Background

• Solid Waste and Recycling implemented Rubicon SmartCity in December 2020, utilized for all recurring collections services.

• Cloud-based software optimizes and verifies collections for all of COD Solid Waste & Recycling lines of business
Routing Program Implementation

Pods and iPad mounts installed in 78 vehicles

• 80 Residential Routes (Trash, Recycling, Brush, Bulk, and Cart Maintenance)
  • More than 80,000 stops weekly for more than 35,000 residences

• 60 Commercial Front and Side Load (Trash and Recycling) Routes
  • More than 5,500 stops weekly

• 50 Roll Off Routes
  • Over 270 stops weekly

• Valet program
  • Over 130 customers

• Home Chemical Collection
Dispatch Office – Old Workflow

- Paper Heavy – all dispatches were printed
- Dispatches changed hands frequently, often resulting in the loss of information and re-work
- Very manual and labor-intensive process
Dispatch Office – New Workflow

• Instead of piles of paper workorders to be completed manually, our dispatchers now use spreadsheet reports from Rubicon to complete work orders that incur fees or change inventory.

• Work orders that do not result in a fee are not completed in the billing system, saving large amounts of time.
Field Operations – Old Workflow

- Routes and work orders were printed daily
- All documentation of collections was manual input
- Routes were designed via hand-colored maps
- New driver training took weeks to complete
- Roll-off Dispatches were received via radio from office
- Collection reports were difficult to acquire
Digitization-New Workflow

• Converted over 240 weekly routes and 120,000 weekly stops from paper-based to paperless across all collection services, saving over 75,000 pieces of paper per year

• Provided one stop shop for route progress in real time

• Digitized weight tickets, pre/post-trip inspections, and issues at the curb

• Reduced training time for new drivers

• Decreased dispatch completion time

• Expedited route design completed in hours rather than weeks or months

• Streamlined reporting, growth forecasting, and vehicle triaging

• Collection reports are exported to excel spreadsheet
Route Design Process

Before

After

1202

Edit
Export
Sequence Route

Edit Route Locations

Search

Map
Satellite

City of Denton
SOLID WASTE & RECYCLING
New Routing Design

Before

After
Route Assist

- Drivers assisted on 2,804 of 30,426 total routes logged in 2021
- Drivers assisted on 294,829 total stops
- Route Assist adoption has increased over the course of 2021
Supervisor App.
In-Cab Device Placement
Route Tablet View
Exception Examples

- Blocked Container
- Cart Not-Out
- Contaminated Recycle
- Other
Service Exceptions

- **87,864** exceptions logged in all 2021
- **88%** of exceptions logged in residential, **9%** in cart delivery, and **3%** in frontload
- **67,943** bins not out logged in 2021
- **Over 70%** reduction in go-backs

<table>
<thead>
<tr>
<th>Issue Name</th>
<th>Count</th>
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<tbody>
<tr>
<td>Bin Not Out</td>
<td>67,943</td>
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<tr>
<td>Container Not Ready (Cart Delivery Only)</td>
<td>8,080</td>
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<tr>
<td>Contaminated/ Unacceptable</td>
<td>7,137</td>
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<tr>
<td>Blocked</td>
<td>1,098</td>
</tr>
<tr>
<td>Overflowing</td>
<td>725</td>
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<tr>
<td>Damaged Container</td>
<td>541</td>
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<tr>
<td>Couldn't Enter/ Reach Address</td>
<td>460</td>
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<tr>
<td>Other</td>
<td>1,880</td>
</tr>
<tr>
<td>Total</td>
<td>87,864</td>
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</tbody>
</table>
Reduced Recycling Contamination

- Average monthly contamination decreased by 21%.
- Average monthly recyclables increased by 150 net tons.
- 5,188 tons of CO2e saved from increasing capture of recyclable materials, equivalent of 1,128 passenger vehicles off the road.
Cart Delivery Optimized
Cart Scanner and Bar Code Sheet
Services Assistance Program Customers

- Customers that are unable to move carts
- Each commodity responsible for their own cart
- No longer potential visual “targets” from the street (Yellow Lid)
Operator Testimonials

“This is the handiest device that I have ever seen, and it helps us out a great deal. The route assist feature is awesome”

Oliver Braizer-ASL, 14 yrs. MSW Exp.
“Navigation makes running my routes very efficient and going paperless is better for me as well as the environment”

Michael Westbrook-Roll-Off, 9 yrs. MSW EXP.
Operator Testimonial

“It has helped me a lot, trying to learn new routes is much easier than with paper route sheets”

Edgar San Miguel-Frontload, 2 yrs. MSW Exp.
Operator Testimonial

“It helps me find the customer location easy and quick vs. paper dispatches”

Johnny Parris-Cart Delivery, 35 yrs. MSW Exp.
### Vehicle SW-1438

#### Vehicle Summary

<table>
<thead>
<tr>
<th>Vehicle Type</th>
<th>Mileage</th>
<th>Due For Next PM At</th>
<th>Engine Hours</th>
<th>Vehicle Subtype</th>
<th>Total Unresolved Issues</th>
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</thead>
<tbody>
<tr>
<td>Residential</td>
<td>69236.91</td>
<td>–</td>
<td>8978.2</td>
<td>Tipper</td>
<td>37</td>
</tr>
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</table>

**Last Known Location**
Landfill Rd, Denton, TX 76208, USA

#### Vehicle Maintenance Status

**PM Up To Date**

#### Preventative Maintenance Log

**232 preventative maintenance log(s) found**

#### Vehicle Fuel Log

- **25 Fill Ups**
- **2.6 MPG**
- **503.3 Gallons Used**
- **1390 Miles Driven**

#### Vehicle Issues

- **7 vehicle issue(s) found**

#### Vehicle Inspection Log

- **79 vehicle inspection(s) found**

#### Vehicle Fault Codes

- **499 vehicle fault code(s)**
Efficiency Gains

- Average route mileage and route time decreases in Residential, Frontload, and Cart Delivery routes through route digitization.

- In Residential alone, average route mileage decreased by 39 miles across 65 recurring routes, saving an estimated, $125,000 in fuel costs and roughly 450 tons of CO2e, the equivalent of 100 passenger vehicles off the road annually.

Stats are for 2021.
Additional Efficiency Gains

- Training for drivers is modernized and simplified
- Route design is now streamlined
- Growth and budget forecasting capabilities
- Fleet Data is now digital access
- Route status, vehicle location and exception reporting in real-time
- Container location pinned in the field by the drivers
- Work orders are uploaded to the routes in a fraction of the time
Customer Service Enhancements

- Call center representatives can see if an address has been serviced in near real time
- Route playback can be used to determine if the truck has only serviced on side of the street or help identify missed areas
- Stop confirmation is also time coded
- Photos of cited issues allow call center reps to speak intelligently about the issues
On the Horizon…

- Integration with our Billing System
- Integration with our Weigh Station System
- Enhanced User Interface
- Inventory Management
Questions?