



SUBMISSION FORM

All submission forms must include the following information. Separate submission forms must be turned in for each eligible program. **Deadline: July 1, 2025.** Please include this submission form as the first page of your electronic entry. If you do not receive an email confirming receipt of your entry within 3 days of submission, please contact [Gage Harter](#).

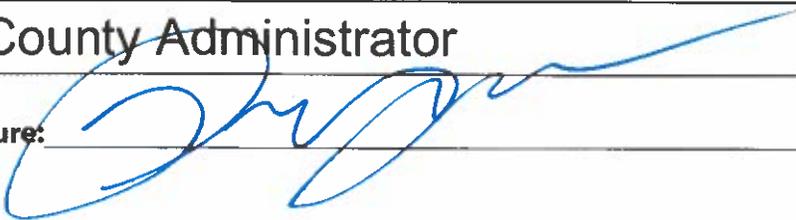
PROGRAM INFORMATION

County: Roanoke County
Program Title: Smart Trash
Program Category: Technology

CONTACT INFORMATION

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SIGNATURE OF COUNTY ADMINISTRATOR OR DEPUTY/ASSISTANT COUNTY ADMINISTRATOR

Name: Richard Caywood
Title: County Administrator
Signature: 

EXECUTIVE SUMMARY

The Roanoke County Solid Waste division serves our residents by providing weekly curbside trash collection, bi-weekly curbside bulk and brush collection, and collecting recyclable materials from 6 drop-off locations across the county. Solid Waste works closely with the Fleet Services division to maintain and repair trucks and peripherals that are critical for serving residents. A lack of data related to route equity and efficiency, engagements and life expectancy of peripherals, and real-time truck diagnostics were contributing to high repair costs, increased vehicle downtime, and frequency of tows. By working internally to implement a telematics solution and collaborating with a group of students from Virginia Tech's Industrial and Systems Engineering Senior Design Program to integrate sensors on peripherals, the county saw a 27% reduction in towing costs, 30% reduction in downtime, and 9.3% reduction in repair costs from November 2024 to May 2025. A video summarizing the project can be found at <https://www.youtube.com/watch?v=m286WF9JODE>.

The local NBC affiliate (WSLS) did a story on the project which can be viewed [here](#).

BACKGROUND

Roanoke County's General Services Department is responsible for providing effective and efficient trash and recycling removal services for our citizens. The department is made up of multiple divisions, which include Solid Waste and Fleet Services. The Solid Waste division performs weekly curbside can collection for all residents and many commercial customers, bi-weekly curbside bulk and brush collection for all residents, and dumps recycling trailers from six drop-off locations six days per week. The Fleet Services division oversees the maintenance and repair of over 1200 assets across its light-duty, heavy-duty, equipment, and upfit shops. As good stewards of tax dollars, these divisions must work together to minimize cost and maximize value.

PROBLEM

The Solid Waste and Fleet Services divisions negotiate many constraints to provide excellent service to our residents, including maintenance schedules for trucks and peripherals, vehicle downtime, route optimization, management of fuel consumption, and expensive repairs. The Solid Waste division has 13 bandit side-loader trucks, 5 knuckle boom brush/bulk trucks, 5 rear-loader bulk trucks, and 8 pickup trucks. These trucks are very expensive to maintain and replace. For example, bandit trucks pick up over 900 cans per day and are the most expensive to replace at over \$400,000. Although the divisions had detailed repair, maintenance, and fuel consumption records, there was a lack of data related to route equity and efficiency, engagements and life expectancy of peripherals, and real-time truck diagnostics. The peripherals in these trucks include arms with fingers that empty cans, packer blades that compact trash, PTO mechanisms that operate boom claws, Bayne tippers, dump bodies, and outriggers. These peripherals are also expensive to maintain and replace with new arms costing more than

\$30,000. The divisions needed a solution that would provide them with the data needed to help them reduce towing, vehicle downtime, and expensive repairs.

SOLUTION – TECHNOLOGY & COLLABORATION

In the Spring of 2024, General Services began working with our Information Technology department's GIS division to pilot a telematics solution that would allow us to track our trucks' locations. Our goal was to obtain accurate route details and see where each truck was located as we worked to efficiently dispatch drivers and collectors to addresses across our county. Our Fleet Services division installed the telematics equipment on each of our trucks, and we began learning the system. Shortly after we began installations, we learned that the telematics solution also offered the ability to integrate sensors that would provide additional details about each truck. Although this was an exciting opportunity, our limited resources were going to keep us from exploring this further.

In August, our Information Technology Director learned about an opportunity to apply for a project sponsorship with Virginia Tech's Industrial and Systems Engineering Senior Design Program. Applications required projects to address a real-world issue affecting our organization which required consulting assistance, include a design component requiring data collection and analysis, be technically challenging and complex, and relate to one or more areas of industrial and systems engineering. Our project application requested a team of seniors to collaborate with our various teams so they could determine how to integrate these sensors in a manner that would allow us to reduce downtime, reduce towing, and reduce repair costs of trucks and peripherals.

Once approved to be a sponsor, our project was chosen by three seniors who immersed themselves in the General Services department and played a critical role in improving our data collection and operational efficiencies. These students conducted interviews and worked alongside our drivers and mechanics so that they could determine how to best integrate up to 10 different sensors that were integrated in each truck to obtain real-time engagement data for our major peripherals to include bandit arms, packer blades, PTO mechanisms, Bayne tippers, dump bodies, and outriggers. They worked alongside our Fleet Services division to install and test the sensors in each type of truck and the implementation was completed before Thanksgiving. The students were also able to configure automated alerts for our Solid Waste and Fleet Services division for engine trouble codes, speed, idle time, fluid levels and pressures.

The data collected after implementation through the end of the Spring semester, coupled with the hands-on driver and mechanic experiences, allowed the students to provide us with additional recommendations that included the number of cans to collect before emptying our trucks, the use of cameras in truck hoppers and cabs, tool improvements for drivers, use of old fire hoses to protect hydraulic lines, route reconfigurations, preventative maintenance schedules for peripherals. The collaboration between our VT ISE students, General Services team, and Information Technology team allowed us to experience a 27% reduction in towing costs, 30% reduction in downtime, and 9.3% reduction in repair costs from November 2024 to May 2025. Roanoke Valley Television (RVTV-3) filmed a video summarizing our project that can be found at <https://www.youtube.com/watch?v=m286WF9JODE>.

BREAKING NEWS Sens. Tim Kaine and Mark Warner respond following UVA President Jim Ryan's reported resignation

LOCAL NEWS

New data helps Roanoke Co. save money on garbage truck maintenance

Ethan Ellis, Multimedia Journalist

Published: June 3, 2025 at 6:43 PM

Tags: Roanoke County, Money, Technology, Truck Maintenance



ROANOKE CO., Va. – A partnership between Roanoke County and Virginia Tech engineering students has yielded significant cost savings in waste collection operations through innovative use of sensor technology and data analysis.

The collaboration, which began as a final project for VT engineering students eight months ago, has already demonstrated remarkable results in reducing operational costs and improving efficiency in the county's waste collection fleet.

"A lot of the items we g Services Department fo

PERSPECTIVE
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 THE WOBBOBY NEWS & POLITICS 2017 Best of News Category
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The project's success stems from the strategic placement of sensors throughout the waste collection trucks. These sensors monitor various operational aspects, including the movement of the automated arm that lifts waste containers and the activation frequency of the trash compactor. This data collection enables predictive maintenance, allowing the county to address potential issues before they lead to costly breakdowns.

The technology's impact is particularly significant given the high-volume nature of waste collection operations, with trucks handling over 1,000 containers per route. The preventive approach to maintenance helps ensure these essential services continue without interruption.

Beyond the financial benefits, the project has improved safety conditions for waste collection workers. Brad Jordan, Solid Waste Manager for Roanoke County, highlighted how the installed cameras have enhanced driver safety: "It's less time of them having to get out of the trucks and do walk arounds on busy streets."

The cameras provide drivers with clear visibility of what's being put in their trucks, making it easy to spot any potential hazards.

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The cost savings achieved through this innovative partnership are being reinvested into the department's operations. County officials indicate that the freed-up funds could be directed toward new trucks and equipment for the department.

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ABOUT THE AUTHOR



Ethan Ellis

Ethan Ellis officially joined the WSLs 10 News team in May 2025.

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