2025 Innovation Challenge Showcase Summary

Final Summary Report

Introduction

The SCDOT Research and Innovation Unit has successfully completed its second annual SCDOT Innovation Challenge for 2025, further advancing the Department's mission to identify, recognize, and reward individuals who implement innovative tools and ideas in the field. These innovations contribute to enhanced safety, improved efficiency, and cost reduction across SCDOT Operations.

This year, the Innovation Challenge was expanded to include all Operations field staff. To support this broader participation, the SCDOT Innovation Council was restructured to incorporate members with expertise across all areas of SCDOT Operations. Members of the SCDOT Research and Innovation Unit served as administrators of the Council.

The Challenge opened at the beginning of the year, with submissions accepted through April 18, 2025. A total of 17 innovations were submitted from various Offices. Each submission included a brief description of the innovation along with details on its benefits to SCDOT.

After the submission deadline, the Council met on May 13 to review the entries and develop follow-up questions for clarification and additional information. A second meeting was held on May 29, during which each innovation was evaluated based on four key criteria: *Increased Safety, Improved Efficiency, Cost Savings, and Ingenuity*. After discussion and scoring, six innovations were selected as the 2025 Outstanding Innovations.

SCDOT's second annual Innovation Challenge Showcase was held on August 25, 2025. This year, innovations, including their live exhibits, were staged inside of the Columbia Metropolitan Convention Center's Exhibit Hall. The Showcase ceremonies, as well as lunch were also held within the Exhibit Hall, creating a seamless experience for the (93) attendees which included SCDOT Secretary of Transportation, Justin Powell.

The 2025 Innovation Challenge & Showcase proved to be another successful year as we promote a Culture of Innovation within SCDOT.

2025 Innovation Challenge & Showcase

SCDOT Innovation Council

Huley Shumpert
(Retired SCDOT Maintenance)

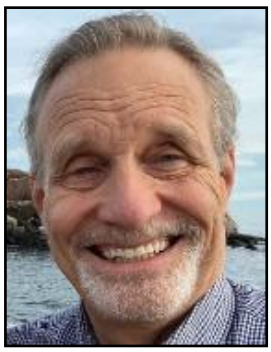
David Cook
(FHWA)

Laura Fulmer
(Maintenance)

Jim Beach
(Supply & Equipment)

Bobby Usry
(Construction)

Ashleigh Sandel
(Mechanical / Traffic / Bridge)



Jeffery Ellison
(Retired SCDOT Maintenance)

SCDOT Research & Innovation Team

Merrill Zwanka

Terry Swygert

Dan Cook

Jade Watford

SCDOT Innovation Showcase Agenda

10:00am – Welcome Ceremony – Exhibit Hall

- Opening Statement
  Rob Perry, *Deputy Secretary for Engineering*
- Welcome & Background
  Terry Swygert, *Research Engineer*
  Merrill Zwanka, *Materials & Research Engineer*
- Presentation of Innovations
  Dan Cook, *Innovation Manager*

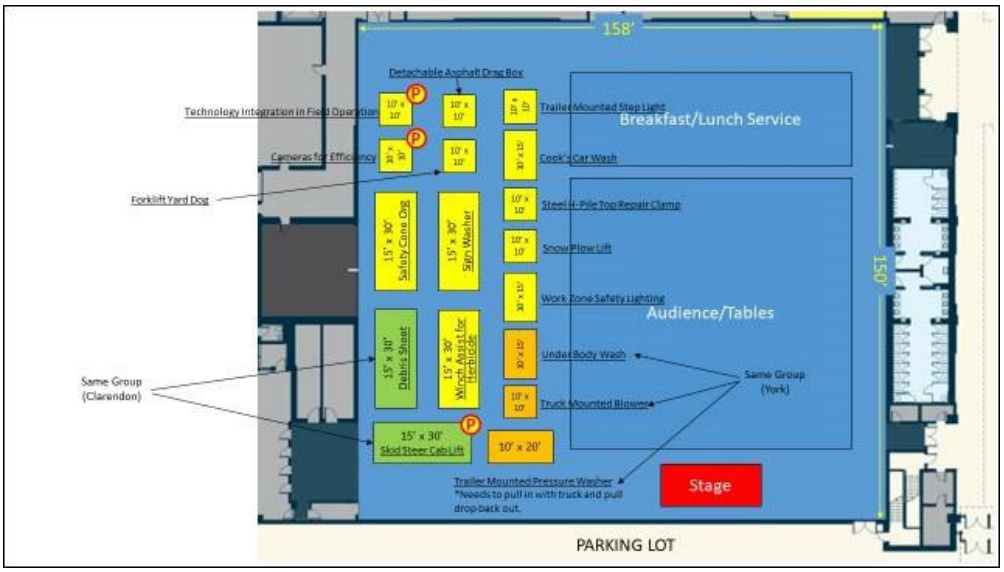
10:45am – Innovation Show & Tell – Exhibit Hall

12:00pm – Lunch – Exhibit Hall

1:00pm – Awards Ceremony

- Awards Ceremony Speaker
  Andy Leaphart, *Chief Engineer for Operations*
- Awards Presentation Speakers
  Dan Cook, *Innovation Manager*
  Jade Watford, *Research Program Manager*

2:00pm - Adjourn



Opening Ceremony

The Innovation Challenge Showcase began with an opening ceremony lead by Merrill Zwanka, SCDOT Materials and Research Engineer.

Rob Perry, SCDOT Deputy Secretary for Engineering, shared an opening presentation stressing how the Challenge makes SCDOT more efficient, safer and more effective.

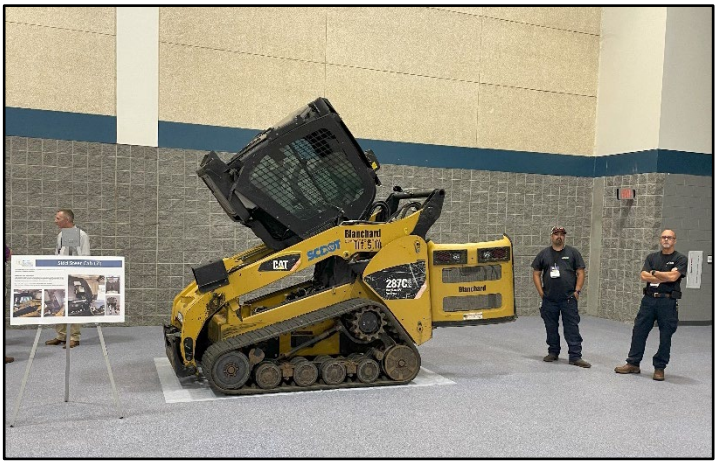
Terry Swygert, SCDOT Research Engineer, shared an overview of SCDOT's Innovation Program how we are implementing a Culture of Innovation within the Department.

Presentation of Innovations

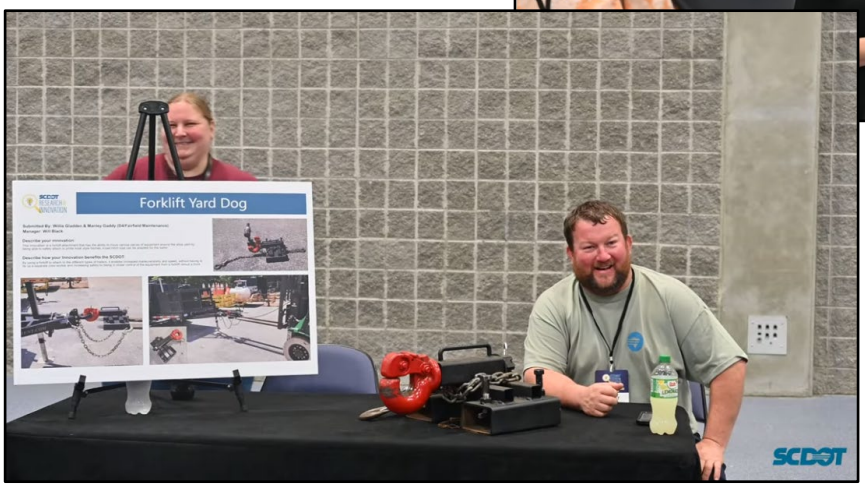
Dan Cook, SCDOT Innovation Manager, presented the 2025 Innovation submittals. All innovators that submitted their innovation received a custom coaster as well as a hard hat sticker, recognizing their contribution to SCDOT's Innovation Challenge.

Innovation Show and Tell

All innovations submitted this year were able to display within the Convention Center's Exhibit Hall. This allowed an easier transition following the opening ceremony and made for a more comfortable experience for everyone.



Innovation Show and Tell



Innovation Showcase Awards Ceremony

Andy Leaphart, SCDOT's Chief Engineer for Operations, kicked off this year's Awards Ceremony stressing the importance of a Culture of Innovation within our Department. As the winners were announced, Mr. Leaphart was joined by Justin Powell, SCDOT's Secretary of Transportation, to present awards for this year's Outstanding Innovations.

2025 Innovation Challenge Showcase Awards

Winning innovations received a custom sign which listed the names of the innovators associated with the innovation. These signs can be displayed at the team's office for recognition of their innovation. Each innovator also received a custom "Outstanding Innovation" plaque, a custom hardhat sticker, and up to a $500 bonus for their winning innovation.

2025 Innovation Challenge Showcase Winners

This year, SCDOT's Research & Innovation awarded six innovations as "Outstanding Innovations".

Cook's Car Wash

Clarence Cook

D4/Union Maintenance

Safety Cone Organizer

Paul Phillips

D5/Williamsburg Maintenance

2025 Innovation Challenge Showcase Winners

Technology Integration in Field Operations

Becky Owen

D2/Newberry Maintenance

Steel H-Pile Top Repair Clamp

Buddy Bell & Richard Hunter

D4/Bridge Maintenance

2025 Innovation Challenge Showcase Winners

Debris Chute

Donald Mahoney, William Jones, and John Ives

D7/Clarendon Maintenance

Winch Assist System for Herbicide Trucks

Mike Britton

D1/Richland Maintenance

Closing

After the awards ceremony, Secretary Powell presented a closing statement honoring our winners and all of those helping to spread a Culture of Innovation within SCDOT.

2025 Innovation Submissions

Cameras for Efficiency

Submitted By: Nick Rebovich & Billy Lybrand (D2/Traffic Engineering)

Manager: Kevin McLaughlin DEA

Describe your innovation:

Some years ago we decided it was necessary to find a more efficient way to conduct Turning Movement Counts (TMC). Traditionally a TMC requires an engineer to be on site at the intersection at 7:00am and then stay in place for a minimum of two hours. Subsequently that same engineer would need to be in place at the same intersection generally from 2:00pm to 6:00pm and they must stay in place with no breaks. This time frame was detrimental to our ability to address other work items, as well as also having an impact on home life due to early departures and late return. We researched options and found most camera systems to be financially unreachable. We ended up finding a start up company and were able to acquire a relatively inexpensive camera. Deploying these cameras to film the intersections fundamentally changed how we conduct TMCs.

Describe how your Innovation benefits the SCDOT:

The benefit is general efficiency both for SCDOT and for the engineer. Our process now is to plan a County visit and deploy between two and three cameras in one day. We set those cameras to film from 7:00-9:00am and 2:00-6:00pm. Some instances we also cover 11:00am-1:00pm. After we set up the cameras we remain in the county and are able to address other work request items and review completed work. We return the next day to retrieve the cameras and bring them back to the office for processing. Once all the data is downloaded from the cameras we can either submit the data to a counting service where a third party conducts the TMC or we can view the film at our desk and conduct the TMC. When conducting the TMC at our desk we can speed up the video such that we can complete a 4-6 hour count in 1-2 hours. Additionally we have film of the intersection for discussion with upper management. Lastly, the benefit to the employee is normal working hours, the ability to have a food break, the ability to have a bathroom break, and a better home life with reduced exhaustion. Our office completes at least 20 to 30 TMCs each year so this change has been significant for us. If other offices used this technology/method they too would have these benefits.

Cook's Car Wash

Submitted By: Clarence Cook (D4/Union Maintenance)

Manager: Jason Childers

Describe your innovation:

This truck wash has an undercarriage wash that is made up of a 12' long 1,1/2" x ¼" square metal tubing with a clean out on one end and a 2" cam lock fitting to hook up water on the other end. Holes were put in the tubing for jets and metal plates were added for stability. The overhead spray bar is made of 2" PVC Schedule 80 or 40. This part comes in five pieces: Two stands, one on each side approximately 12' apart. The stand has legs for support and a water hook up that you would find in a brine room. There is a valve to turn the water on and off through the PVC based on the side you use. The base or leg part stands about 30" tall. The tall parts have cam locks on the top and bottom so they can only go on one way. These sides are approx., 9'6" long .These sides have holes drilled every foot. The sides have a hose clamp with a 3/8 chain link for a ratchet strap to be fastened to for stability in the middle and closer to the top. The top has a double cross bar for stability and also has holes drilled in the bottom cross bar for water jets. The legs have a hose clamp on each end with the 3/8 chain link for the straps to be attached and tightened down. Water can be hooked up on either side, holes can be drilled in various locations along the PVC. Pumps can also be added to increase water pressure. These connections work with all the various connections you would find in a brine room operation. So, the dimensions are 12'6" wide and 14' to the bottom cross bar.

Describe how your Innovation benefits the SCDOT:

The benefit of this truck wash is that it reaches the hard to clean undercarriage and high overhead out of reach areas. The truck wash helps keep employees from having to get wet right after an event during the cold and reduces the number of people that is needed for cleaning equipment. The truck wash is tall enough to clean all equipment, even equipment loaded on a trailer. The truck wash is light weight, and 2 people can put it together in less than 10 min. It is simple in its design and can be repaired if damaged by just replacing the damaged part. The truck wash is portable and can be set up almost anywhere. All of the parts needed for the truck wash was purchased at our local Hardware store. In finding out that it works great for snow and ice, it can also be used after ditching operations to reduce dirt and dust. The truck wash can also be used after reclamation or zipping operations to reduce concrete and dust sticking to vehicles. This truck wash has already had a huge benefit for Union in snow and ice cleanup and our hope is that it can help others as it has helped us!

Debris Chute

Submitted By: Donald Mahoney, William “Marty” Jones, and John Ives (D7/Clarendon Maintenance)

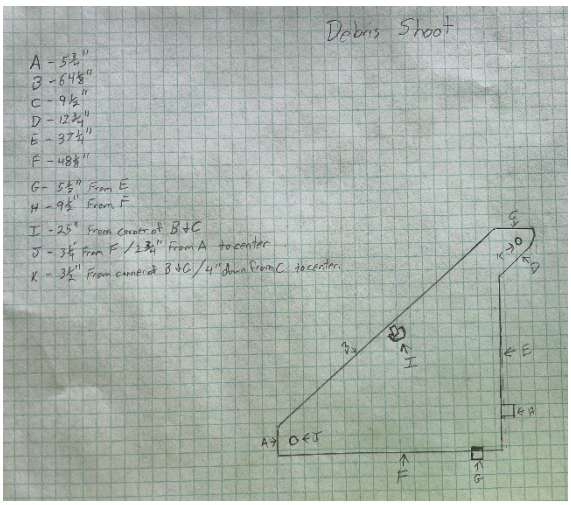
Manager: James Hodge

Describe your innovation:

This design incorporates steel pates that attach to the tailgate and the bed of the dump truck to allow tree debris and other debris to be dumped without getting hung up in the tailgate chains. This design also supports the tailgate better to avoid damage to equipment.

Describe how your Innovation benefits the SCDOT:

This innovation allows debris to slide over the tailgate without getting caught at the sides, and also adds better support for the tailgate of the truck, adding efficiency and reducing damage to the equipment.



Detachable Asphalt Drag Box

Submitted By: Darrell Coker (D6/Colleton Maintenance)

Manager: James Kirkland

Describe your innovation:

This detachable asphalt drag box was designed and constructed for integration with our patch truck. This innovative drag box features full adjustability, accommodating a maximum span of 9 feet and a minimum span of 3 feet to enhance versatility in various applications.

Describe how your Innovation benefits the SCDOT:

The newly developed detachable asphalt drag box offers significant advantages for the South Carolina Department of Transportation (SCDOT) in several key areas:

1. Enhanced Efficiency: With its adjustable span, the drag box can be tailored to various project requirements, allowing for a more efficient application of asphalt. This adaptability can lead to faster project completion times and reduced labor costs.

2. Improved Quality of Work: The precision offered by the adjustable design enables smoother and more uniform asphalt distribution. This can enhance the overall quality of road surfaces, leading to improved durability and reduced maintenance needs.

3. Cost-Effectiveness: By integrating this drag box with existing patch trucks, SCDOT can maximize the use of its current fleet without the need for significant additional investment in new machinery.

4. Versatility: The ability to adjust the span from 3 to 9 feet allows for a wide range of applications, from small patch jobs to larger repair projects. This flexibility ensures that SCDOT can address a variety of road conditions and requirements effectively.

5. Environmental Benefits: Efficient asphalt application can lead to reduced material waste and lower emissions associated with transportation and equipment use, aligning with SCDOT's commitment to sustainable practices.

6. Safety Improvements: The drag box design promotes safer working conditions by minimizing the need for manual adjustments and reducing the likelihood of accidents associated with traditional asphalt application methods.

Overall, the integration of this asphalt drag box into SCDOT's operations can lead to enhanced productivity, improved road quality, and significant cost savings, ultimately benefiting both the department and the traveling public.

Forklift Yard Dog

Submitted By: Willie Gladden & Manley Gaddy (D4/Fairfield Maintenance)

Manager: Will Black

Describe your innovation:

This Innovation is a forklift attachment that has the ability to move various pieces of equipment around the shop yard by being able to safely attach to pintle hook style hitches. A ball-hitch type can be adapted for the same.

Describe how your Innovation benefits the SCDOT:

By using a forklift to attach to the different types of trailers, it enables increased maneuverability and speed, without having to tie up a separate crew worker and increasing safety by being in closer control of the equipment from a forklift versus a truck.

Safety Cone Organizer

Submitted By: Paul Phillips (D5/Williamsburg Maintenance)

Manager: Richard Livingston

Describe your innovation:

The Safety Cone Organizer is a custom-designed storage and deployment system intended to improve the efficiency and safety of loading and unloading safety cones in the field.

Describe how your Innovation benefits the SCDOT:

Traditionally, workers must climb into the truck bed or trailer to access and deploy cones—an action that increases the risk of slips, trips, and falls. The Safety Cones Organizer eliminates this hazard by allowing cones to be accessed from ground level.

Sign Washer

Submitted By: Arkivious Mackins & Joseph Gainey (D7/Barnwell Maintenance)

Manager: Dennis Buckmon

Describe your innovation:

Our innovation is simply a power washer mounted onto the sign truck. This innovation has helped our sign operations tremendously, by allowing us to use just one piece of equipment to clean signs, while performing maintenance.

Describe how your Innovation benefits the SCDOT:

Our innovation benefits SCDOT in two ways: Safety and Efficiency

In the past, we would use a 30-gallon tank mounted on 2 wheels and pull behind the sign truck. At times, this made it difficult to maneuver and get completely off the roadway. With the tank being mounted on the truck, the sign person is able to get completely off the road, back up and turn around safely, with no problems.

Before, we would get a count of signs that needed cleaning and set aside days to accomplish this task. We would take the 30-gallon mounted tank, a bulky 10-gallon container or 5-gallon bucket to refill the tank. With the tank being mounted on the truck, we do not have to take another piece of equipment on the road, carry bulky containers or 5-gallon buckets to refill the tank. We can clean the signs on the spot, as we go, which saves time.

We also feel that this innovation shows the public and other government agencies, SCDOT's initiative, ingenuity and the care we put into our daily activities.

Skid Steer Cab Lift

Submitted By: Lenn Gardner & John Ives (D7/Clarendon Maintenance)

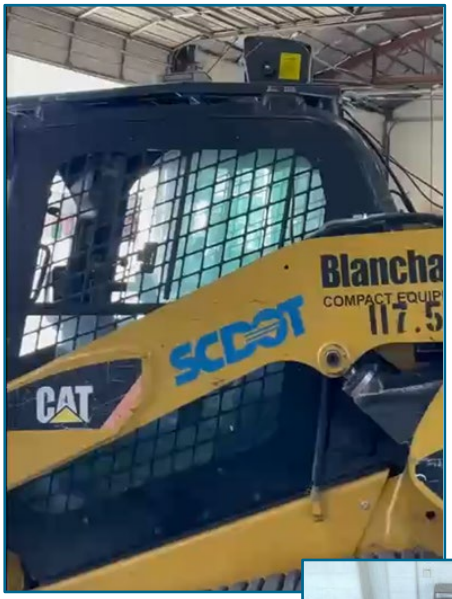
Manager: Coleman Holladay

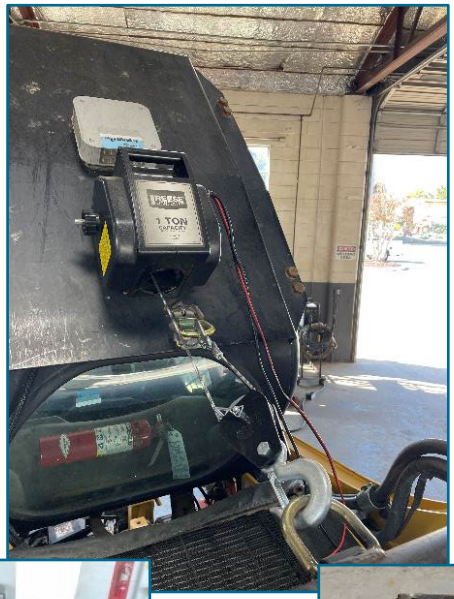
Describe your innovation:

This Innovation adds a 12 volt electrical winch to the top of the cab that easily allows one person to raise the cab for underneath cab cleaning, battery replacement, or any other repair that needs to be accessible. The winch has a 2,000 Pound capacity and costs approximately $160.00. Installation takes about two hours.

Describe how your Innovation benefits the SCDOT:

This Innovation eliminates back injuries and also eliminates the need for two people to lift the cab.





Snow Plow Lift

Submitted By: Jerry “Bo” Bullman (D4/Cherokee Maintenance)

Manager: Lester Parris

Describe your innovation:

This Innovation uses a jack stand that has been modified with an attachment to securely lift a snowplow to align with brackets on the truck. The jack is portable and not mounted to the plow, so it can be quickly removed and used on multiple snowplows.

Describe how your Innovation benefits the SCDOT:

Attaching a snowplow to the truck can be a time consuming and difficult task. Many snowplows come with jacks or lifts attached to the plow. However, after recurring exposure to the elements and deicing chemicals these jacks tend to not work, fail and need repair or replacement. A portable jack that is not mounted to the plow allows employees to use the jack to lift the plow to the truck then remove and store the jack away from the elements and deicing chemicals. The jack can also be used on multiple plows. This improves safety, it allows the jack to do the heavy lifting not employees, it reduces repair and replacement costs by eliminating a plow mounted jack, and it improves efficiency by allowing a minimum of 2 employees to attach a plow instead of 3 or 4. It is also portable and able to be moved from plow to plow.

Steel H-Pile Top Repair Clamp

Submitted By: William “Buddy” Bell & Richard Hunter (D4/Bridge Maintenance)

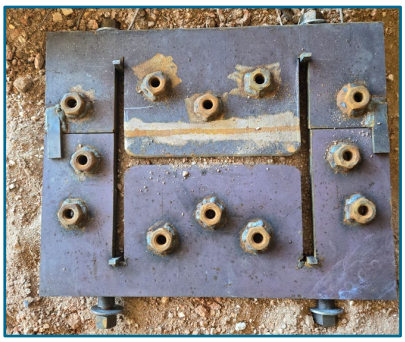
Manager: Cody McAbee

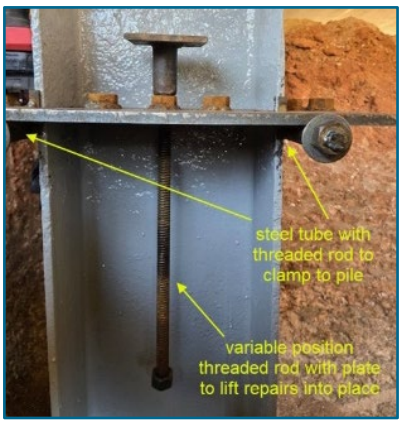
Describe your innovation:

A common deficiency on bridges with steel H piles is decay or section loss at the top where the pile meets the bottom of the cap. The repair for this deficiency is to bolt steel repair sections to the top of the pile through the web and flanges as well as up against the bottom of the existing cap. The repair sections vary in length but each piece can exceed 100 pounds. Additionally, the top of the pile being worked on may be 10 to 15 feet above ground. The D4 Bridge Maintenance Steel H-Pile Top Repair Clamp allows the repair sections to be lifted and held into place in a secure manner without the need for additional help or standard screw type clamps until the holes are drilled and the repair sections are bolted in place.

Describe how your Innovation benefits the SCDOT:

In tighter working conditions like on the inside of a pile or from a man lift, it is hard to get clamps in place and adjusted while temporarily holding the steel repair sections. The D4 Bridge Maintenance Steel H-Pile Top Repair Clamp is a safer alternative and requires less crew members than standard clamps. Also, using this clamp speeds the installation time allowing for more repairs to be placed in a single day with fewer employees. Lastly, using this clamp creates a more uniform product throughout our bridges than if each repair was installed without it.

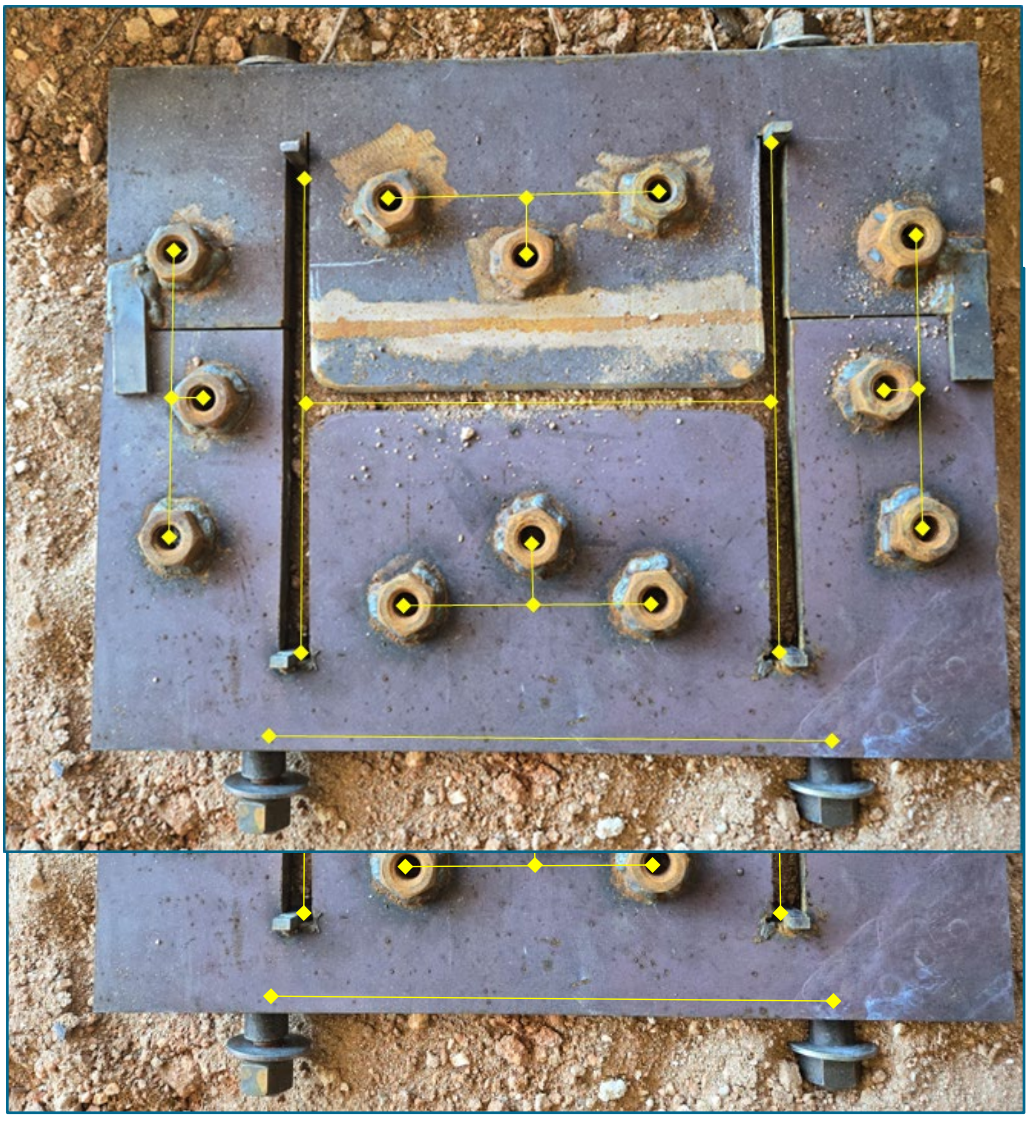




Steel H-Pile Top Repair Clamp

Submitted By: William “Buddy” Bell & Richard Hunter (D4/Bridge Maintenance)

Manager: Cody McAbee



Steel H-Pile Top Repair Clamp

Submitted By: William “Buddy” Bell & Richard Hunter (D4/Bridge Maintenance)

Manager: Cody M

Technology Integration in Field Operations

Submitted By: Rebecca “Becky” Owen (D2/Newberry Maintenance)

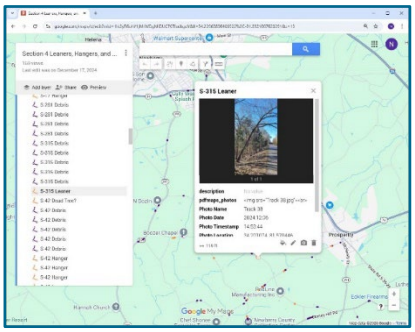
Manager: Jeremy Knight

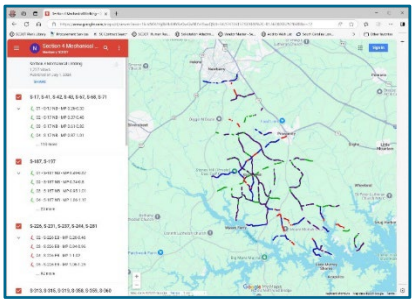
Describe your innovation:

Newberry has effectively incorporated DOT-issued tablets and smartphones, along with a variety of digital tools, to enhance the efficiency and accuracy of field inspections and contracted work. Routine inspections of culverts, guardrails, and catch basins, as well as non-routine inspections prompted by events such as Hurricane Helene, have been streamlined through the use of technology. Additionally, contracted services like Mechanical Tree Limbing benefit from this tech-forward approach. The primary technology resources employed include Avenza Maps, Google Earth, Google Maps, Microsoft Excel, and an Excel-to-KML converter enabling precise mapping, data collection, and reporting.

Describe how your Innovation benefits the SCDOT:

The use of apps like Avenza Maps can significantly improve both the safety and efficiency of inspections. By consolidating all data locations, photos, and field notes into a single platform, inspectors can work more quickly and with fewer errors. GPS-enabled data collection eliminates the need to repeatedly stop for Distance Measuring Instrument (DMI) readings, and removes the manual step of converting handwritten DMI notes into MilePoints. GPS coordinates can be exported to Google Maps or converted into KMZ/KML files for seamless sharing with contractors or DOT forces. This not only streamlines communication but also reduces the need for risky activities, such as placing paint marks on busy roadways. With improved navigation capabilities, field crews can pinpoint work sites and use built-in GPS directions to reach them efficiently and safely.





Trailer Mounted Pressure Washer

Submitted By: Nathan Lance (D4/York Maintenance)

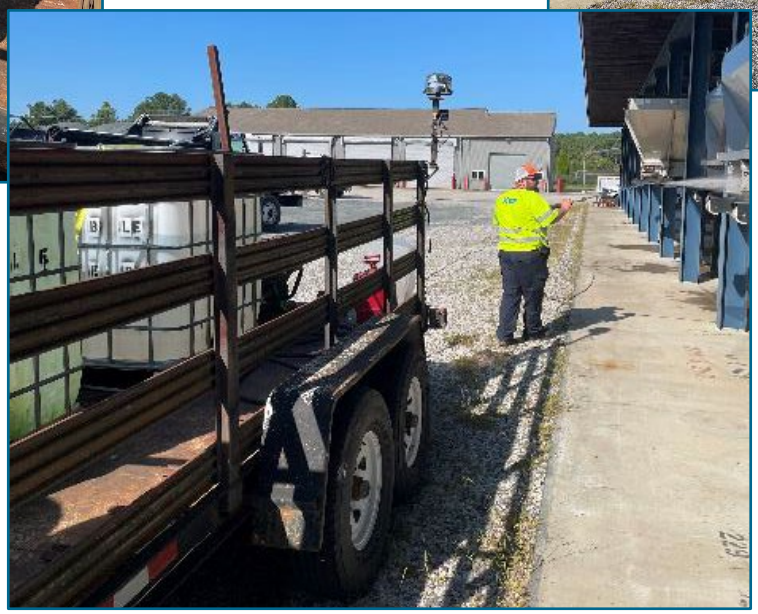
Manager: Brice Parker

Describe your innovation:

This Innovation incorporates a pressure washer mounted on a trailer along with two water tanks to create a mobile pressure washing station.

Describe how your Innovation benefits the SCDOT:

This innovation allows multiple uses. Snow and ice equipment can be rinsed after it is unmounted from the trucks which removes any salt or brine that is still sitting on the sanders or brine tanks. It has also come in very handy for our vegetation crew for rinsing off equipment in the field. This trailer has come in very handy for the vegetation crew. Unlike other crews, their equipment is usually staged on the side of the road, which makes it hard for general housekeeping and maintenance. Now they have the capability to do general housekeeping and maintenance without having to transport every piece of equipment back to the facility.



Trailer Mounted Step Light

Submitted By: Howard Stokes (D7/Bamberg Maintenance)

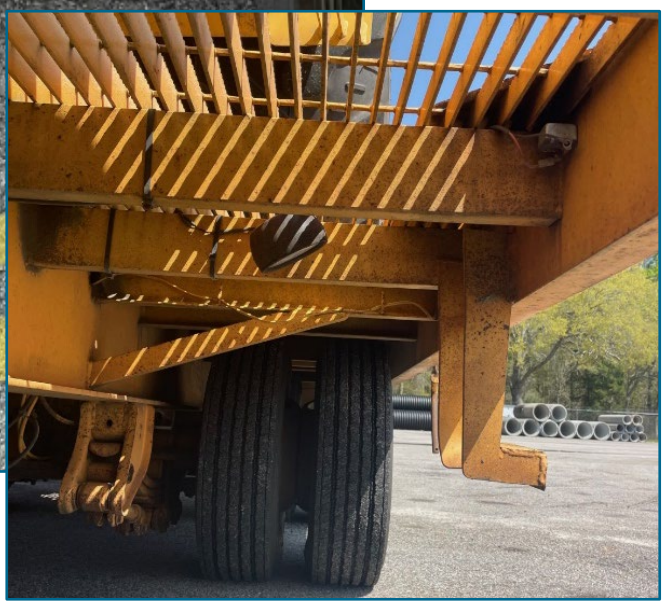
Manager: Wayne Anderson

Describe your innovation:

This Innovation adds LED lights that can be switched on in the darkness to light up backhoe trailer steps. These lights assist in climbing up and down on a trailer at night, as well as getting on and off of any machine that is on the trailer. Lights shine on fluorescent paint, so the operator knows where the step is located.

Describe how your Innovation benefits the SCDOT:

These lights are on both sides of trailer allowing the operators to see where the steps are in the dark. It also illuminates the ground so an operator can see any dangers that exist before stepping down. This increases the safety of the operator.



Truck Mounted Blower

Submitted By: Nathan Lance (D4/York Maintenance)

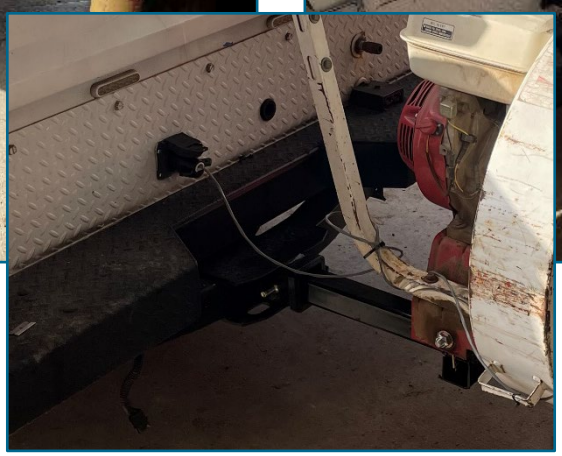
Manager: Brice Parker

Describe your Innovation:

This innovation incorporates a walk behind blower retrofitted with a hitch to be installed on the truck's hitch receiver.

Describe how your Innovation benefits the SCDOT:

This idea arose when all the storms came through. During the storms, pine needle debris took a lot of time to remove by hand, and this idea saved a lot of time and manpower. This was truly a game changer considering the amount of debris caused by the storm. While using this innovation, we also discovered that it creates a much more efficient way of cleaning off bridge decks, as well as curb and gutter.



Under Body Wash

Submitted By: Devin Hayes (D4/York Maintenance)

Manager: Brice Parker

Describe your innovation:

This underbody washer was built a couple years ago, when we needed the ability to clean under trucks and equipment, especially during and after a snow and ice events. It is constructed out of PVC pipe, and utilizes a 2" coupler as an adapter. This tool can be hooked up to our 2" water main line that comes into the facility. Holes were drilled throughout the main piping at different angles, and allows coverage to as much surface as possible.

Describe how your Innovation benefits the SCDOT:

This Innovation with the use of salt neutralizer, aids to remove salt/brine from under trucks and equipment. This helps to prolong the life of our fleet. This tool also helps with normal fleet maintenance, to keep equipment clean.

Winch Assist System for Herbicide Trucks

Submitted By: Mike Britton (D1/Richland Maintenance)

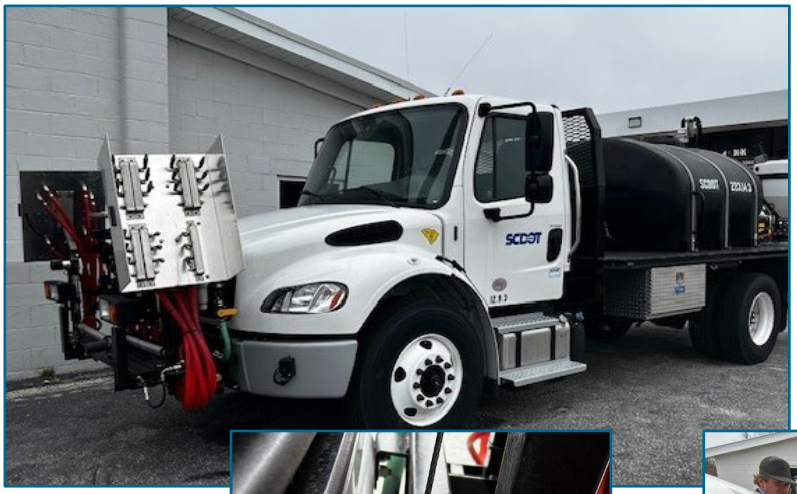
Manager: Alvin Melton

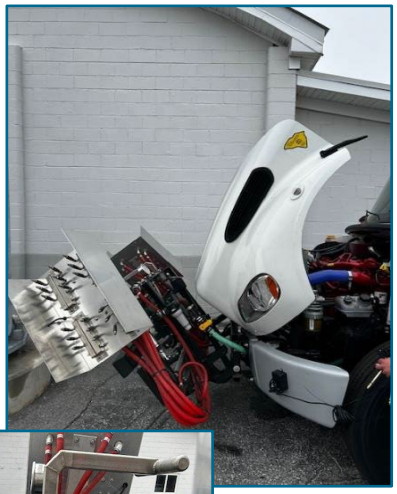
Describe your innovation:

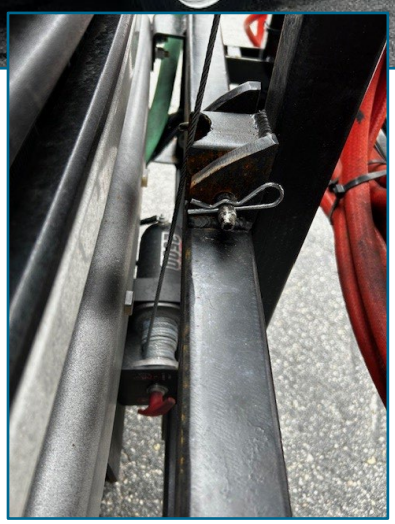
This innovation adds a winch assist system to existing SCDOT herbicide trucks with front mount spray units. The winch is tied into the truck's 12 volt system and controlled with a hand-held remote by the operator. The winch system includes a 2500lb winch, as well as a pulley support bar with a retainer pin and connection link. Raising and lowering the spray bar assembly is now controlled by the push of a button.

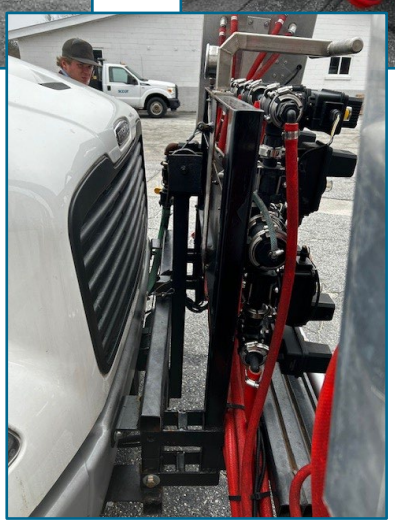
Describe how your Innovation benefits the SCDOT:

Richland Maintenance was issued a new herbicide truck and noted a problem right-away. In order to raise the hood of the truck to perform daily pre-trip inspections, the front spray bar assembly for the herbicide unit needed to be lowered. This assembly weighs in excess of 400 pounds. The factory provided a simple handlebar to accomplish lowering and raising the assembly. Richland Assistant Shop Foreman, Mike Britton designed a winch assist system to facilitate the lowering and raising of the spray bar assembly. This design eliminates the risk of employee injury due to lifting the heavy assembly. Parts costs were about $300 and labor was performed in-house.









Work Zone Safety Enhancement Lighting

Submitted By: Kurt Mead & Chris Barrick (D2/Anderson Maintenance)

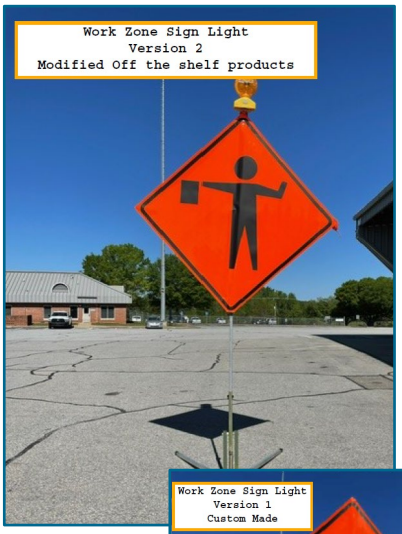
Manager: Michael Anders

Describe your innovation:

Drivers in work zones often disregard work zone signage, even in clear sunny conditions! This causes signs to fall over and endangers employees. These work zone sign and cone lights were created to improve a safer work environment by getting driver's attention. In a flagging operation, adding one supplementary light to the Flagger Symbol sign is the last opportunity to get the attention of a driver who is under the influence or distracted.

Describe how your Innovation benefits the SCDOT:

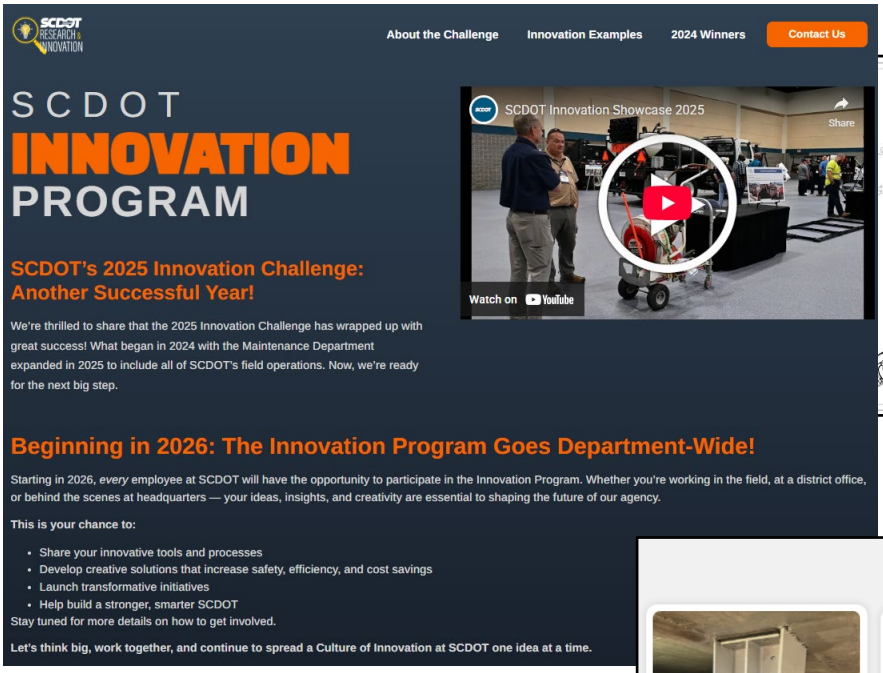
This innovation creates a safer work environment by improving visibility in all work zones. Particularly, the lights are helpful on shaded roads and twilight conditions. The sign lights are submitted in two versions. The first version is custom made with a lightweight plastic housing and a head lamp. The second version uses off the shelf products, with minimal hardware and little fabrication needed. The traffic cone lights bring attention to the beginning taper of a lane closure.

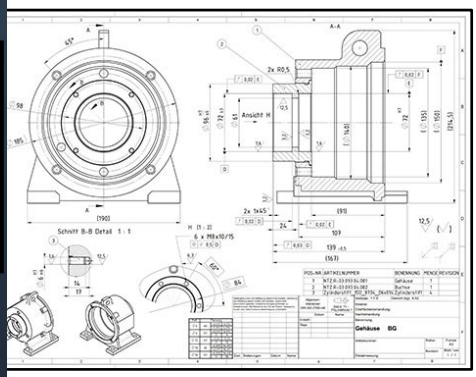


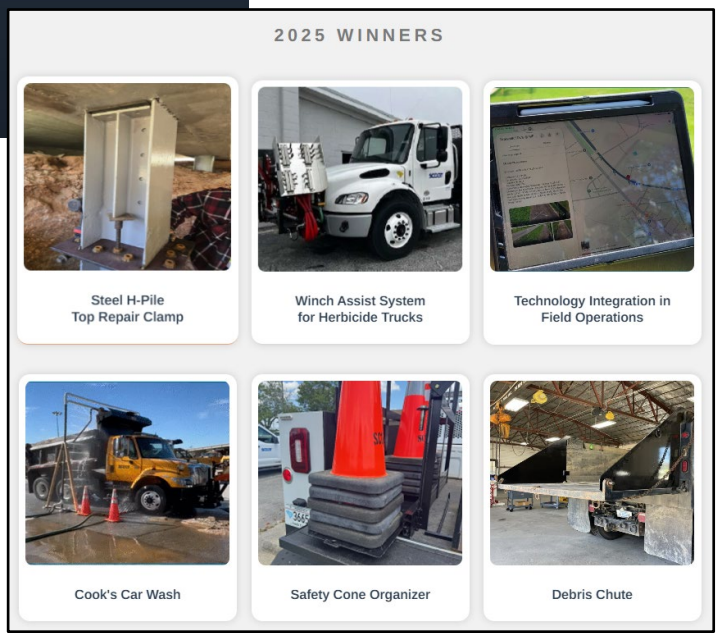
Moving Forward

Our next steps moving forward, will include adding detailed information of the 2025 SCDOT Innovation Challenge and Showcase to our website. We will also include contact information and detailed drawings and bill of materials for each of our winning Innovations so that these innovations can be created and implemented by other units to realize their benefits statewide.

After another successful year, we plan to take the Innovation Challenge Departmentwide in 2026!







SCDOT RESEARCH & INNOVATION

2025 Innovation Challenge & Showcase

Thank You!

We would like to thank all of those who helped to develop SCDOT's Innovation Program and make our Innovation Challenge and Showcase possible, as well as those who supported and participated in this year's Innovation Challenge!

SCDOT RESEARCH & INNOVATION

PUBLIC ENGAGEMENT
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