000 undergrads & grads | 5,000 faculty & staff

Waste Streams at UCSB

recycling



PLASTICS #1-#6
 Plastic Utensils
 Yogurt Cups
 Saran Wrap
 Bottles
 Straws
 Bags





METAL
 Cans
 Foil



GLASS
 Bottles



PAPER
 Newspaper
 Cardboard
 Magazines
 Flyers









landfill



WRAPPERS
 Condiment Packets
 Candy Wrappers
 Snack Bags





MISCELLANEOUS
 Wax Cartons
 Tape





STYROFOAM









compost



ALL FOOD WASTE
 Vegetables & Fruits
 Dairy Products
 Teabags
 Meat



COMPOSTABLE SERVICEWARE
 (must be labeled **compostable**)
 Compostable Utensils
 Clamshells & Plates
 Coffee Cups & Lids
 Bowls



PLA



PLA 7 PRODUCTS
 Drinking Cups
 Containers

SOILED PAPER PRODUCTS
 Sandwich Paper
 Paper Bags
 Pizza Boxes
 Paper Towels



NAPKINS

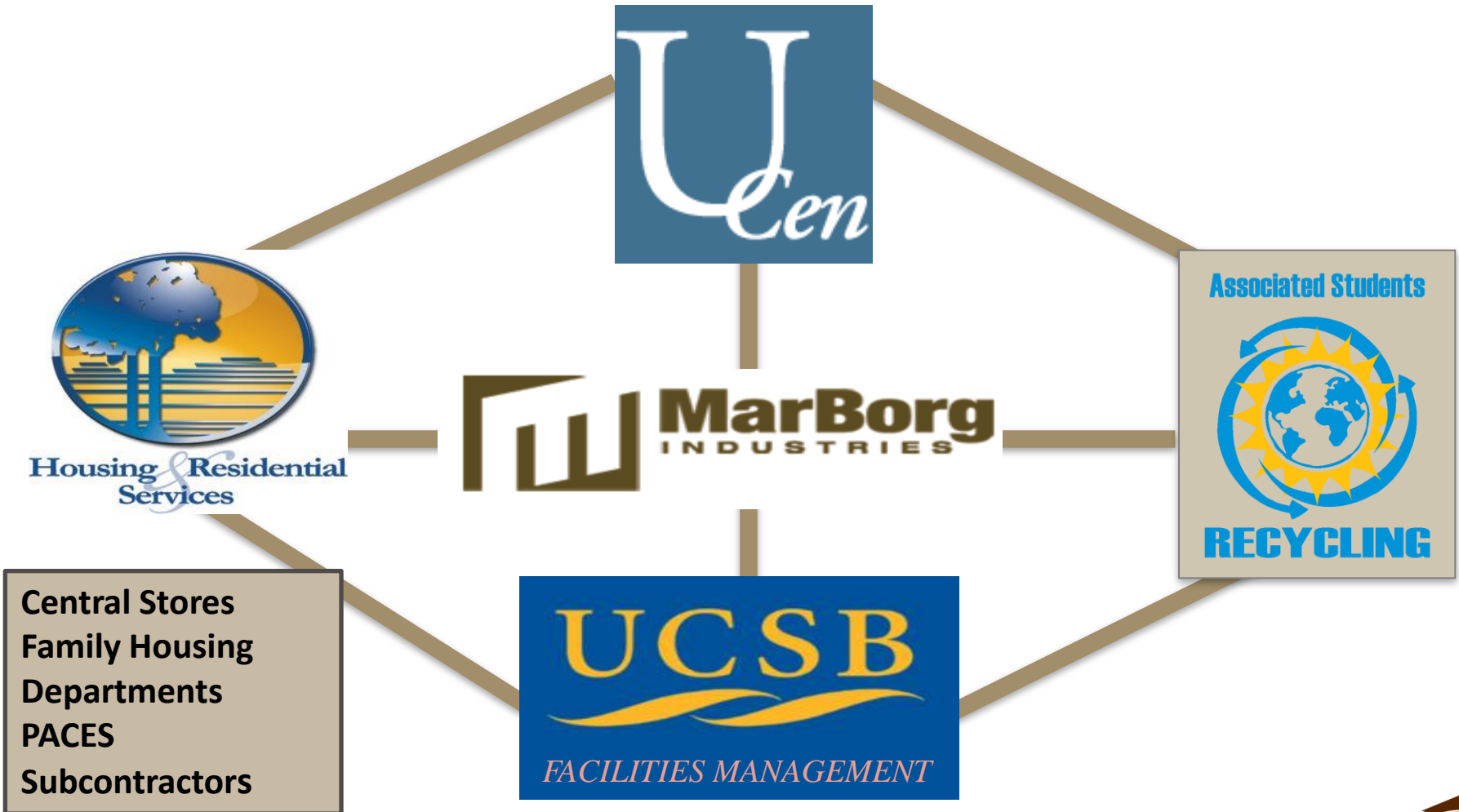








Departments Involved in Waste Management

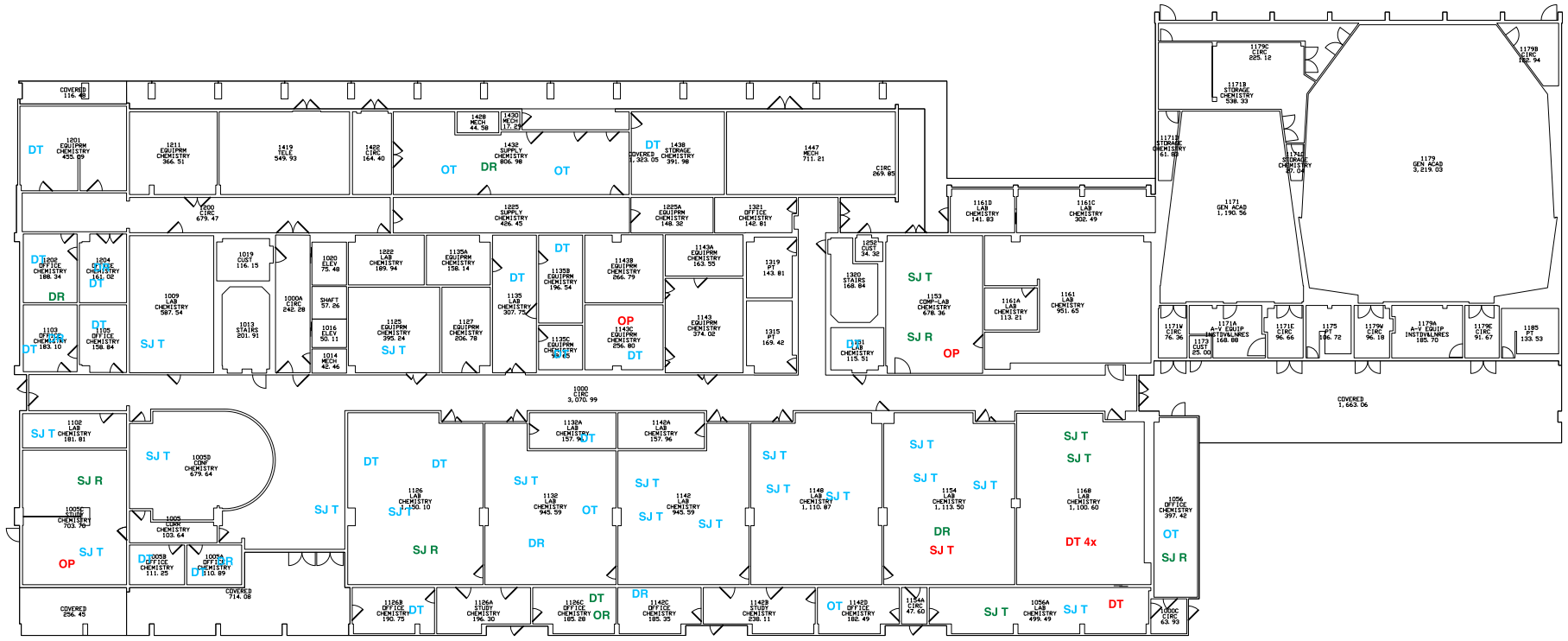


Outdoor Waste Infrastructure



Indoor Waste Infrastructure

557 OI INT 35,563.10
557 OI EXT 40,095.15



FIRST FLOOR PLAN EAST
CHEMISTRY BLDG.
BLDG.No.557

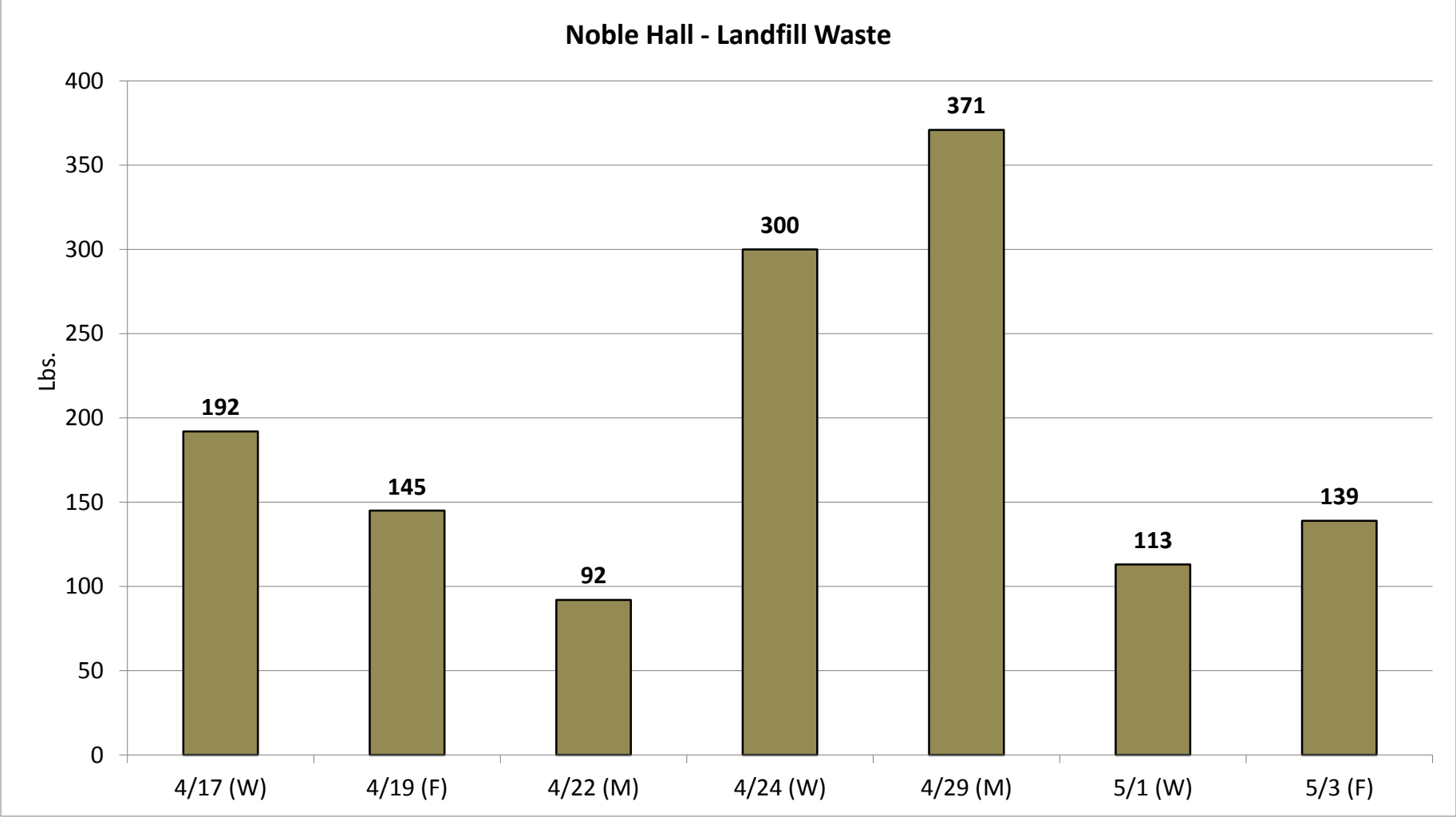
UNIVERSITY OF CALIFORNIA SANTA BARBARA



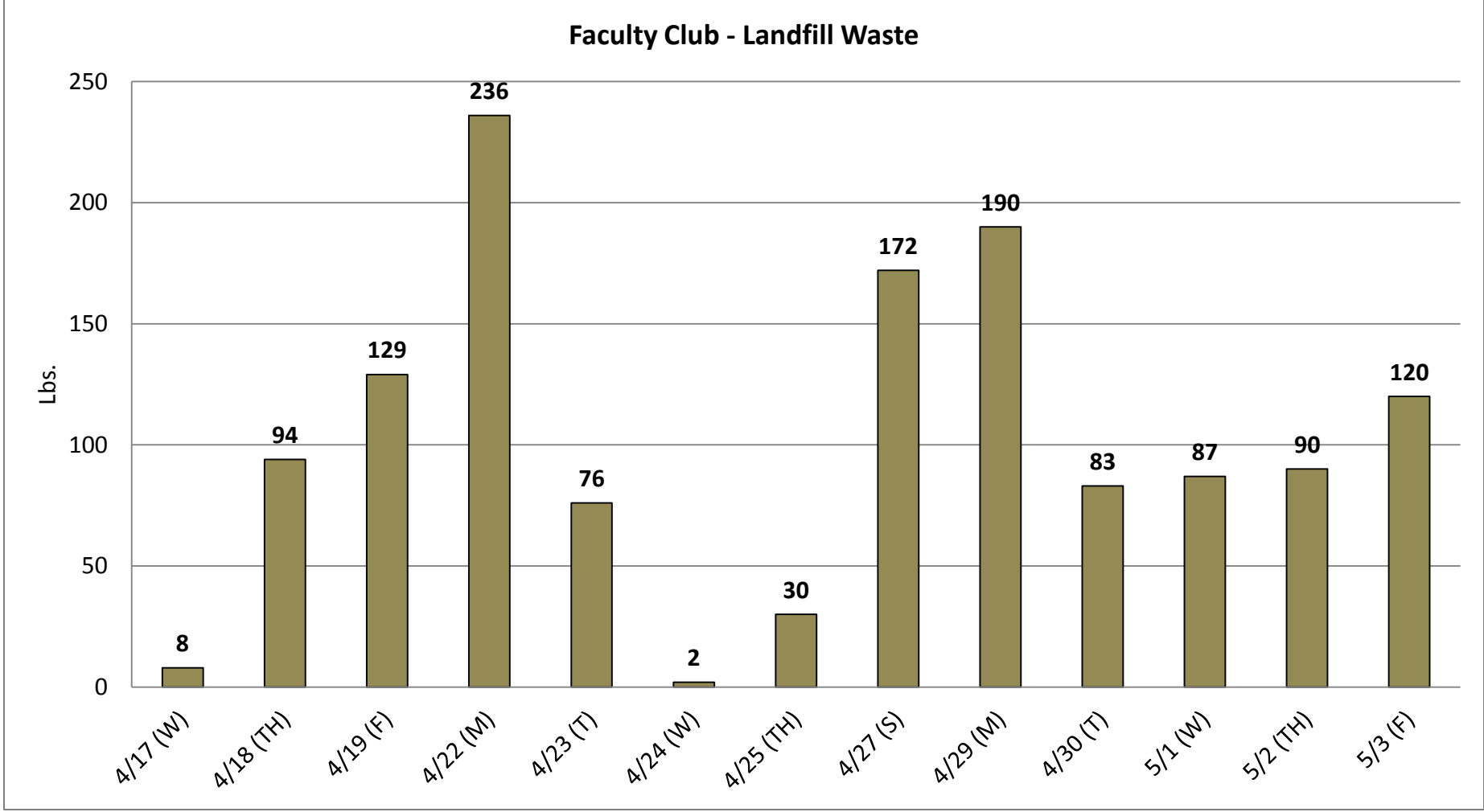
On-board Scales



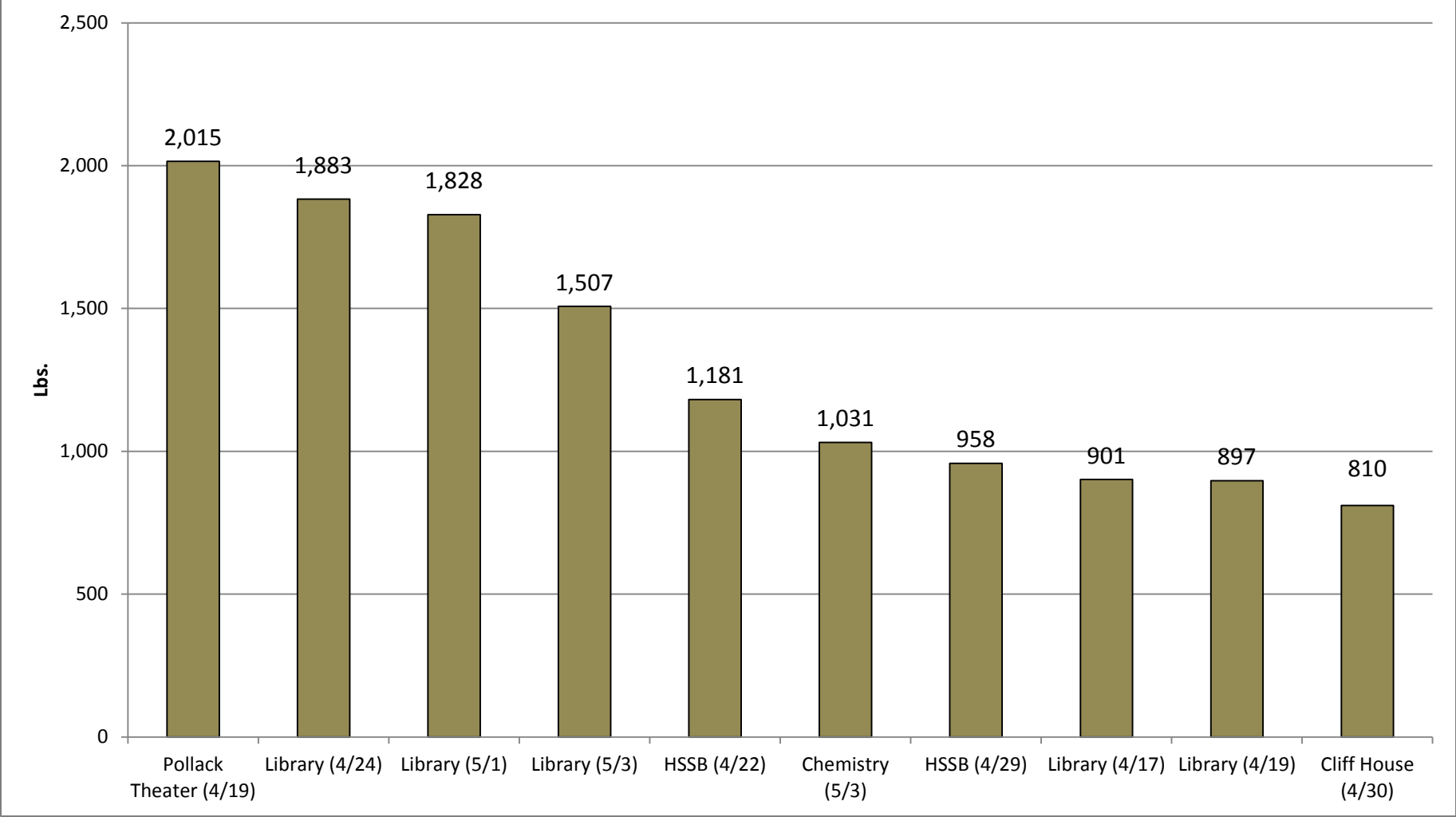
Adjusting Service Cycles



Modifying Waste Infrastructure



Largest Generators of Landfill Waste



Managing the Data

MarBorg (DO NOT INCLUDE C&D WASTE)							Commodity Type (tons)					2012-13					2011-12					2010-11					2009-10				
Week	Dates	Last Day to Report*	Landfill	Commingled	Foodwaste	Greenwaste																									
1	2/2 - 2/8	February 12	25.63	30.5	23.55	5.86																									
2	2/9 - 2/15	February 19	27.13	30.2	24.71	5.16																									
3	2/16 - 2/22	February 26	23.57	26.09	23.2	4.3																									
4	2/23 - 3/1	March 5	31.28	32.82	25.25	8.33																									
5	3/2 - 3/8	March 12	28.63	31.92	26.78	8.63																									
6	3/9 - 3/15	March 19	29.22																												
7	3/16 - 3/22	March 26	27.93																												
8	3/23 - 3/29	April 2	19.44																												

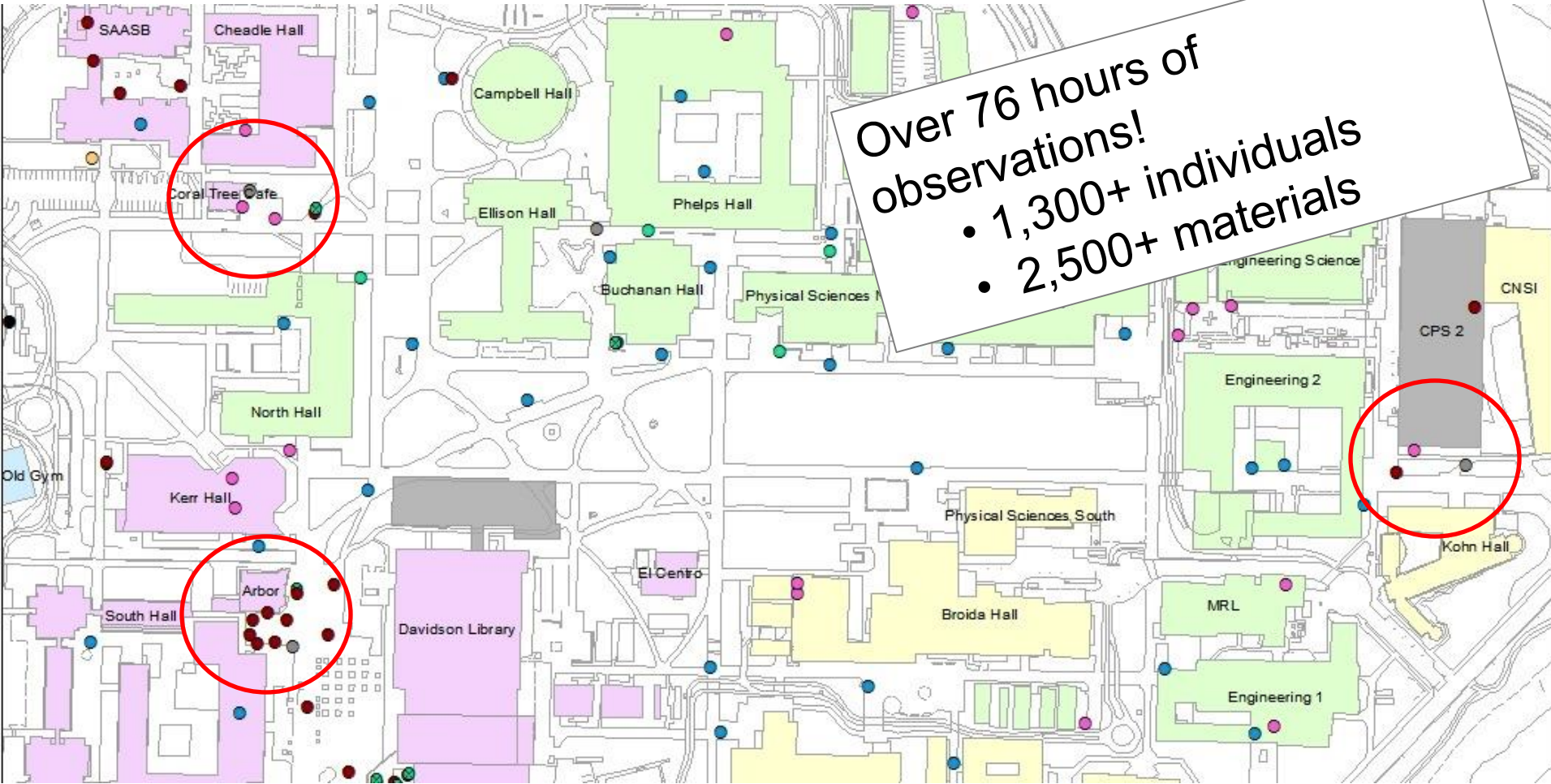
A.S. RECYCLING DATA							Conversion (w/o C&D) FY											
Units - Use Tons, Pounds, Gallons, etc.																		
Sarah Siedschlag sarahs@as.ucsb.edu							9.8438 tons											
Week	Dates	Last Day to Report*	Commingled	Commodity Type	Units	July 2013	Aug 2013	Sep 2013	Oct 2013	Nov 2013	Dec 2013	Jan 2014	Feb 2014	Mar 2014	April 2014	May 2014	June	
1	2/2 - 2/8	February 12	N/A	Glass	lbs.	0	0	0	0	0	0	0	0	0	0	0	0	
2	2/9 - 2/15	February 19	N/A	Aluminum	lbs.	0	0	0	0	0	0	0	0	0	0	0	0	
3	2/16 - 2/22	February 26	N/A	Plastic #1	lbs.	0	0	0	0	0	0	0	0	0	0	0	0	
4	2/23 - 3/1	March 5	N/A	Plastic #2	lbs.	0	0	0	0	0	0	0	0	0	0	0	0	
5	3/2 - 3/8	March 12	N/A	B-metal	lbs.	0	0	0	0	0	0	0	0	0	0	0	0	
6	3/9 - 3/15	March 19	N/A	Family Housing Food Waste	lbs.	874	750	683	714	762	476	766	742	980	833	1043		
7	3/16 - 3/22	March 26	N/A	Family Housing Green Waste (Carbon)	lbs.		6	32.5	294.5	73.5	65	39	59	53	64	43.5		
8	3/23 - 3/29	April 2	N/A	Dining Commons Pickups for Worms	lbs.	225	322	479	1195	721	420	528	653	959	1161	1221		
*Last day to report is for UCSB to enter data into the RecycleMania Tracker																		
Please update ASAP after the reporting week ends																		
Misc. Organics																		
Bren Vermicom																		
Week	Dates	Last Day to Report*	Commingled	Commodity Type	Units	July 2013	Aug 2013	Sep 2013	Oct 2013	Nov 2013	Dec 2013	Jan 2014	Feb 2014	Mar 2014	April 2014	May 2014	June	
1	2/2 - 2/8	February 12	12.3	Shredded Newspaper for Worms	lbs.	16	5	33	26	0	27	0	0	0	0	0	0	
2	2/9 - 2/15	February 19		Ink & Toner Shipped Off Campus	lbs.	0	246	0	0	0	0	95.2	0	0	0	0	0	
3	2/16 - 2/22	February 26		Mobile Devices Shipped Off Campus	lbs.	0	76	0	0	0	0	0	0	0	0	0	0	
4	2/23 - 3/1	March 5		Central Stores dropoffs - do not include	lbs.	3409	3610	2793	1595	1675	445	1955	1194	2306	2612	1568		
5	3/2 - 3/8	March 12		EH&S dropoffs - do not include	lbs.	644	395	491	494	308	271	417	344	463	645	222		
6	3/9 - 3/15	March 19		Books	lbs.	0	0	0	0	0	0	0	0	0	0	0	0	
7	3/16 - 3/22	March 26																
8	3/23 - 3/29	April 2																

All weights given in Tons				TONNAGE CONVERSION													
Kathy Borgatello Koeper																	
	July 2013	Aug 2013	Sep 2013	Commodity Type	Units	July 2013	Aug 2013	Sep 2013	Oct 2013	Nov 2013	Dec 2013	Jan 2014	Feb 2014	Mar 2014	April 2014	May 2014	June
UCSB																	
Recycled	91.7	80.19	86.91	Glass	Tons	0	0	0	0	0	0	0	0	0	0	0	0
Food Waste/ Compost	60.15	46.9	34.24	Aluminum	Tons	0	0	0	0	0	0	0	0	0	0	0	0
Office Park	6.62	4.98	3.57	Plastic #1	Tons	0	0	0	0	0	0	0	0	0	0	0	0
Recovered from MRF	52.3	80.62	79.39	Plastic #2	Tons	0	0	0	0	0	0	0	0	0	0	0	0
Average Daily Cover	12.21	39.37	37.96	B-metal	Tons	0	0	0	0	0	0	0	0	0	0	0	0
Green Waste	67.52	46.92	53.79	Family Housing Food Waste	Tons	0.437	0.375	0.3415	0.357	0.381	0.238	0.383	0.371	0.49	0.4165	0.5215	
Trash	119.52	132.33	136.07	Family Housing Green Waste (Carbon)	Tons	0	0.003	0.01625	0.14725	0.03675	0.0325	0.0195	0.0295	0.0265	0.032	0.02175	
SUBCONTRACTORS																	
Recycled	49.17	17.97	62.04	Dining Commons Pickups for Worms	Tons	0.1125	0.161	0.2395	0.5975	0.3605	0.21	0.284	0.3265	0.4795	0.5805	0.6105	
Green Waste	1.39			Shredded Newspaper for Worms	Tons	0.008	0.0025	0.0165	0.013	0	0.0135	0	0	0	0	0	0
Trash	15.69	4.08	91.04	Ink & Toner Shipped Off Campus	Tons	0	0.123	0	0	0	0	0.0476	0	0	0	0	0
TOTAL																	
Recycled+MRF+ADC	272.15	270.03	304.11	Mobile Devices Shipped Off Campus	Tons	0	0.038	0	0	0	0	0	0	0	0	0	0
Green Waste	68.91	46.92	53.79			476.49	439.3	295.35	267.14	273.68	402.56	452.29	437.82	457.48	4,348.40	572.12	
						57.78	43	33.44	41.46	36.27	45.75	49.29	50.44				
Total Diverted	341.06	316.95	357.9			534.27	482.3	328.79	308.6	309.95	448.31	497.36	487.11	477.59	4,890.19	619.12	
Total Trash	135.21	136.41	227.11			467	193.88	130.85	140.02	135.96	182.34	168.03	162.82	171.06	2,250.69		
Grand Total	476.27	453.36	585.01			1001.27	676.18	459.64	448.62	445.91	630.65	665.39	649.93	648.66	7,140.89		
MARBORG DIVERSION	71.81%	69.91%	61.18%			53.36%	71.33%	71.53%	68.79%	69.51%	71.09%	74.75%	74.95%	73.59%	68.48%		

Plastic film		H&RS		Books		Blankets	
Plastic film	0.5000	1.7600	AS	0.0000	AS	8.0000	1.2000
Textiles							
Eyeglasses							
Bicycles							
Books							
Blankets							



Behavioral Economics: Changing the Norms of Waste Management Through Behavior Change

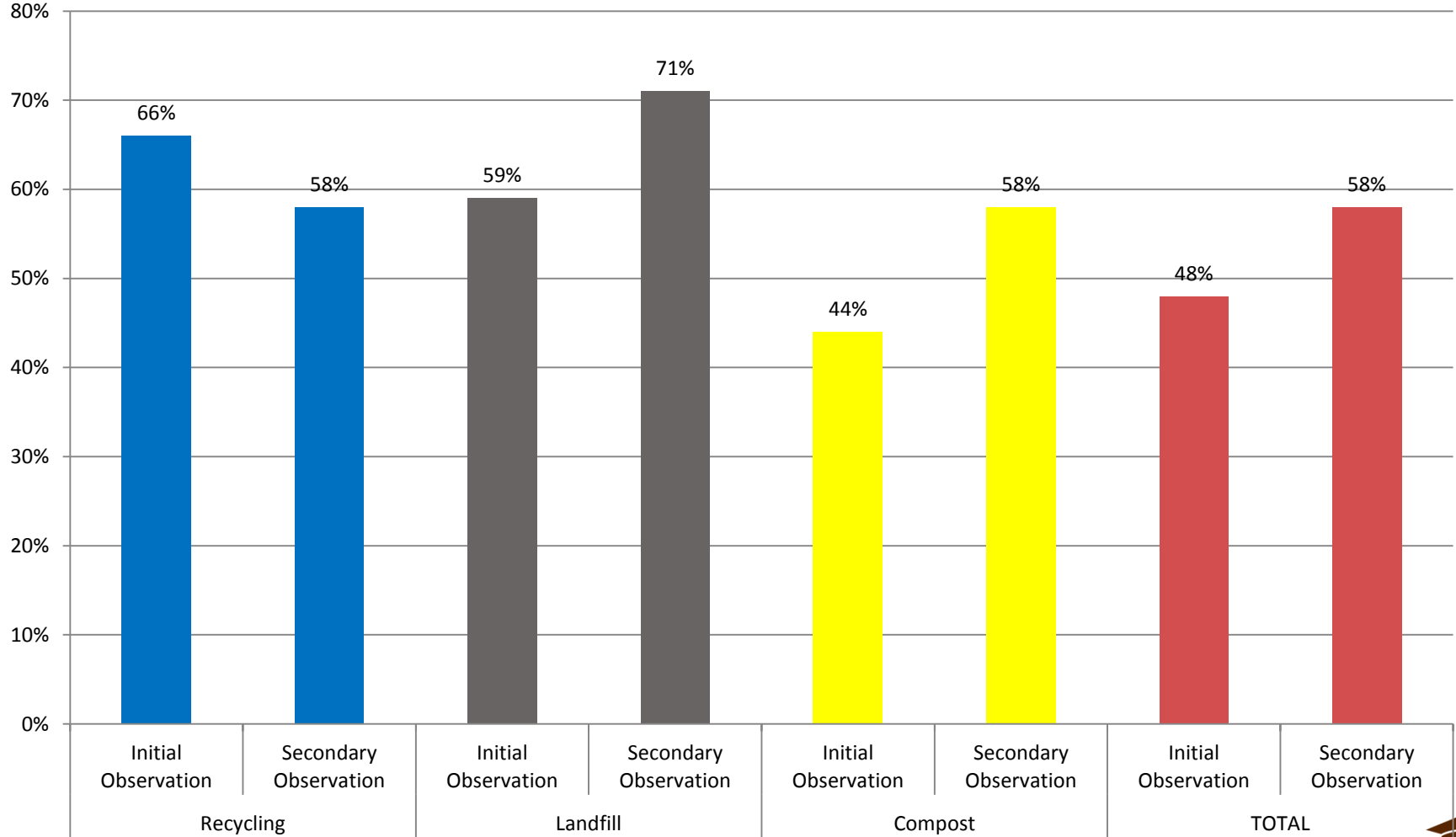


Over 76 hours of observations!

- 1,300+ individuals
- 2,500+ materials

Behavioral Economics – *Cont.*

Total Percentage of Material Sorted Correctly



Summary

“Don’t ask people to change, ask them to measure. Their findings should promote the



Questions?

ORANGE COAST COLLEGE RECYCLING CENTER

**Mike Carey, LEED AP
Sustainability Coordinator**

mcarey@ccd.edu

ORANGE COAST COLLEGE

- **Community College**
Located in Costa Mesa,
CA
- **164 Acre Campus**
- **25,000 Students**
- **2,300 Staff**



RECYCLING CENTER

- Established in 1970
- Occupies 1 acre
- Associated Students operation
- Public drop-off and CRV Buy-Back Center



RECYCLING CENTER

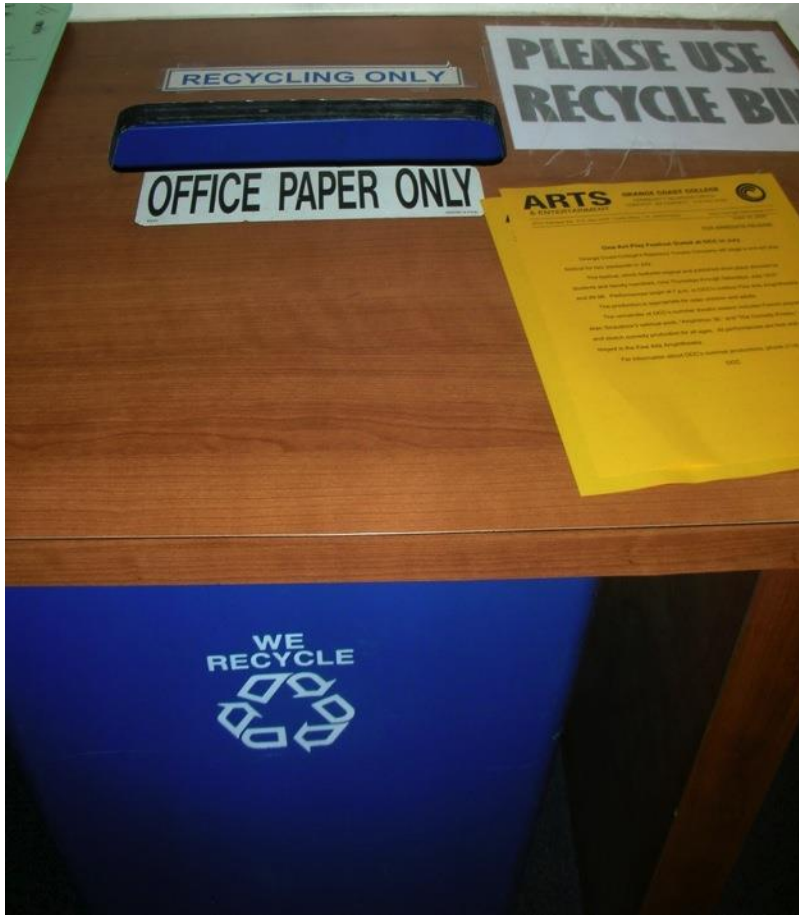
- **Completely self supporting**
- **4 Full Time staff**
- **26 Part Time staff**
- **2013/14 Gross Sales = \$1,527,000**



RECYCLING CENTER



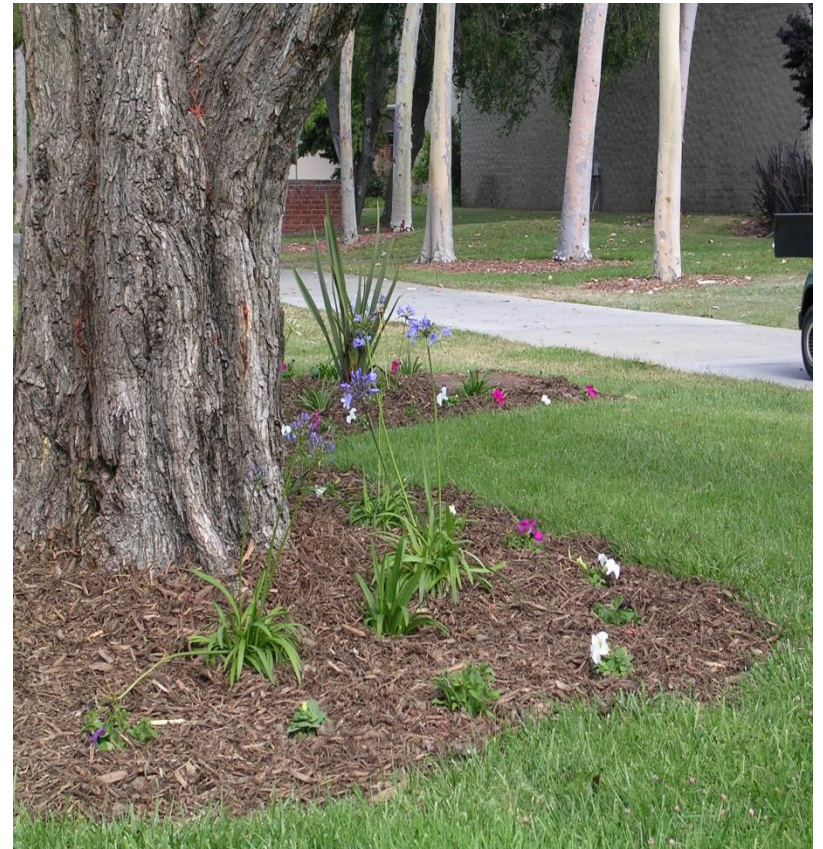
ON-CAMPUS RECYCLING



MULCHING PROGRAM



MULCHING PROGRAM



COLLECTION BINS

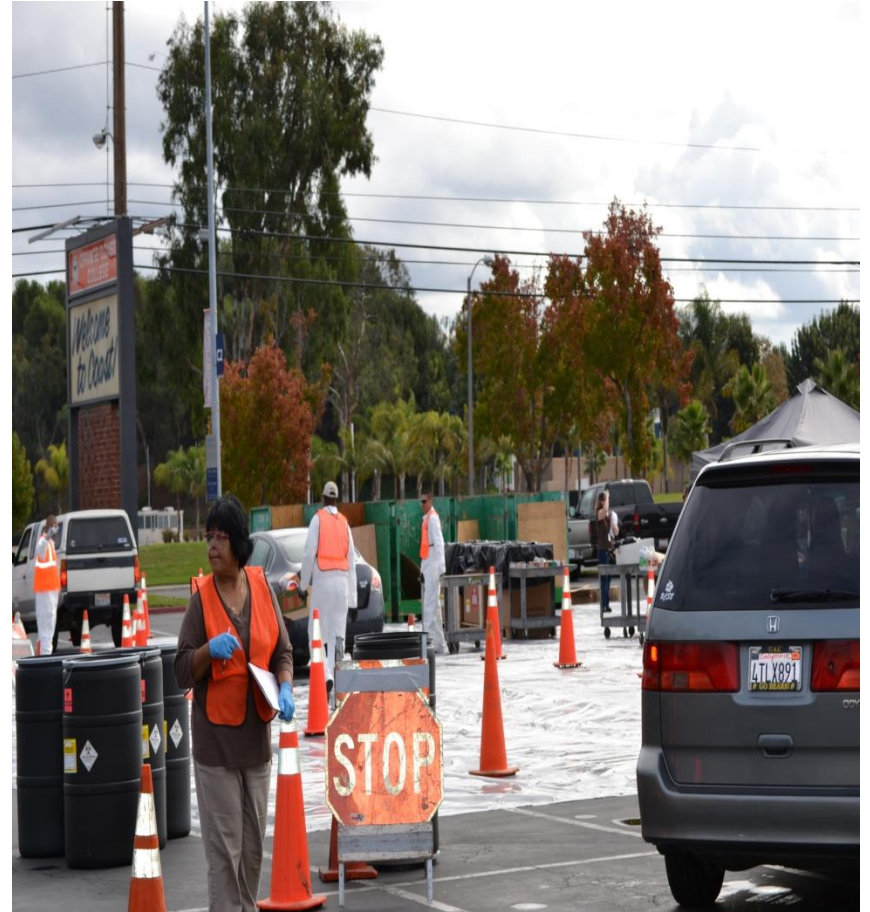




RECYCLING COMPETITIONS



HAZARDOUS WASTE ROUND UP



ORANGE COAST COLLEGE RECYCLING CENTER

**Mike Carey, LEED AP
Sustainability Coordinator**

mcarey@ccd.edu

Creating a Leaner Campus Recycling Program

Christine von Kolnitz Cooley, ACEM, CRP
Medical University of South Carolina

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843-792-4066

Staff

- CDL Drivers \$\$\$\$
- Drivers \$\$\$
- Non-drivers \$\$
- Students \$
- Special needs \$
- Schedule to accommodate lower cost labor
- Dedicated or not
- Full or part-time or temp
- Contract labor

Lists

- **Bin Inventory**
- **Bin schedules**
 - **Daily, weekly, other**
- **Customers - contacts**
- **Room codes, room type**
- **Special info about rooms**
- **Avg bins per route >100 full time**
- **Max 208**

Daily Run Sheet for Wednesday, 11/05/2014 -- Route T2 - TRUCK 2 (BOX)

11/04/2014 12:52 PM

Sequence: Route, Assigned Primary Address Order, Service Order, Assigned Bin Location Stop, Bin Type, Action

Route Summary:	5 Customers	7 Addresses	143 Stops	213 Bins	Action to Take
Notes:					22 (96) Replace 1 (1C) Tip 88 (23) Tip 66 (30) Tip 36 (CN) Tip

Customer Primary Address	Bin Location	# Bins	Bin Description	Action to Take
--------------------------	--------------	--------	-----------------	----------------

1) Customer: 98240 S/O No. AAAACSEE Contact: Fred Miles
 Medical University Hospital Authority-MUHA
 Children's Hospital...PGS
 Charleston, SC 29425

EH 204 code [redacted] <i>not correct code</i>	2	(CN) 23 GAL CAN BIN	Tip
EH 212 LAB	1	(CN) 23 GAL CAN BIN	Tip
EH 218 F cytongenetics	2	(CN) 23 GAL CAN BIN	Tip
EH 218 molecular	2	(CN) 23 GAL CAN BIN	Tip
EH 219	1	(CN) 23 GAL CAN BIN	Tip
EH 224 LAB	1	(CN) 23 GAL CAN BIN	Tip
EH 314	2	(CN) 23 GAL CAN BIN	Tip
EH 319	2	(CN) 23 GAL CAN BIN <i>90</i>	Tip
EH 324 [redacted]	3	(CN) 23 GAL CAN BIN	Tip
EH 329	1	(CN) 23 GAL CAN BIN	Tip
EH 433 "Trash room"	1	(CN) 23 GAL CAN BIN	Tip
EH 508 STAFF LOUNGE	2	(CN) 23 GAL CAN BIN	Tip
EH 512 KITCHEN 512A <i>take out of</i>	1	(1C) 1 cubic yard	Tip
EH 512 KITCHEN 51499 <i>can + fork</i>	1	(CN) 23 GAL CAN BIN	Tip
EH 526E code [redacted]	1	(CN) 23 GAL CAN BIN	Tip
EH 620 (knock) Pharmacy <i>16730</i>	1	(CN) 23 GAL CAN BIN	Tip
EH 6MRM (EH629)	3	(CN) 23 GAL CAN BIN	Tip
EH 7TH FL ELEV <i>F</i>	1	(CN) 23 GAL CAN BIN	Tip
EH 847 NICU code [redacted]	2	(CN) 23 GAL CAN BIN	Tip
EH 850 NICU in patient area at windows	2	(CN) 23 GAL CAN BIN	Tip
EH 853 NICU	2	(CN) 23 GAL CAN BIN	Tip
EH 902 Hospital Maintenance Shop	1	(CN) 23 GAL CAN BIN	Tip

new 17333 (23)

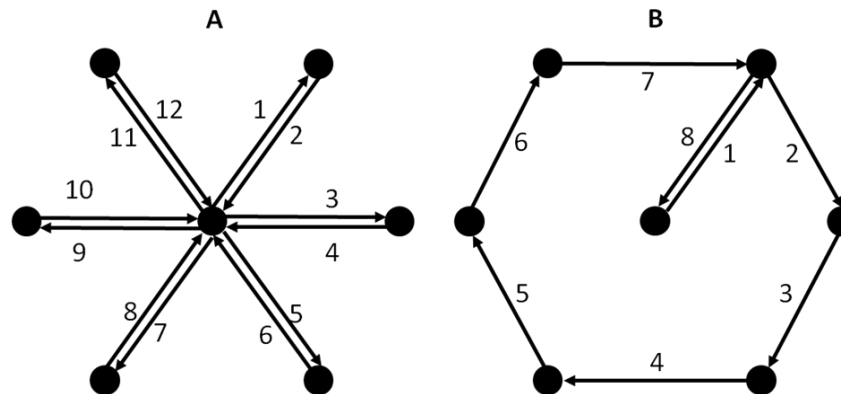
511FL asked 14083

remove 16264 out place in 16277/620 code [redacted]

? 14066 PCU EH 879

Schedule Efficiently

- Milk run
 - outlining blgs utilize truck
 - on-call battery/toner collection
- Spoke and hub
 - Core of campus on-foot



Stay on schedule

- War Board
 - Weekly and Daily routes at a glance
 - Misc tasks
 - Call 2-3 hours before end of shift to make sure staff is on schedule

	Monday	Tuesday	Wednesday	Thursday	Friday
<u>T1</u>	SHRED TRUCK Robert	SHRED TRUCK Robert	SHRED TRUCK DAVID	SHRED TRUCK David	SHRED TRUCK Robert
<u>T2</u>	BOX TRUCK Tony	DAVID	Robert	BOX TRUCK AM Robert 1/2	Tony
<u>F1</u>	Scott	Scott	Scott	Scott	Scott
<u>F3</u>	David	Tony	Tony	Tony	David
EXTRAS	clean lids		put out lab bins		
MISC					

Work Orders

- AIM System with I-phones
- Send WO to phone
- Employee closes WO on phone real time
- Track where employee is by WO
- KPI – Hrs per WO
- Current Goal = 10 hrs avg
 - Actual to date July 7.9, Aug 3 & Sept 4
 - # WO July 179, Aug 209 & Sept 273

Work Orders

- **KPI - % Billable**
- **Current Goal = 50%**
 - Actual to date July 86%, Aug 58%, Sept 54%
- **Take action to reduce call backs**
 - Stay on schedule
 - Track list of multiple calls
 - Add another bin
 - Increase schedule
 - Keep staff informed
 - Reward staff

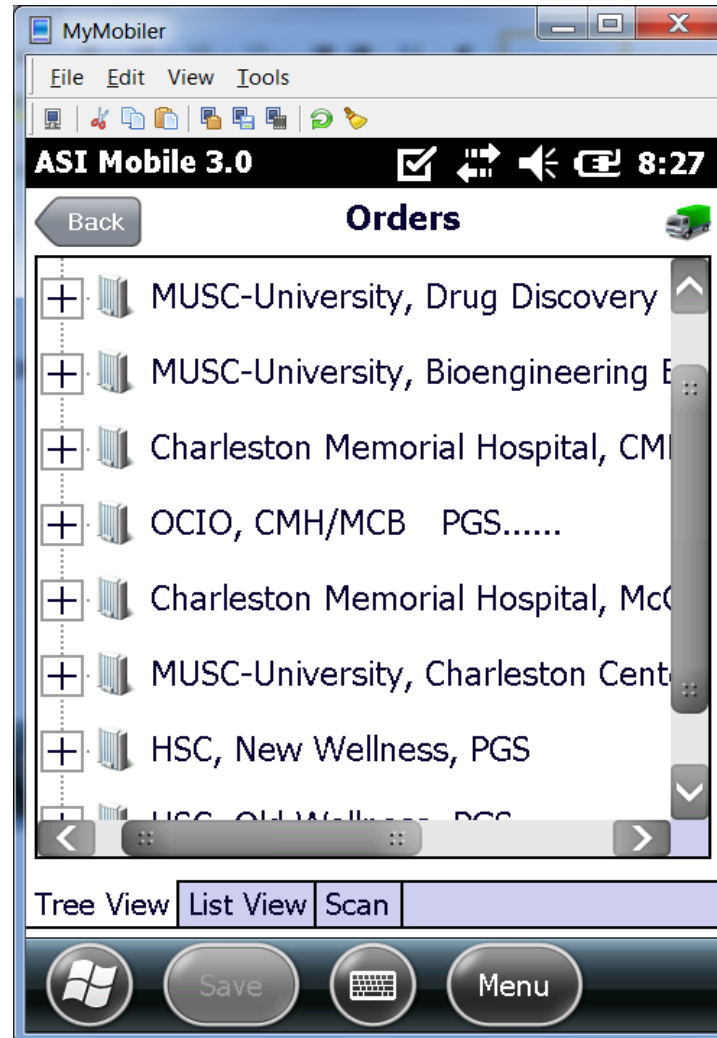
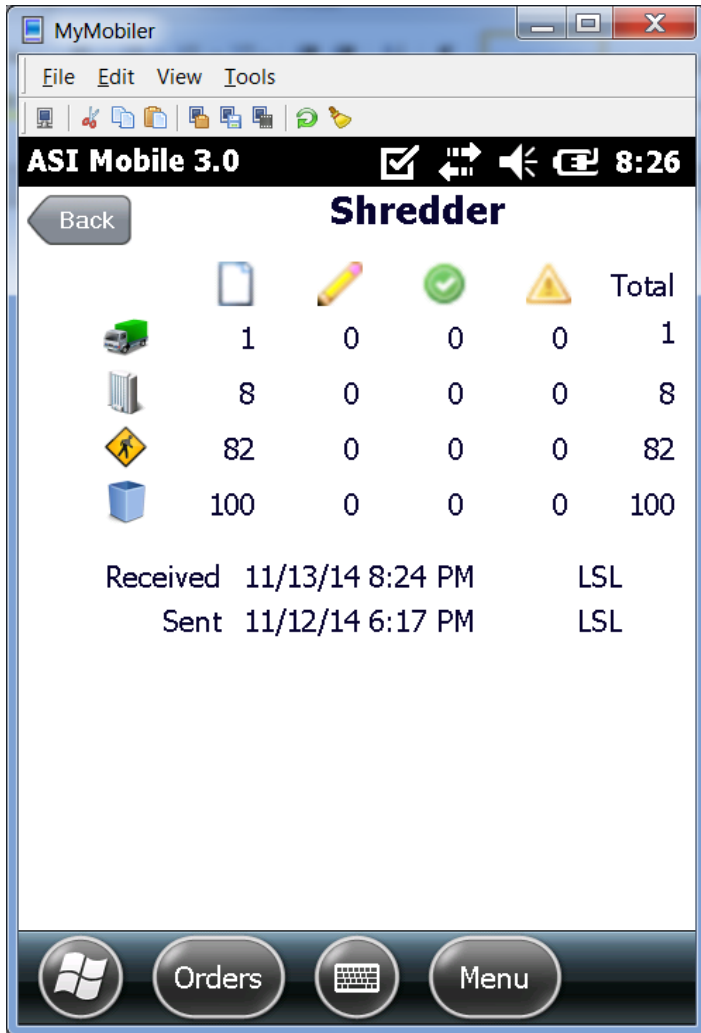
Bin Management

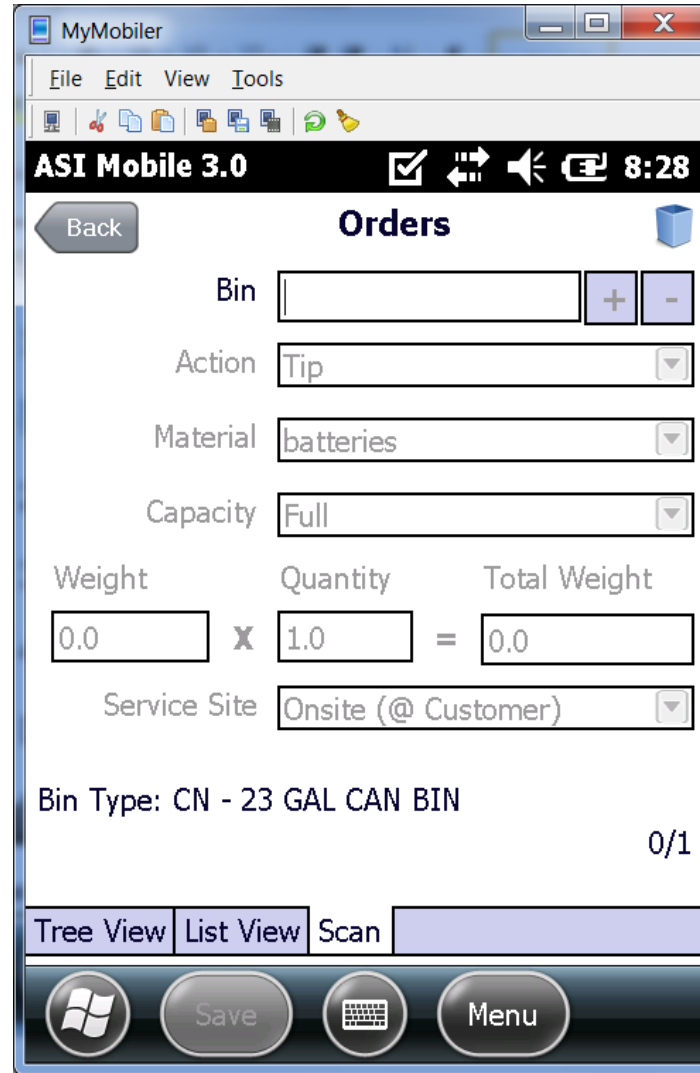
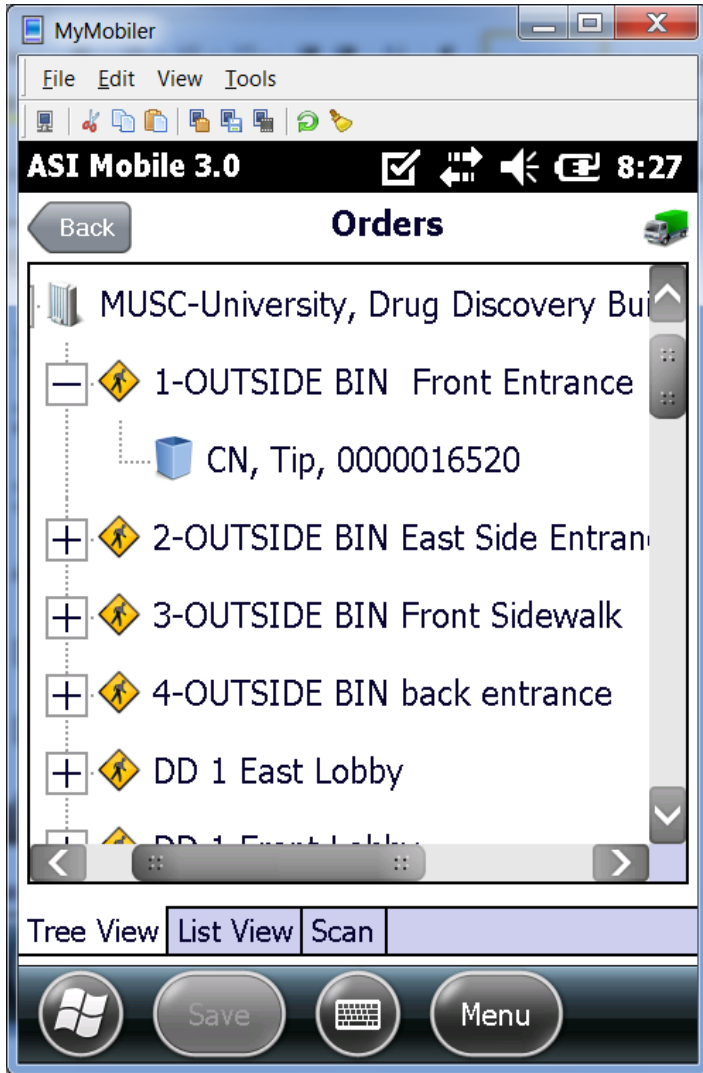
- **Veri-Shred Software**
 - **Customer, Building**
 - **Room #, Bin type**
 - **Barcode, Reports**

Bin Management

- **Mobile ASI Software on Intermec Unit**
 - Receive & view service orders
 - Scan bins
 - Enter notes & volume







Medical University of South Carolina
 97 Jonathan Lucas Street
 Charleston, SC 29425

Bin Management

AC-Rutledge Tower Rutledge Tower.....TONER Charleston SC 29425	94010-ACRUTLEDGETOWER Invoice No.: 0003405 Invoice Date: 11/01/2014 Order No.: Terms: UPON RECEIPT Print Date: 11/07/2014 # 405
--	--

	Amount	Tax	Subtotal
10/01/2014 - 10/31/2014 Services:	2,875.95	0.00	2,875.95
Total Services:			2,875.95
PLEASE PAY THIS AMOUNT			2,875.95

- Invoicing
 - Monthly
 - Could use Quick Books for accounts receivable

Date: 10/03/2014	W/O: N040209	S/O: AAAACQRC	Rate	Qty	Units	Amount	Tax	Total Amount
AC-Rutledge Tower	23-23 GAL BIN		3.8500	6.000		23.10	0.00	23.10
AC-Rutledge Tower	30-30 GAL CONSOLE		3.8500	6.000		23.10	0.00	23.10
AC-Rutledge Tower	96-96 GAL BIN		3.8500	1.000		3.85	0.00	3.85
AC-Rutledge Tower	TT-TRUCK TRIP		0.0000	1.000		0.00	0.00	0.00
Work Order Total:						50.05	0.00	50.05

Date: 10/02/2014	W/O: N040263	S/O: AAAACQOQ	Rate	Qty	Units	Amount	Tax	Total Amount
AC-Rutledge Tower	1C-1CUBIC YARD		3.8500	1.000		3.85	0.00	3.85
AC-Rutledge Tower	CN-23 GAL CAN BIN		3.8500	45.000		173.25	0.00	173.25
AC-Rutledge Tower	O1-OUTDOOR PGS BIN		3.8500	1.000		3.85	0.00	3.85
AC-Rutledge Tower	TT-TRUCK TRIP		0.0000	1.000		0.00	0.00	0.00
Work Order Total:						180.95	0.00	180.95

Date: 10/01/2014	W/O: N040288	S/O: AAAACQMS	Rate	Qty	Units	Amount	Tax	Total Amount
AC-Rutledge Tower	02-2 GAL BIN		3.8500	2.000		7.70	0.00	7.70
AC-Rutledge Tower	23-23 GAL BIN		3.8500	25.000		96.25	0.00	96.25
AC-Rutledge Tower	30-30 GAL CONSOLE		3.8500	53.000		204.05	0.00	204.05
AC-Rutledge Tower	96-96 GAL BIN		3.8500	7.000		26.95	0.00	26.95
AC-Rutledge Tower	TT-TRUCK TRIP		0.0000	1.000		0.00	0.00	0.00
Work Order Total:						334.95	0.00	334.95

Date: 10/08/2014	W/O: N040629	S/O: AAAACQVG	Rate	Qty	Units	Amount	Tax	Total Amount
AC-Rutledge Tower	23-23 GAL BIN		3.8500	27.000		103.95	0.00	103.95
AC-Rutledge Tower	30-30 GAL CONSOLE		3.8500	54.000		207.90	0.00	207.90
AC-Rutledge Tower	96-96 GAL BIN		3.8500	8.000		30.80	0.00	30.80
AC-Rutledge Tower	TT-TRUCK TRIP		0.0000	1.000		0.00	0.00	0.00
Work Order Total:						342.65	0.00	342.65

Date: 10/10/2014	W/O: N040707	S/O: AAAACQZS	Rate	Qty	Units	Amount	Tax	Total Amount
AC-Rutledge Tower	23-23 GAL BIN		3.8500	6.000		23.10	0.00	23.10
AC-Rutledge Tower	30-30 GAL CONSOLE		3.8500	6.000		23.10	0.00	23.10
AC-Rutledge Tower	96-96 GAL BIN		3.8500	1.000		3.85	0.00	3.85
AC-Rutledge Tower	TT-TRUCK TRIP		0.0000	1.000		0.00	0.00	0.00
Work Order Total:						50.05	0.00	50.05

Time and Motion Study

- Best way to see into the system
- Staff rights down all of their actions throughout day for set period of time
- Change staff to compare
- Analyze data
 - Why 1 hr for one person but 1.5 for another?
 - Is equipment slowing things down?
- Correct schedules

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