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SYSTEM ENGINEERING OPTIMIZATION FOR FLEET VEHICLES

ROANOKE COUNTY VA
GENERAL SERVICES

Aidan O'Neill | Afreen Ali | Clark Tanman

provides trash and recycling collection through their solid waste operations, utilizing fleet upfit, welding, and light-heavy duty service shops.

BACKGROUND

1. Excess downtimes, tows, and breakdowns result in costly repairs

ROANOKE COUNTY FLEET
W305 - Work Order Dollar Summary
10/4/2024 9:35:38 AM

Report Summary:
Asset Count: 29
Work Order Count: 511

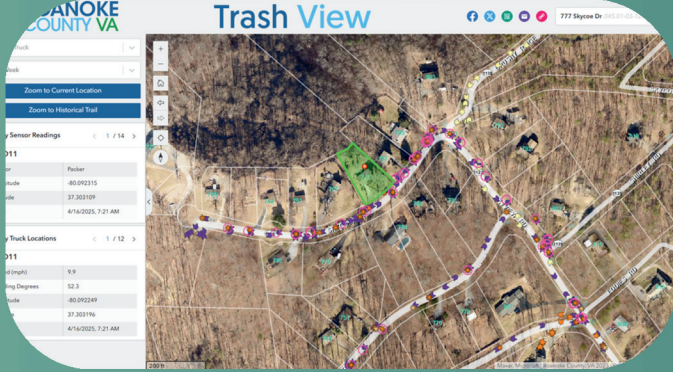2. Failures stem from driver neglect, wear and tear, and overpacking
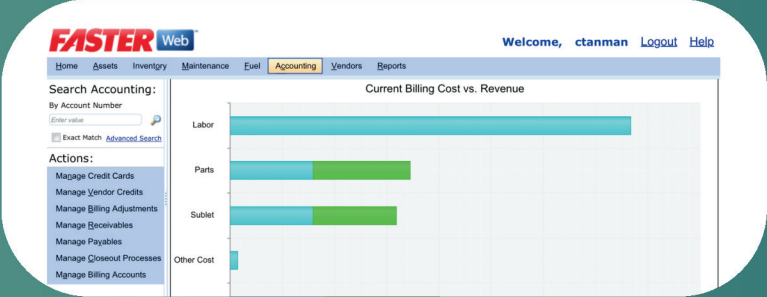
3. Current routes are outdated, inefficient, and/or nonexistent

SOLUTION DESIGN

1/8 visits to Fleet Services for 1st hand account observation/interviews

TrashView software used to optimize recycling and bandit routes/stops

Faster software used to analyze maintenance data to create schedule

Objectives: Downtime, towing, repair costs

Causes: Overpacking, Wear and tear, Driver neglect

Methods: DiffEQ, Python, TrashView, Excel, FASTER

Solutions: Maximum can count, Optimized recycling routes, Reorganized bandit stops, Preventative maintenance schedule

RESULTS

Towing ⬇15%
Before	After
$12,905	$10,969

Downtime ⬇10%
Before	After
119 hrs	107 hrs
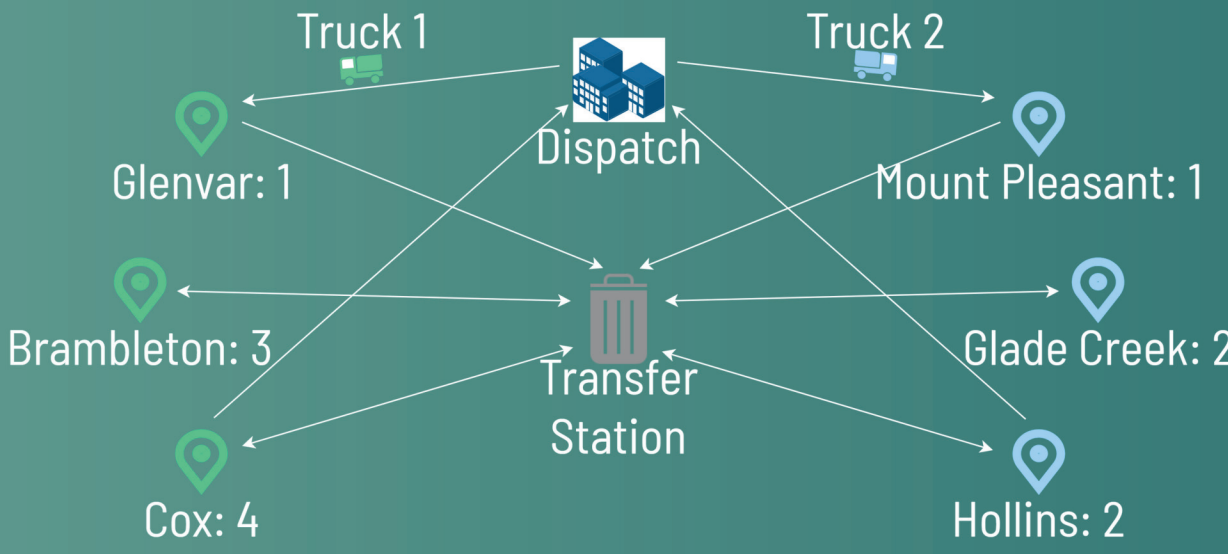
Repair Cost ⬇5%
Before	After
$798,437	$758,515

Objective results relative to initial metrics

Item	Daily	Weekly	Monthly	Responsibility	Notes
Arm Greasing	☑			Driver	
Packer Greasing		☑		Greasing Tech	
Advanced Arm Greasing		☑		Greasing Tech	
Arm Engagements Service			☑	Heavy Duty shop	16,000 Engagements
Packer Engagements Service			☑	Heavy Duty shop	6,000 Engagements
Hydraulics Adjustments			☑	Heavy Duty shop, Upfit shop	
Hardware Inspection		☑		Driver	

Preventative Maintenance Schedule

Recycling route with # of trips to stops

Truck 1 — Dispatch — Truck 2
Glenvar: 1 — Mount Pleasant: 1
Brambleton: 3 — Transfer Station — Glade Creek: 2
Cox: 4 — Hollins: 2

Maximum Can Count: 436 ~ 482 square cans for bandit style trucks

Monday: 10
Below Threshold: 6
Within Threshold: 0
Above Threshold: 4

Tuesday: 9
Below Threshold: 4
Within Threshold: 1
Above Threshold: 4

Wednesday: 17
Below Threshold: 10
Within Threshold: 0
Above Threshold: 7

Thursday: 14
Below Threshold: 10
Within Threshold: 0
Above Threshold: 4

Updated bandit neighborhoods using can count

IMPACT

$22,512 Annual materials cost avoidance

254 mi/yr saved on recycling routes

433 hrs/yr added for truck greasing

$14,220/yr saved in labor costs

Other solutions Roanoke County will continue to employ:
- Fire hose covers
- Hopper camera
- Grease guns

OBJECTIVES

Reduce Towing by 15% from approx. $13k annual total

Reduce Downtime by 10% from annual 5 day maximum

Reduce Repair Cost by 5% from approx. $800k annual total

METHODOLOGY

- **Plan** → visits and truck ride alongs
- **Design** → determine solution ideas
- **Develop** → implement ideas given metrics
- **Test** → test out recommendations
- **Deploy** → finalize and send deliverables
- **Review** → analyze results against objectives

Our solutions focus on bandit style trucks

FUTURE WORK

- Optimize bandit routes with newly organized neighborhoods
- Long term comparison of Maintenance Data