



**FHWA LTAP/TTAP | Build A Better Mousetrap  
National Competition | Entry Booklet 2015**

# Table of Contents

---

- 3 About the Build a Better Mousetrap Competition
- 3 About LTAP/TTAP

## 2015 Competition Winners

- 4 First Place Winner: Virginia—Curve Analysis Application
- 6 Second Place Winner (tie): Kentucky—Under Body and Frame Pressure Water
- 8 Second Place Winner (tie): Michigan—Transportation Asset Collection Using Android Tablet & ArcGIS Collector
- 10 Third Place Winner: North Dakota—Redesigned Sign Truck

## Additional National Entries

- 12 Colorado—Milling Scoop
- 14 Connecticut—Construction Trailer
- 16 Delaware—3-Point Hitch Brine Sprayer
- 18 New Hampshire—Satellite Salt Distribution System
- 19 Ohio—Multi-Use Trail Map
- 22 Pennsylvania—Portable Spreader Box Pump
- 24 West Virginia—Right-of-Way Sprayer

## Appendix

- 26 Additional State Mousetrap Competition Entries

# About the Build a Better Mousetrap Competition

---

The Build a Better Mousetrap National Competition highlights innovative solutions to everyday problems and issues that local and county transportation workers and other LTAP/TTAP clients encounter. They can be anything from the development of tools, equipment modifications, and/or processes that increase safety, reduce cost, improve efficiency, and improve the quality of transportation.

## About LTAP/TTAP

---

For over 30 years, 58 Centers that comprise the Federal Highway Administration's Local & Tribal Technical Assistance Programs (LTAP/TTAP) have provided information and training to local governments and agencies responsible for over three million miles of roads and over 300,000 bridges in the United States. The LTAP/TTAP Clearinghouse acts as a central source of information for LTAP/TTAP Centers and other industry stakeholders.

The LTAP/TTAP Centers enable local counties, parishes, townships, cities and towns to improve their roads and bridges by supplying them with a variety of training programs, an information clearinghouse, new and existing technology updates, personalized technical assistance and newsletters.

Through these core services, LTAP/TTAP Centers provide access to training and information that may not have otherwise been accessible. Centers are able to provide local road departments with workforce development services; resources to enhance safety and security; solutions to environmental, congestion, capacity and other issues; technical publications; and training videos and materials.

The mission of LTAP/TTAP is to foster a safe, efficient, and environmentally sound surface transportation system by improving skills and increasing knowledge of the transportation workforce and decision makers.

If you would like additional information about the FHWA LTAP/TTAP Program, or the Build a Better Mousetrap National Competition please visit [LTAP.org](http://LTAP.org) or contact Mia Robinson at the FHWA LTAP/TTAP Clearinghouse at [LTAP@artba.org](mailto:LTAP@artba.org) or 202.289.4434.

# First Place: Virginia - Curve Analysis Application

---

Agency: Virginia Department of Transportation

## Contact

Jacob Dellinger  
1596 Deborah Lane,  
Salem, VA 02415  
540.375.0124

## Problem Statement

One very important part of any speed, safety, or warning sign study is the process of “ball-banking curves.” Ball-banking curves is part the process whereby the safe speed for a curve is determined. Until now, we have had to use relatively expensive tools (easily \$2,000) to capture what is at best, spot location data of a curve or set of curves. Often times this process requires an additional person as one person is required to drive and the other to make notes.

## Solution

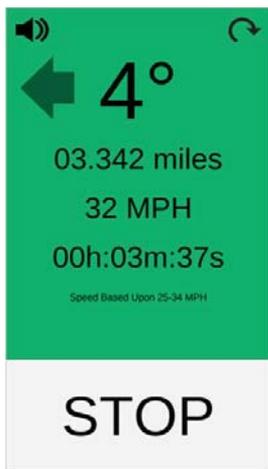
Nathan O’Kane and I realized that all of the components and sensors within the current tools, i.e. Distance Measurement Instruments (DMI), Speedometers, Accelerometers and Inclometers (for Ball-Banking the curve), are sensors that are in nearly every new smartphone on the market. With this in mind, we began building and testing a mobile application that not only provides real-time display of the same data the current tools do; but more importantly, logs the data automatically. The logged data can easily be uploaded into a free visualization program where each data point can be displayed on a map. This is a tremendous advantage over the current system. Data is no longer captured only at one or two spot locations, but is captured at multiple points along the roadway which also aids in data analysis. Accuracy is increased and the need for a second person in the field is eliminated.

## Labor/Materials/Cost

\$0

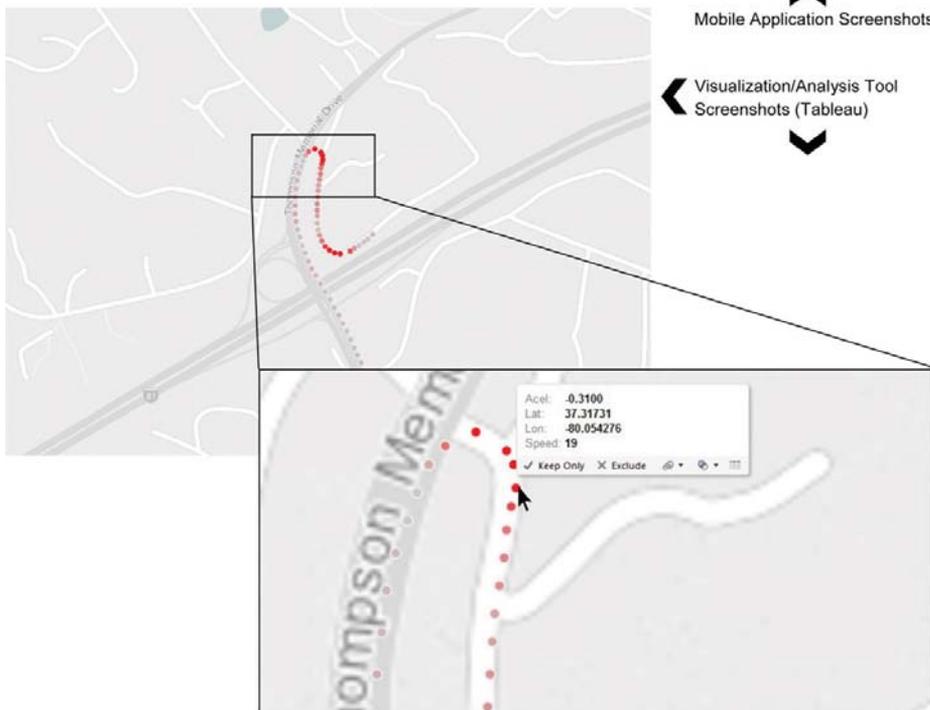
## Savings/Benefits to the Community

This tool is extremely beneficial as it displays data more accurately than most current tools, records exponentially more data over traditional methods of data collection (data is logged several times per second rather than a few times per minute by hand), and the application costs nothing. Moreover, it is feasible that this tool could be provided to less skilled staff and engineer-grade data could be captured.



  
 Mobile Application Screenshots

 Visualization/Analysis Tool  
 Screenshots (Tableau)



# Second Place: Kentucky - Under Body and Frame Pressure Washer

---

Agency: Mt. Sterling Public Works Department

## Contact

Steve Lane  
110 Willow Street  
Mt. Sterling, KY 40353  
859.404.3250  
steve.lane@ky.gov

## Problem Statement

I wanted to design something that would wash off salt from underneath truck frames and dump beds after a snow event to help slow down the rusting process and help preserve the brake parts from early failure. I also wanted it to be something we could make economically.

## Solution

I finally settled on a frame size small enough to be easily maneuverable and also big enough to accommodate enough nozzles. Caster size had to be big enough to roll easily and small enough to fit under brake chambers. Water supply needed to be high volume and the spray nozzles needed to fan out and overlap each other.

## Labor/Materials/Cost

Frame is 1" box tubing, 3" swivel casters, 1 1/3" galvanized pipe for handles, all other piping is pvc sch. 40 (3 sizes) 1 1/3 - 1" and various fittings, nozzles are screw in type with 45" fan installed to overlap 1 1/3" fire hose from handle to a 2" 195 GP gas water pump.

\$300 and a fire hose.

## Savings/Benefits to the Community

Our trucks and dump bed will last longer and look better, thus saving money and showing our department takes pride in our equipment. Keeping the brake parts from building up with rust means safer trucks and less liability plus longer brake life.



# Second Place: Michigan - Transportation Asset Collection Using Android Tablet & ArcGIS Collector

---

## Contact

Ken Hudak  
248.645.2000  
khudak@rcoc.org

## Problem Statement

The Road Commission for Oakland County was seeking a cost effective solution to map road stream crossings and dryweather flow screening within its right-of-way for storm-water permit compliance. Mapping road infrastructure and assets can often be expensive because of the required equipment and time.

## Solution

The Road Commission for Oakland County leveraged its existing geographic information system (GIS) to support field mapping using a free collection software suite called ArcGIS Collector. ArcGIS Collector runs on Android and Apple tablets, and it uses the tablet's built-in GPS that provides a twometer accuracy, which is well within the required parameters of our project. This equipment can be acquired at retail wireless providers for just 10% of the cost of survey grade GPS systems.

The Road Commission for Oakland County then hired two summer interns with a background in Environmental Studies and GIS to conduct the field surveys. Over the course of 10 weeks, the interns visited over 500 locations and mapped road stream crossing points (outfalls) where storm-water drainage from the pavement was fed into natural waterways in our right-of-way. In total, over 2,500 points were collected at a total cost which was 80% lower than similar proposals from private consultants.

The team was also able to identify problems with infrastructure (such as dry weather flow indicating potential illicit discharge) and collapsed structures. These were inventoried with geotagged photos and submitted to highway maintenance for additional investigation.

---

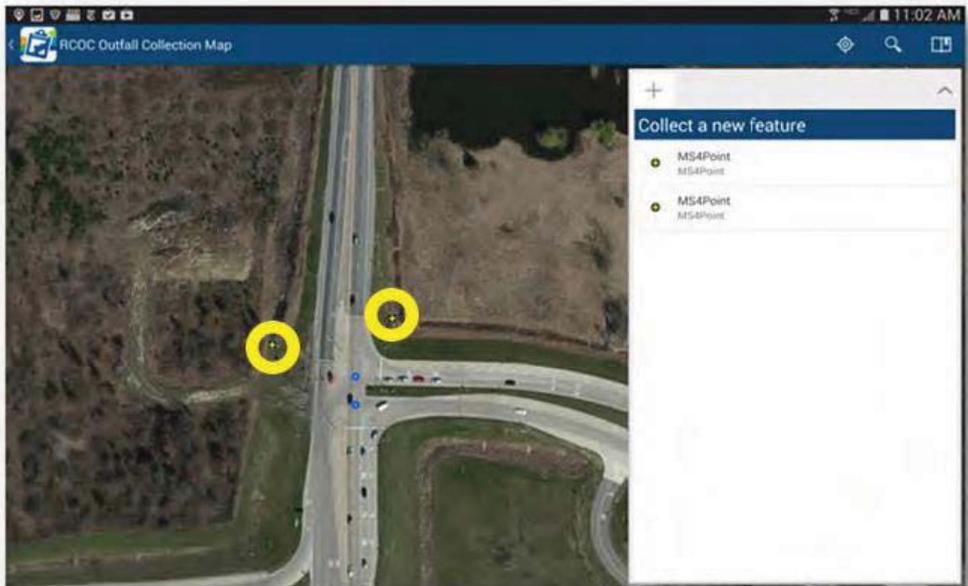
### Labor/Materials/Cost

- Two summer interns
- ArcGIS Collector program
- Android or Apple tablet

Total cost of labor, equipment, and software were 80% lower than contractor's proposals of a similar project.

### Savings/Benefits to the Community

Lower cost and a readily available system for collecting transportation assets in the future.



**Screen View of ArcGIS Collector Field Application  
Showing Mapped Outfall Collection**

# Third Place: North Dakota - Redesigned Sign Truck

---

**Agency:** Billings County in North Dakota

## Contact

Jeff Baranko  
Billings County District #2  
12811 20<sup>th</sup> St. SW  
Belfield, ND 58622  
701.260.2588  
barankojeff@yahoo.com

## Problem Statement

Many items on the sign truck were poorly designed and not efficient. This included a catwalk that had to be manually swung to be extended. All the equipment was kept on the bed of the truck and had to be lifted from a high location. To replace or install a sign post or sign required two people. The ladder was mounted on the rear of the truck and had nothing to hold onto when climbing up or down. Tools were kept in a tool box but weren't organized. When working with equipment on the sign truck the chances of injury were great and it took a considerable amount of time to complete a task. Many items on the sign truck were poorly designed and not efficient. This included a catwalk that had to be manually swung to be extended. All the equipment was kept on the bed of the truck and had to be lifted from a high location. To replace or install a sign post or sign required two people. The ladder was mounted on the rear of the truck and had nothing to hold onto when climbing up or down. Tools were kept in a tool box but weren't organized. When working with equipment on the sign truck the chances of injury were great and it took a considerable amount of time to complete a task.

## Solution

Redesign the sign truck to make it more efficient and safer for employees to work. Rebuilt the catwalk pivot hub and added a camper jack so the catwalk would swing mechanically. Added a 12-volt electrical system connected to the camper jack so the catwalk didn't need to be swung manually. Added an electrical switch on the catwalk so it could be operated top side. Added a toolbox and holders for the drive dyes on the catwalk so they would be handy and didn't have to climb off the catwalk for a sign installation. Built holders on the side of the truck bed for the air hammer and auger so it was accessible from ground level. Moved the compressor and built a bracket to mount a reel so the air hose could be extended easily. Designed an air operated auger from an air wrench

to be able to dig post holes eliminating the need for a second person to install a sign. The ladder was moved from the rear middle area of the truck bed where it was in the way to the rear corner of the truck bed. The ladder was rebuilt to include grated steps and a hand rail was added. The storage box on the rear of the truck was extended and a vise was added and could be used for a work bench. A bracket was added to protect the generator and air compressor from sign posts which are stored on the truck bed. Dividers were added to the tool boxes mounted on the side of the truck bed so items could be better organized.

### Labor/Materials/Cost

\$1200.00 in materials and 20 hours in labor.

### Savings/Benefits to the Community

The redesigned sign truck changes the signing operation from a two person to a one person operation. The changes to the catwalk and holders for the air hammer and auger; and redesigning the ladder reduces the exposure to injuries to employees. All the changes increase the efficiency of the signing operation and the reduction to possible bodily injury is a great benefit to employees and saves the county money in possible workers compensation costs.



# Colorado - Milling Scoop

---

**Agency:** Arapahoe County Road & Bridge

## Contact

Keith Runyan  
7600 S. Peoria St.  
Englewood, CO 80127  
720.874.6831  
krunyan@arapahoegov.com

## Problem Statement

Arapahoe County Road and Bridge had purchased an asphalt milling attachment to use with a skid steer for milling cracks, bumps and soil mixing. We had success with the milling machine, but found that the crew was spending extended time on the cleaning of the milled area. Shovels were fine for removal of about the first inch or two of millings but then near impossible once touching the milled surface. Push brooms were also not an acceptable tool for the job.

## Solution

The patching crew came up with a very innovative and creative solution. They took a standard 6-ft wide skid steer bucket that was 18-in tall and turned it into a custom milled surface trench cleaner. The bucket has a 22.5-in center scoop that sits 2.5-in below the standard front cutting edge. It extends out from the cutting edge a total of 8.5-in, has a 2-ft flat section and then a 10-in taper to the back of the bucket. This bucket is 100% custom designed to work the trench behind our mill attachment to clean out millings and dirt from the hole.

## Labor/Materials/Cost

The total cost of the project was just under \$400 with parts and labor. It was less than a full day for the labor.

## Savings/Benefits to the Community

The bucket has saved on average, about 10 minutes per crack (2' x 24') that we clean out and then repair. With an average of about five cracks a day, that gives us close to a full hour of available labor time every time we use the bucket. The patch crew is able to finish work faster and more efficiently, and reopen roads sooner to the traveling public. There are additional safety benefits from crew not being needed in the roadway to clean the milled areas around the heavy machinery.



# Connecticut - Construction Trailer

---

Agency: Town of Bloomfield

## Contact

John Lawlor

21 Southwood Dr.

Bloomfield, CT 06002

860.243.1487

jlawlor@bloomfieldct.org

## Problem Statement

Much time was wasted by going back and forth to the garage for forgotten tools and in clean up after job completion.

## Solution

It is a landscape style trailer that holds all equipment in one spot. The ramp allows wheel equipment to be wheeled on and off with ease. The trailer is also equipped with a 25 gallon water tank which is necessary for road saw, rock saw and demo saw. There is a pump onboard to handle any water removal projects and for pumping water from tank to equipment. The trailer centralizes all tools and equipment. The solar panel mounted on the toolbox aids in keeping the safety strobe lights on at all times when not connected to the truck. The trailer can be pulled behind and type of truck providing maximum flexibility and frees up truck bed space.

## Labor/Materials/Cost

About \$1500 in materials.

## Savings/Benefits to the Community

It has greatly streamlined the process of gathering tools for specific jobs and significantly cut down wasted time both at the beginning and end of the day. The trailer can be left at the project site, making the vehicle available for other shorter duration projects throughout the day, making operations much more efficient and maximizing productivity of crew.



# Delaware - 3-Point Hitch Brine Sprayer

---

**Agency:** University of Delaware Grounds Services

## Contact

Roger Bowman  
28 New London Rd.  
Newark, DE 19716  
302.831.1816  
r\_bowman@facilities.udel.edu

## Problem Statement

Need to reduce the amounts of chlorides being applied to hardscapes on campus (25 miles of pedestrian pathway, 4'-16' wide).

## Solution

We needed to develop a low cost solution to apply brine to large plazas, patios, and sidewalks that are utilized by pedestrians and determined the best approach was to spray areas at the rate of 1-3 gallons per 1,000 square feet (preference is toward 1 gallon). Since no traffic would be driving on these areas, thorough coverage was needed to ensure all areas would be treated.

## Labor/Materials/Cost

150 gallon water tank and PTO pump already in fleet - \$0.  
Spray bar, nozzles, and controller - \$2,200.

## Savings/Benefits to the Community

Will allow us to apply brine to campus sidewalks, plazas, and patio areas 3-4 days in advance of storms. Will reduce salt usage. Can also use sprayer rig for other uses on campus with minor modifications (for example, herbicide application to patio areas to reduce emergent weeds requires only a change of nozzles to allow 1 ounce/1,000 SF application rate).



# New Hampshire - Satellite Salt Distribution System

---

Agency: Town of Hanover

## Contact

Michelle Chase  
194 Lebanon St.  
Hanover, NH 03755  
603.640.3375  
michael.chase@hanovernh.org

## Problem Statement

Our holders, which are used to plow and apply treatment to sidewalks, can hold only a relatively small amount of salt. During snowy/icy events, drivers must return to the Department of Public Works to load up on more salt several times a day to keep sidewalks in acceptable condition. Because the sidewalks are not within a close proximity to Public Works, much time is spent making trips back and forth to re-stock on salt.

## Solution

Sidewalk-treating crews created a wood frame using leftover lumber from guard rails that can hold a used truck-bed-style sander that can be moved and placed in an area much closer to the sidewalks. Before an impending storm, one of our larger trucks is filled with salt from Public Works and brings it to the location of the creation where it is transferred using the loader. During the storm, when the holder needs more salt, crews can re-fill at the much closer location. The holder is backed-up underneath the sand/salt spreader on the old truck bed sander and turned on through a remote to load the salt into the holder.

## Labor/Materials/Cost

\$441.90

## Savings/Benefits to the Community

Less time & fuel spent traveling to retrieve additional material, faster response time to treating sidewalks.

# Ohio - Multi-Use Trail Map

---

## Contact

Michael Fortune  
10 South Second St.  
Newark, OH 43055  
740.670.5290  
mfortune@lcounty.com

## Problem Statement

The most requested item from Licking Parks District and the Convention and Visitors Bureau is a trail map, to the tune of over 15,000 maps per year. Licking County has over 60 miles of multi-use trails. The county has never had a good system for mapping its trails. Although a map did exist it was incomplete, did not list amenities, was missing trails, not legible, and quite simply not very usable. Proper mapping and wayfinding is essential to multi-use tourism, something our trails are becoming known for, and for the lives of everyday residents. There was a need to develop an easily navigable map that moves people efficiently to their destination with minimal confusion, and to capture revenue in the towns and villages along the trail system.

## Solution

The solution was to create a new multi-use trail map. A mapping service is very costly, but the need for a new map still existed. Licking County Area Transportation Study (LCATS) decided to create the map in-house. The goal was to create a clear, concise map that minimized confusion, highlights amenities important to trail users, show the interconnectivity of our trails, list every trail in the county regardless of jurisdiction, make it easy to use, and make it a size that fits in bicycle bags or back pockets.

It was decided that a 32"x16" overall map would be efficient to show the detail needed, but would also fold down to 4"x8". Through inter-departmental collaboration LCATS was able to decide on what information to include on the map and where the interests are located. This information includes: Color coded, numbered, and named trails for three ways of identification that combats color blindness, illiteracy, and can be used by younger people; a history of Licking County Trails, an explanation of the map, trail head parking, bike shops, trail kiosks, potable water, restrooms, and hospital/medical facilities. The back of the map (the 'panel side') can be folded to each individual 4"x8" panel, which corresponds to the panel numbers on the front, for an increased view of cross streets and amenities that are on that section of the trail. The panels also include match

# Ohio - Multi-Use Trail Map (cont'd)

---

lines that correspond to the front of the map for easy identification, and mileage of that specific section. When a section is completed the map is simply flipped or folded to the next section. North arrows are included on each panel for orientation. LCATS believes it has created a one-of-a-kind map that is tailored for our specific trail system and those users both here in the county as well as passers through can easily use.

## Labor/Materials/Cost

The labor for the project was completely incurred by 2 LCATS staff members. A total of about 200 hours was spent on developing the map. The equipment used were computers, bicycles, and a camera (both photo and video). More specifically the map was created using ArcGIS then transferred into Adobe Illustrator and Adobe Photoshop for final design.

Lacking the capability to print such a large duplex document a local printer was selected to make the final prints. The map is printed on 50# paper that has been coated for UV protection, wear resistance, and water resistance making the maps last much longer than the previous version.

Cost: 200 hours labor = \$8,000

Equipment: \$0, equipment already owned by the department

Prints: \$0 each (outside local organizations with interest in the multi-use system have committed money for printing the first 20,000 maps)

## Savings/Benefits to the Community

The maps will be distributed free of charge costing community and non-community members nothing. With the introduction of US Bike Routes 50 through Licking County, and 50A through Johnstown, we expect that there will be more people using our trail system. It is important that we capture some of this revenue that is riding around our towns. There are 10 towns and villages directly adjacent to the trail system, and many more further off of the trail, through Licking County. With the introduction of this map trail users have the ability to safely navigate to the towns and villages to visit numerous stores, shops, and places of interest like the Newark Earthworks and parks.

In 2013 LCATS completed the Licking County Multi-Use plan. During research for this plan it was discovered that numerous people from out of town were on the trail at any given time, even from as far away as San Diego! They did not have a map to navigate them into various towns. After speaking with a few of

---

them they were very curious as to what was around and were unaware that they were only a mile down the trail from a store where they could replenish water and snacks. This trail map will guide them to the towns where they can spend money and bolster the local economy.

Local residents will also benefit from the trail map. With its fair share of Low to Moderate Income areas, Licking County experiences a great number of local residents riding bicycles for transportation. Many of these residents are unaware of the extent of the trail system and how to use it to get to other amenities that are important to their everyday life. This map will increase circulation of local residents into the business areas where amenities are located. It will also increase physical activity participation among residents as now they will have a clear picture of where they can go and how to get there.

# Pennsylvania - Portable Spreader Box Pump

---

Agency: Cranberry Township

## Contact

Koah Pentz  
3726 SR 257  
Seneca, PA 16346  
814.676.8812 x 101  
kpentz@twp.comcastbiz.net

## Problem Statement

Our Township is approximately 71 square miles. We have a large fleet of trucks equipped with the ability to run spreader boxes for applying salt and anti-skid to our many miles of road. Each year we undergo the daunting task of preparing no less than 9 plow trucks. This requires an extensive amount of time and labor to ensure that all of the trucks and spreader boxes are in top operating condition. The trucks are essentially useless for any other purpose while doing this pre-season maintenance because the spreader boxes are run by the truck's hydraulic systems. During the plowing season, a truck would be off the road when we needed it the most because of spreader box problems.

## Solution

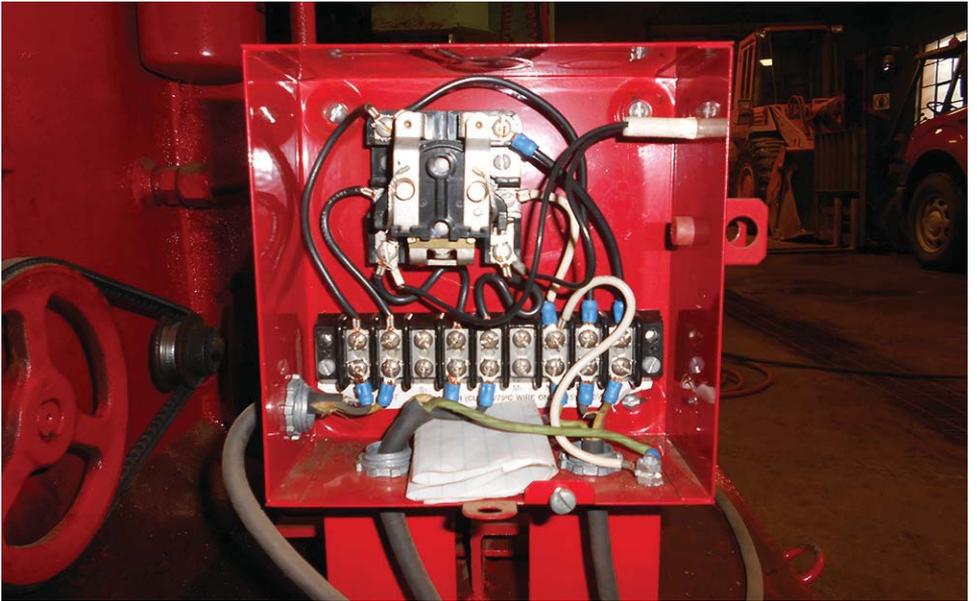
We needed a portable hydraulic system that could operate the spreader boxes without the need of our trucks. This would make preseason maintenance easier and less time consuming. We also needed a way to free up the truck during the plowing season so we could swap out broken boxes, get the truck back on the road, and still be able to fix a broken spreader box. We needed all this to be a one man operation for the sake of our mechanic, as he frequently has to work alone.

## Labor/Materials/Cost

Total cost to create this Portable Spreader Box Pump cost the township a total of about \$100.00, including the bright red paint.

## Savings/Benefits to the Community

Besides the fact that it only cost the township \$100.00, it solves every issue we needed to address and it operates flawlessly. This machine permits our trucks to be free for other important jobs in the fall and reduces the amount of labor needed to service each spreader box by more than half the time. In the winter trucks can spend more time treating the ice and snow- everyone benefits from that. It also helps to reduce overtime by allowing one person to complete all the needed tasks.



# West Virginia - Right-of-Way Sprayer

---

**Agency:** City of Charleston Public Grounds Department

## Contact

Travis Bostic  
P.O. Box 2749  
Charleston, WV 25301  
304.348.0769  
travis.bostic@cityofcharleston.org

## Problem Statement

The Public Grounds Department was consuming large amounts of labor, fuel and equipment wear cutting vegetation within rights-of-ways adjacent to city streets.

## Solution

Joe Gooch, a Public Grounds employee and part-time inventor created a mechanism/sprayer that retrofitted the stake pockets in a full size pickup bed and could be extended out beyond guardrails directing weed killer (i.e., RoundUp) at numerous angles and projections. This sprayer was then connected to a 60 gallon water tank and pump that fed the liquid mixture through the sprayer. An additional “genius” aspect of this “mousetrap” was that the pump feeding the sprayer was wired directly to a trailer light harness that can be easily plugged into the vehicle and controlled by utilizing the parking light circuit.

## Labor/Materials/Cost

3/4” steel gas piping, old “extend-a-mirror” supports/brackets from an old pickup truck, irrigation heads, 1/4” flat bar, 60 gallon water tank, electric pump and a 5-prong trailer wiring harness.

1 day’s labor in welding, installing the tank and wiring the pump.

Cost: 60 gallon tank - \$200  
Pump - \$100  
Misc. fittings - \$20  
Scrap piping and metal flat bar - \$0

## Savings/Benefits to the Community

Saved hundreds of man hours and eliminated treacherous working conditions (e.g., steep slopes and rocky terrain) for men. As an example, this sprayer turned a 2 man, 2 day trimming job, 3 times/year into a 1 man, 30 minute spraying route, 2 times/year.



# Appendix: Additional State Mousetrap Competition Entries

---

In this section you will find entries for Centers' Build a Better Mousetrap State Competitions.

## 27 West Virginia

27 Dig Down Tool Holder

## 29 Michigan

29 Cutting Edge Little Helper

31 Bar Seal

33 Wing Pivot Links

35 Moldboard Step

37 Cutout Scales

## 39 Connecticut

39 Backflow Preventer/Water Meter

41 Bucket Mounted Snow Broom

42 Street Light Bench Top Test

## 44 Ohio

44 Snow Diverter

46 Deicing Equipment Storage System

49 A More Efficient Way to Mow Grass and Remove Litter

52 Cut-off Saw Water Pump

## 54 Delaware

54 2 Hands Are Better Than 4

56 Leaf Collector

# West Virginia - Dig Down Tool Holder

---

**Agency:** Huntington Sanitary Board

## Contact

Martin Shelton  
555 7<sup>th</sup> Ave.  
Huntington, WV 25701  
304.360.1769  
mshelton@huntingtonsb.com

## Problem Statement

When going to start work on dig downs to repair sewer lines, it is difficult to find a place for all the equipment needed without having to use additional equipment. So, storage is difficult.

## Solution

When setting up tools needed on dig down trailers the crew leaders, Seth Rardin and Brandon Queen looked at placement of all items and how we could use space wisely and keep everything secured and safe.

## Labor/Materials/Cost

We had 8 inch pipe sections that had already been cut at prior jobs and bungee cords on the shop. This took about 2 hours to complete.

Cost: Bungee cords - \$15.88  
Pipe already on hand.

## Savings/Benefits to the Community

The savings comes from not having to have additional equipment to haul all needed tools and all tools are secured and safely in place to avoid having them fall off the truck.

## West Virginia - Dig Down Tool Holder (cont'd)

---



# Michigan - Cutting Edge Little Helper

---

**Agency:** Otsego County Road Commission

## Contact

Kiel House

989.732.5202

shop@ocrc-mi.org

## Problem Statement

Lifting cutting blades for replacement is a difficult task. In the past, a shovel was used to lift the cutting edge into position to be bolted to the moldboard. However, this method is especially straining on drivers' backs.

## Solution

The Otsego County Road Commission built a tool that replaces the shovel and better aids in lifting cutting edges. The head (angle end piece) has the ability to pivot 180 degrees and the "u" shape flat stock gives it the ability to slide in position with ease and provides its ability to lift. To use the tool, start by putting a bolt on the innermost hole. Then insert the tool under the cutting edge and lift until the holes are all aligned. Finally, insert and tighten the remaining nuts and bolts. Repeat the same process on the other cutting edge.

We had used many different variations of this type of tool in the past, with wheels and without. This works because you don't need a clean or even a flat surface, which aren't always available in our line of work.

## Labor/Materials/Cost

Scrap metal. Labor to fabricate.

## Savings/Benefits to the Community

Less down time for drivers. Prevention of back injuries.

## Michigan - Cutting Edge Little Helper (cont'd)

---



# Michigan - Bar Seal

---

**Agency:** Roscommon County Road Commission

## Contact

Scott Eckstorm

989.366.0333

eckstorms@roscommoncrc.com

## Problem Statement

Many roads suffer from deteriorating edges and various cracking throughout. Before the road is able to be repaired with a chip seal or ultrathin overlay, it needs to have a relatively uniform surface. If the road has differing levels of distress, any effort to repair the road with a chip seal or ultrathin overlay would fail.

## Solution

The Roscommon County Road Commission has applied the bar seal to repair distressed roadway edges as well as additional areas of distress in preparation for a future chip seal or ultrathin overlay. The bar seal has proven to be very effective in stabilizing the road edges as well as other areas of distressed pavement and at a fairly reasonable cost per square yard.

## Labor/Materials/Cost

- One truck driver to operate truck with a “Duz Mor” spreader
- One truck driver for asphalt distributor
- One truck driver for one-ton with roller
- One person to operate hopper on the rear of the spreader
- One or two people for traffic control
- Terry Seal (AE90) Application Rate: 0.40 gal/yard<sup>2</sup> (3ft wide)
- H-1 Blue Limestone Application Rate: 32 lbs/yard<sup>2</sup>

Cost: \$2.10/yard<sup>2</sup>

## Savings/Benefits to the Community

Prolongs the life of the road surface at a reasonable cost.

# Michigan - Bar Seal (cont'd)

---



# Michigan - Wing Pivot Links

---

**Agency:** Allegan County Road Commission

## Contact

Walter Jansen

269.673.2184

rcwalter@alleganroads.org

## Problem Statement

Plow wings undergo a lot of stress during the operation season. On occasion, the pivot links break and the varying links available make service calls a hassle for both the operator and mechanic. When plow wing trucks are nonoperational, time and money are lost.

## Solution

In order to make service calls more convenient and precise, the different links are painted different colors. When a driver has a failure and calls in, the color of the link is indicated (e.g., "I need a red one").

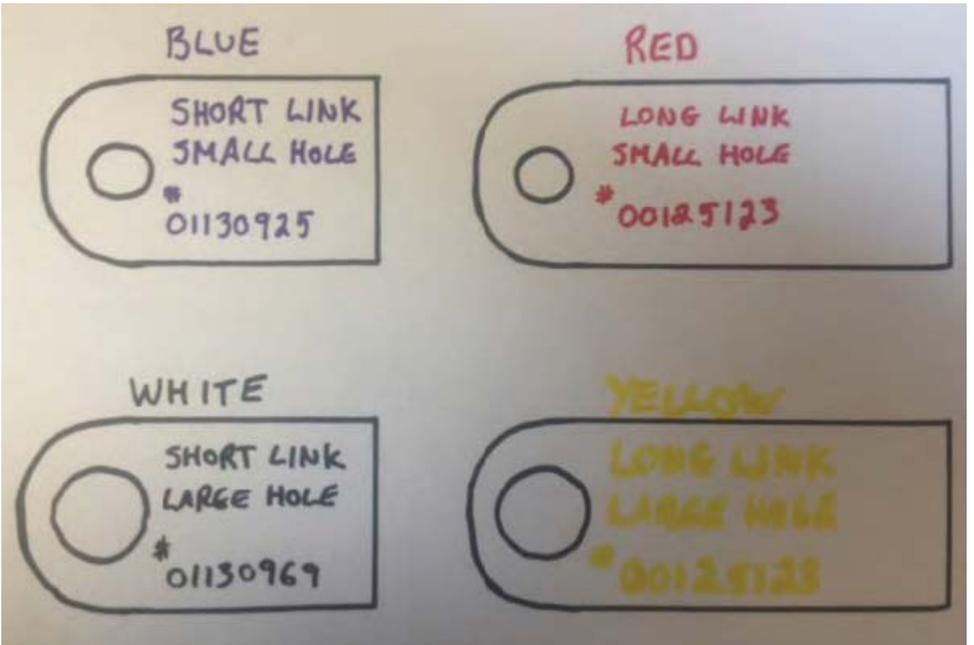
## Labor/Materials/Cost

Paint, parts and time of application. Materials and labor costs.

## Savings/Benefits to the Community

This system makes ordering correct parts easier and more accurate.

# Michigan - Wing Pivot Links (cont'd)



# Michigan - Moldboard Step

---

**Agency:** Ottawa County Road Commission

## Contact

Randy Nagelkirk

616.842.5400

rnagelkirk@ottawacorc.com

## Problem Statement

Drivers have slipped and fallen off the moldboard while entering or exiting their trucks. The Ottawa County Road Commission needed to make it safer when drivers use their moldboard for a step.

## Solution

While most agencies may already use some type of abrasion on the end of their moldboard, the Ottawa County Road Commission found that adding a grate step proved to be safer and allowed material to fall through. The grate step is raised off the moldboard and level to the ground for easy access.

## Labor/Materials/Cost

- 1-8" x 12" welded steel grating
- 2-pieces 2" x 8" x 1/4" flat stock, cut to the contour of the top of moldboard
- Approximately two hours labor to cut and install step

Cost of material and installation.

## Savings/Benefits to the Community

Increased driver safety.

# Michigan - Moldboard Step (cont'd)

---



# Michigan - Cutout Scales

---

**Agency:** Grand Traverse County Road Commission

## Contact

Toby Javin

231.922.4848

tjavin@gtrc.org

## Problem Statement

During spring weight restrictions, it is difficult to accurately and safely determine the weight on truck axles in the field and to reduce the load to an acceptable weight. Adverse weather conditions and drive-by traffic hamper the timely and accurate determination of a vehicle's weight against the restrictions. Portable scales and blocks must be physically removed and relocated from axle to axle. Overweight items must be removed or relocated. This process causes safety issues from the adjacent traffic, risks personal injury from lifting, potential property damage and is time consuming.

## Solution

Grand Traverse County Road Commission cut out an area on the concrete floor of the truck storage facility. Then they placed portable weight scales for both sets of tires in the cut out area for when a truck is weighed.

This site allows the vehicle to be moved out of the weather and traffic. The driver of the truck in question simply aligns the first axle onto the cut-out scale allowing the Weighmaster to record the weight. The driver moves the vehicle forward until the next axle is in place.

The cutouts are located in the indoor, lighted, drive-through storage building with room to park any vehicles in the yard until they are made legal. The Grand Traverse County Road Commission also provides 24-hour/7-day law enforcement for weighing and indoor truck inspections out of the weather.

## Labor/Materials/Cost

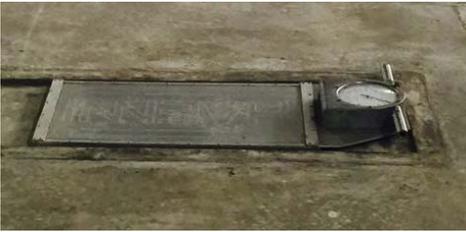
- Labor for cutting out space in concrete floor and installation
- Weighmaster axle scale

## Savings/Benefits to the Community

Safe, easy and quick weight restriction determination.

# Michigan - Cutout Scales (cont'd)

---



# Connecticut - Backflow Preventer/Water Meter

---

Agency: Town of Monroe

## Contact

Jim Robinson  
7 Fan Hill Rd.  
Monroe, CT 06468  
203.650.6681  
jrobinson@monroect.org

## Problem Statement

We are required to meter water when using for sweepers, tanker trucks and any other high volume use required by Aquarion Water Company. The Backflow Preventer is also a requirement by the water company.

Since this is to be used on a constant basis, we have to store the meter supplied by Aquarion inside and make it easily accessible at any time. This is necessary because we used to leave the meter outside and it was stolen and since the item costs approximately \$3,500, we needed a solution for ease of use and also for security.

## Solution

The backflow/meter is attached to the fire hydrant to meter water use and stop any backflow from the equipment being watered up. What we figured out was a way to keep it mobile. We have loaded it onto a wheeled “wagon” which can be hand pulled or pushed by one person for ease of use.

## Labor/Materials/Cost

Approximately \$0 – this tool was made from a discarded jogger baby carriage and scrap wood and parts from the yard. Three employees worked on it: Tony Dombrowski, Chris Roberto and Joe Agachinski.

## Savings/Benefits to the Community

The ease of use of the water meter on a daily basis and the security of knowing it won't be taken.

## Connecticut - Backflow Preventer/Water Meter (cont'd)

---



# Connecticut - Bucket Mounted Snow Broom

---

Agency: Town of Hebron

## Contact

Jeff Robitaille  
15 Gilead St.  
Monroe, CT 06248  
860.228.2871

## Problem Statement

To clear snow from roll-off containers during the winter months. Keep the workers safer by not using ladders in icy conditions.

## Solution

- Pushes snow off the steps of trailers & containers using an old sweeper broom
- Slide payloader bucket between extensions and chain to secure
- Drive the loader bucket into the opening in the front of the broom
- Chain to fasten to the loader
- Lift and push as needed
- Clean container roofs as needed

## Labor/Materials/Cost

\$200 plus eight hours of labor.  
24' 3"x4" box tubing and 1 used 60" broom with shaft.

## Savings/Benefits to the Community

Usually takes two men with a ladder and a roof rake to accomplish. Now it takes one man and a machine; this resembles a power version and is very inexpensive.

# Connecticut - Street Light Bench Top Test

---

Agency: Town of New Milford

## Contact

Al Russo  
860.355.6040

## Problem Statement

Designed to test street light fixtures and electrical components prior to climbing a 16' ladder to install.

## Solution

Allows simulation and testing of street light units by running them in the shop to ensure proper operations prior to field installation.

100% performance test. Result in 99% effectiveness.

## Labor/Materials/Cost

Used existing spare parts to set up jigs. Minimal cost - \$100

## Savings/Benefits to the Community

Tremendously reduces man hours to install new parts in street lights (town has 190 decorative street lights), requiring truck, ladders and manhours to perform the required repairs more than once.



# Ohio - Snow Diverter

---

**Agency:** Carroll County Highway Department

## Contact

Allan Furbee  
200 Kensington Rd. NE  
Carrollton, OH 44615  
330.627.2345  
countyhighwaydept@yahoo.com

## Problem Statement

Over the last few years, the number of mailbox claims has increased steadily. While there may be multiple reasons for the increase, the root of the cause is the snow plow.

## Solution

If we alter the way snow is discharged from the plow, it may reduce the volume of snow that strikes a mailbox. As it turns out, the snow diverter does exactly that. The snow diverter seems to cause a gap in the discharge, thus greatly reducing the energy striking the mailbox.

## Labor/Materials/Cost

The fabricating shop used 3/16 plate steel to make the diverter. It takes an average of 4 hours each to cut the material to shape, weld it together, paint, and install using 5-1/2" bolts.

They cost less than \$30 in material total.

## Savings/Benefits to the Community

To state the exact number of instances this has reduced is impossible to say. We fitted only 2 plows with diverters in late 2014. To date in March we have received only 1 claim from the area where these trucks operate. So time spent investigating each occurrence is dramatically reduced. An additional benefit is in public perception. Fewer complaints mean less upset constituencies. The benefit of installing the snow diverter far outweighs the cost.



# Ohio - Deicing Equipment Storage System

---

Agency: City of Centerville

## Contact

Marty Tackett  
7970 South Suburban Rd.  
Centerville, OH 45458  
937.428.4783  
mtackett@centervilleohio.gov

## Problem Statement

We have 10 deicing trucks each with their own salt spreader, spinner and pre-wet tank. In the past, this has required us to mark the deicing equipment with truck numbers to keep track of the equipment for each truck since some equipment was specific to certain trucks. Spreaders were stored on a pallet rack with spinners on a skid both in an area separate from where we park the deicing trucks. The pre-wet tanks were hung up in a separate area as well to allow room around the garage. This was not only an inefficient way to store the equipment, but it also created a hazard throughout the shop by having deicing equipment scattered around the garage in more than one place.

## Solution

We wanted a system that would allow us to store the deicing equipment for each truck located close to where the truck parks. We normally would drop the plow in front of where the truck would park so utilizing the snow plow became the primary thought. Our in house staff, Ben Ankeney (Heavy Equipment Mechanic) and Larry Sewell (Heavy Equipment Operator assigned to our Fabrication Shop) came up with the idea for the Deicing Equipment Storage System.

## Labor/Materials/Cost

Ben and Larry came up with an idea of utilizing the snow plow and in the process were able to utilize scrap steel from old picnic tables from our park. This steel normally would have been sold for scrap value, but in this case was recycled and utilized to build the storage system for each truck. Once they had the steel it took about two hours for each truck to fabricate the storage system. 2" tube steel and 1/4" flat steel was utilized to complete this project.

This project was designed and built in-house with steel from scrap picnic tables. The project only cost our department 2 hours labor for two employees per system for a total of 4 hours labor per storage system.

---

\*If materials had to be purchased for this project the estimated cost for material per storage system would be approximately \$200.00 plus the labor to weld the materials together.

### Savings/Benefits to the Community

Convenience and safety was the initial thought process for this project. We found that we not only have a convenient way to store our deicing equipment for each truck but it is safer and saves time trying to locate the correct equipment. Safety is increased by having everything in one place; we have less equipment moving around and less chance for an accident. Safer shop areas reduce cost by reducing the chance of damage to equipment when stored in one place instead of scattered around the garage. Saves time because the dump trucks we use are also utilized for leaf season and since we live in southwest Ohio you never know how early in the year the snow will fall. If it falls early and the leaves are falling late the seasons can collide. Having the convenience of locating the deicing equipment fast and efficiently will not only save time and money but it could be a matter of public safety for our employees and citizens. Improved efficiency when installing or breaking down equipment is made quick and easy.

## Ohio - Deicing Equipment Storage System (cont'd)

---



# Ohio - A More Efficient Way to Mow Grass and Remove Litter

---

**Agency:** Springfield Township, Hamilton County

## Contact

Mike Gould  
952 Compton Rd.  
Cincinnati, OH 45231  
513.522.4004  
mgould@springfieldtwp.org

## Problem Statement

Springfield Township Service Department is responsible for over 100 acres of mowing on a weekly basis, 9 months out of the year. A majority of these areas are public parks and right-of-ways where littering is an ongoing issue. We needed to find a more efficient way to pick up trash while mowing grass in large areas.

With the goal of increased efficiency during mowing operations, our crews have tried various methods of collecting trash. This “trial and error” has led to trash sticks being damaged or the operator being forced to slow down. Not only have we struggled with where to store the pickup sticks while mowing but we have also battled different methods for collecting the trash we gather. Whatever we utilized for short term storage of litter had to allow for quick emptying into a trash bag prior to moving onto our next location.

## Solution

Our Road and Fleet Services Departments worked together to come up with a safer and more efficient way to mow grass while simultaneously picking up trash. First our SCAG Mowers were analyzed to determine the best location, if any, for storage of pickup sticks as well as a bucket for collecting trash. Drawings for three different designs were drafted and then tested with material that we already had on hand. Once the final solution was determined, frameworks were built for proper storage of litter sticks and the trash bucket. Holes were drilled in both frameworks that matched the mowers current bolt pattern allowing for quicker installation. Old HDPE 12” storm sewer pipe was cut to one foot in length and then attached to the mower deck using the fabricated steel brackets to hold the bucket in place. This served to keep the trash storage bucket in place and allowed ease of emptying when an area had been

# Ohio - A More Efficient Way to Mow Grass and Remove Litter (cont'd)

---

completed. Finally all pieces of the new design were painted to match the mower it was being attached too. To utilize this new system, minimal modifications would have to be performed regardless of the manufactured mower. In the future, these storage components can be easily removed and transferred onto a new SCAG Mower at no additional cost.

## Labor/Materials/Cost

Square tubular and flat stock steel was purchased as well as cut with band saw to necessary lengths for fabrication. All welding was performed using a MIG Welder. Standard nuts, bolts, and washers were utilized for installing brackets to hold litter sticks as well as bucket in place. HDPE Storm Sewer Pipe was used from current stock and cut with a reciprocating saw to the length that was needed. One 5 gallon bucket was used for trash collection. Two cans of SCAG orange paint was used for aesthetic purposes.

- One 2 ½" x 2 ½" x 24" Long—11 Gauge Steel: \$6.40
- One 2 ½" x 2 ½" End Cap: \$2.00
- One 3" X 17" Flat Stock—11 Gauge Steel: \$5.00
- Three 3/8" Bolts, Washers, and Nuts: \$4.00
- One 24" x 1" x 1" Angle—1/8" thickness: \$6.00
- One 3" x 14" Flat Stock—11 Gauge Steel: \$5.00
- Four 3/8" Bolts, Washers, and Nuts: \$5.00
- Two Cans of Spray Paint: \$10.00
- Three Man Hours of Labor: \$113.66

Total Cost: \$157.06

## Savings/Benefits to the Community

Springfield Township's average cost for mowing is \$64.60/acre. By utilizing this new system for collecting trash while mowing, the estimated cost is \$54.91/acre, a savings of \$9.69/acre and an overall monthly savings of \$2,355.60.

Additionally, it currently takes one man an hour to mow one acre of grass. With the addition of this new system, we will cut that by 15%. On a monthly basis, this means we will be able to cut an additional 11 acres of grass in the same amount of time. Lastly, this idea is universal. While we built jigs to match the bolt pattern of our SCAG mowers, we could easily create a new framework for any mower brought in by fleet. This application would work for a Toro, EXmark, John Deere, etc...



# Ohio - Cut-off Saw Water Pump

---

**Agency:** St. Clair Township Road Department, Columbiana County

## Contact

Scott Barrett  
15442 Pugh Rd.  
East Liverpool, OH 43920  
330.385.5509  
sbarrett@stclairtwp.com

## Problem Statement

- Diamond blades get hot and warp
- Keep dust down for operator
- Keep dust down for local residents

## Solution

Create a 12 volt portable pump station. Keep the diamond blade (\$150.00) cooler so it doesn't warp and the blade lasts about 4 times longer and make it more ecofriendly; less dust for the surroundings and the operator.

## Labor/Materials/Cost

- ½ hour labor
- 12 volt pump: \$40.00
- 25 foot low pressure hose (15 cents a foot): \$3.75
- Used Stihl Connector
- Used 5 gallon bucket
- Two 12 volt battery clips: \$3.00

Total: \$46.75

## Savings/Benefits to the Community

Diamond blades last 4 times longer at a \$150.00 each (\$600.00 savings).  
Savings to the environment & operators health (priceless).



# Delaware - 2 Hands Are Better Than 4

---

Agency: City of Newark, Delaware

## Contact

Jason Winterling  
220 South Main Street  
Newark, DE 19711  
302.381.7835  
jwinterling@newark.de.us

## Problem Statement

The installation of a new plow blade required 2 men to hold the blade in place and bolt the blade to the plow. While this did not take a significant amount of time, any opportunity to make two man job a one man job with a little thought and little to no cost is certainly worth it.

## Solution

Utilizing an old jack and scrap materials, a plow blade temporary support was constructed. A piece of plate steel was welded to the top of the jack. Scrap rebar and plate steel were then welded to the flat plate to create and support that would allow the blade to be correctly positioned on the plow by one mechanic.

## Labor/Materials/Cost

Only spare or scrap material was used (<\$100 including labor).

## Savings/Benefits to the Community

Sometimes finding the extra set of hands is what takes the longest. This is especially the case when long plowing shifts leave public works crews short staffed in the garage. When a plow blade needs to be replaced in the middle of a shift, and all of the available support is on the streets, one man can get the job done.



# Delaware - Leaf Collector

---

**Agency:** University of Delaware Grounds Services

## Contact

Roger Bowman  
28 New London Road  
Newark, Delaware 19716  
302.831.1816  
r\_bowman@facilities.udel.edu

## Problem Statement

Our large leaf collection system and vehicle were too large for many of the small, tight areas on campus.

## Solution

A current staff member had previously utilized a small leaf vacuum that utilized a snow plow lift and truck frame for a snow plow that would allow the leaf vacuum to be mounted to the front of the truck. Constructed with existing shop materials. By mounting to the front of the truck, we improved visibility, safety, and productivity.

## Labor/Materials/Cost

Less than \$10,000 total. Largest expense was purchase of debris/leaf collection from Fradan (which we would have had to do anyway)—this was ~\$4900. Alternatively to this solution, we would have purchased a trailer mounted Fradan machine for about \$6900 and still had to construct the plywood box and piping. Hence, this actually saved about \$2000 over the default solution and improved safety, productivity, and visibility.

## Savings/Benefits to the Community

Allows for more efficient collection of leaves from highly congested areas. Reduces the chances of someone being struck when the truck and trailer (default solution) is backing. Assistants can communicate with driver more easily and with greater safety.







