

FHWA LTAP/TTAP | Build A Better Mousetrap  
National Competition | National Entry Booklet 2014



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## About the Build a Better Mousetrap Competition

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The National Entry Booklet is a compilation of all the entries from the FHWA LTAP/TTAP 2014 Build a Better Mousetrap National Competition, representing LTAP/TTAP Centers from around the country. 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

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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 - Discharge Control Door: Kentucky

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### Contact

Jeff T. Lashlee  
City of Bowling Green  
P.O. Box 430  
Bowling Green, KY 42102  
270-393-3657  
jeff.lashlee@bgky.org

### Problem Statement

When mowing right-of-ways, it is hard to control discharge from mowers. The city experienced several problems with discharge hitting cars.

### Solution

Bowling Green Public Works fleet division developed a flap to replace the plastic chute that comes standard with the mower. The flap has three positions; fully closed (doesn't allow any debris to be discharged), half open (allows debris to be discharged and directed down), or fully open (allows debris to be discharged freely).

### Labor/Materials/Cost

\$25 per unit

### Savings/Benefits to the Community

The door provides a safer means of mowing rights-of-way. This cost efficient device reduces the company's liability. The unit is easy to operate.

## Second Place - Truck Tire Changer/Roll Tube Bender: West Virginia

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### Contact

Jerry Arnold  
City of Buckhannon  
70 East Main Street  
Buckhannon, WV 26201  
304-472-4443  
jarnold.buckhannon@gmail.com

### Problem Statement

We needed 1 1/4" pipe-roll formed to add the arch supports for our farmers market structure in Jawbone Park. The shop we had used in the past could not get to it for several weeks, so we had to develop a method to bend the tubing.

### Solution

We couldn't just bend the tubing with a pipe bender. It would just kink and we could not keep it consistent. I was mounting truck tires one day and I thought this machine has all of the functions I need to form the tubing. It rotates and can create down force.

### Labor/Materials/Cost

\$100.00

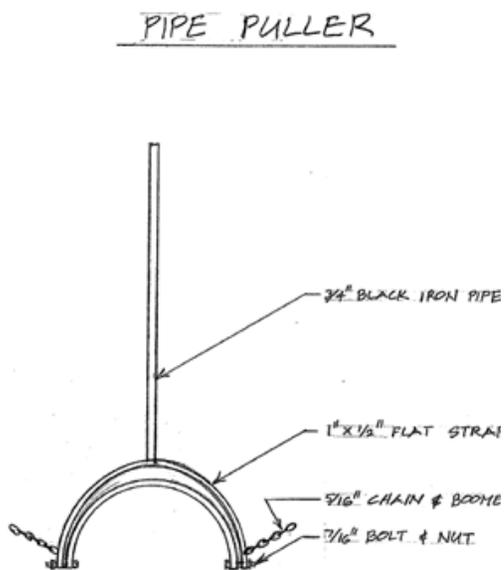
### Savings/Benefits to the Community

Immediate savings was about \$1,200. It allowed us to complete a grant project on time. Benefits to the Community: Provides a state of the art farmers market and has become a gathering place for the community with such events as Festival Fridays.



## Third Place - Pipe Puller: Colorado

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### Contact

Adam Lancaster  
City of Cañon City  
P.O. Box 1460  
Cañon City, CO 81215  
atlancaster@canoncity.org

### Problem Statement

While installing 24-inch diameter HDPE pipe, the gasket ends of the pipe were being damaged during the process of pushing the joints of pipe together with the bucket of the backhoe.

### Solution

After trying various methods to push the pipe together without causing damage, it was decided to design and build a device to pull the two pieces of pipe together. The puller consists of a bar for leverage attached to a strap that fits down in the corrugations of the pipe with the chain and boomers attached to the other end. Then the bar is pulled back, pulling the two pieces of pipe together. A blueprint drawing is attached for your reference.

### Labor/Materials/Cost

Cost of 6 feet of 1" X 1/2" flat strap: \$9.18  
Cost of 3 feet of 3/4" black iron pipe: \$7.98  
Cost of 6 feet of 5/16" chain: \$23.94  
Cost of 2 - 10" chain boomers: \$17.99  
Cost of 2 - 7/16" X 2 1/2" bolt: \$2.78  
Cost of 2 - 7/16" lock nuts: \$2.80  
Cost of labor: \$160.00  
Total Cost: \$225.67

### Savings/Benefits to the Community

The 24 inch diameter pipe costs on average \$480.00 per 20-foot section and if the ends are damaged the pipe is useless as the pipe cannot be sealed. Time is saved on the job as the workers can safely put the pipe together while the operator continues to dig.

## Sign Base Carrier: Connecticut

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### Contact

Jeff Robotille  
Town of Hebron Public Works  
550 Old Colchester Road  
Amston, CT 06231  
860-228-2871  
kkelly@hebronct.com

### Problem Statement

Cannot travel safely in work truck with two people and sign bases.

### Solution

Sign Base Carrier hangs on a standard truck ladder rack. It is easily moveable from one truck to another and allows crews to safely transport sign bases without impacting safety of crews in truck cabs.

### Labor/Materials/Cost

Less than \$50.

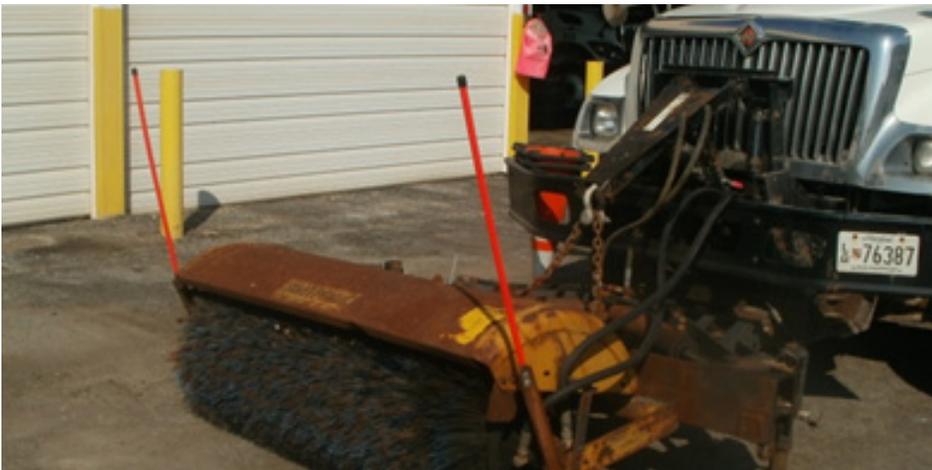
### Savings/Benefits to the Community

Greatly reduces chance of crew injury during placing and removing heavy sign bases from truck cab. Works very well and is easily transferrable from truck to truck. Also a cost savings in being able to take one vehicle to job site rather than two - one with bases and one with other crew person.



## 6 Wheel Dump Mounted Broom: Maryland

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### Contact

Mike Gerrish  
Cecil County Government  
758 E. Old Philadelphia Road  
Elkton MD 21921  
410-996-6270  
mgerrish@ccgov.org

### Problem Statement

In preparing roads for a tar and chip process, the entire road surface must be swept clean of any loose and foreign material just prior to placing the tar and chip. Occasionally the County encounters long sections of roads that require sweeping. We currently utilize a Laymor 3 wheel broom that sweeps a 4' wide path, with a slow operating speed, requires multiple passes to complete a road, and a safety vehicle following the 3 wheel broom is required. This is very time consuming and also cuts into the actual tar and chip operation timeframe, as well as idle equipment and sub-contractors waiting until the sweeping is completed.

### Solution

Come up with a way to decrease the amount of time required to sweep longer stretches of roadways. We had a larger broom 6' wide head that was removed from an old tractor years ago. We decided to find a way to utilize this larger broom head to sweep the roads.

### Labor/Materials/Cost

Material used: 4 – 5" x 5" x 3/8" plate steel; new hydraulic lines and fittings; old discarded 6' wide broom head; and an old plow harness from 6 wheel dump truck. Material Cost - \$200 Labor – 6 Hours

### Savings/Benefits to the Community

Savings of idle manpower, equipment, and contractors. A major benefit is an improvement in the tar and chip productivity along with a properly prepared road surface which provides the adequate bonding between the existing road surface and the tar and chip process. A reduction in the amount of time that citizens in the immediate area are inconvenienced is also a significant benefit to the County.

## Grader Paver: Michigan

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### Contact

Randy Nagelkirk  
Ottawa County Road Commission  
14110 Lakeshore Drive  
Grand Haven, MI 49417  
616-842-5400  
rnagelkirk@ottawacorc.com

### Problem Statement

Before the Road Commission would stone seal a road, they would send out a crew to crack seal the road first. This would hopefully make for a better and longer lasting road. The problem was that most of the road edges were badly deteriorated with numerous cracks. The center of the roads; however, seemed to be in good shape, with much fewer cracks.

### Solution

The solution seemed to be just repair the outside edge and bring it back to its original shape. Then you could stone seal the whole road and have one that should last for a long time. To bring in an asphalt contractor would be too expensive, hence the Grader Paver. We made a wing that bolts to the grader moldboard. The wing is controlled with a two way cylinder, that is operated by using the front plow controls and hydraulics. This gives the operator control of how much material is needed to keep a straight level edge. We also made wedges to put in the truck boxes. These move the asphalt over to the passenger side, which gives a nice narrow band of material to work with.

### Labor/Materials/Cost

Approx. 60 hours of labor to fabricate the wing and wedges

Equipment – Grader and Dump Trucks

Wing Material – 5/8" x 5' x 2' sheet metal, 1/2" x 3" x 8' flat stock, 1 1/4" x 12" round stock, 2 sets hyd. quick couplers, and approx.. 30' -3/8 hydraulic hose, 2 way hyd. cylinder

Wedge Material – 1/4" x 30" x 6' sheet metal, 1/4" x 2" x 25" angle

### Savings/Benefits to the Community

Saves money. Road repair should make for a longer road life. It uses equipment most road agencies already own. Faster and better than trying to seal numerous road cracks. Repairs broken road edges. No need to hire a paving contractor.

## Beaver Clean-out Gate for Culverts: Montana

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### Contact

Tim White  
Road Supervisor  
Lincoln County Road Department  
District #3  
P.O. Box 1970  
Eureka, MT 59917  
406-889-3702  
honcho@interbel.net

### Problem Statement

A beaver or muskrat would build inside or in front of the culvert. If not caught in time the stream would build up to where it would take a couple of men in chest waders to remove the dam. On larger culverts, this was a safety concern when the dam would break loose. The volume of water rushing into the culvert would have enough force to suck a man in and possibly drown him, if not cause bodily injury.

### Solution

We determined we needed a system where one person could easily unplug the head end of the culvert. Our design considered how the animal will build in the tines of the beaver gate. By raising the gate with the come-along, the debris will automatically loosen and fall off in small enough portions to go through the culvert. The rush of the backed-up water would also clean out the culvert at the same time.

## Sign Repair Platform: North Dakota

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### Contact

Kenny Tetrault  
Burke County Highway Department  
P.O. Box 310  
Bobwells, ND 58721  
701-339-2455  
ken100burke@gmail.com

### Problem Statement

Repairing or changing road signs can be dangerous and costly if proper equipment is not used. Often times this work is done while employees are standing in the box of a pickup or standing on a ladder. Weather conditions and the condition of the ditch can add to the risk factor in making a timely and safe repair to road signs. If the ditch is too wet or full of snow a repair/ replacement of the sign may not be possible resulting in loss of time and money. Employees have fallen from ladders or slipped and fell in the pickup box hurting themselves.

### Solution

Design a work platform attached to a pickup where employees can safely work on signs from the shoulder of the road. The platform is locked in the upright position for travel and hydraulically lowered and raised to reach into the ditch 14 feet from the shoulder of the roadway. The walking surface of the platform is grated steel and a safety rail is attached for employee safety. At the end of the signing season the platform can be removed in 30 minutes to free the pickup for other work activities. The sign repair platform eliminates the need for employees to stand in the pickup box or on a ladder trying to handle a heavy and bulky sign.

### Labor/Materials/Cost

Material cost was \$450 and 16 hours of labor were required.

## Durable Forms Save Money: Ohio

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### Contact

Matt Younger  
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223 West Galbraith  
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### Problem Statement

The Hamilton County Engineer's Office replaces or installs catch basin/junction box lids routinely during the year. In the past we have either purchased the precast lids or built wooded forms to pour a lid. These forms generally did not last long due to wear and fatigue. Often the purchased lids did not meet our expectations. It was decided to fabricate steel forms that would be durable and produce lids to our standards.

### Discussion of Solution

Our Eastern Division decided to build durable sets of forms that could be utilized to cast reinforced lids themselves. This resulted in time and cost savings due to product costs, pick up or delivery costs and provided us a guarantee of correct material, availability and a uniform and proper finish.

Plans were sketched, raw material acquired and jigs produced so that several sets of forms of various sizes could be easily produced. The forms performed as planned, easily set up and broke down without harming the green concrete. The finished products have voids and recessed areas ready to receive the cast iron lids with a perfect fit.

### Labor, Equipment, & Materials Used

Stock steel for the forms was cut with a plasma cutter and welded with mig welder. The forms are secured and released using simple nut/bolt connections. The reinforcing steel for the lids are typically small diameter and the concrete is Class C, 4000 psi with air entrainment.

## Durable Forms Save Money: Ohio (continued)

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### Cost:

Total costs to fabricate 8 forms was \$1,404.00, this included the forms as well as the re-usable jigs for fabrication of other form sizes. Four forms of each 48" x 48" and 40" x 40" were produced. The stock steel was \$600 and the remainder of the associated costs included 40 man hours of fabrication.

With the jigs in hand and the experience we can now produce any size form required at a cost of less than \$120.00. By comparison costs to purchase (8) precast lids at \$125.00 each plus delivery charge of \$200 equals \$1200.00. Our costs to produce the same (8) lids is \$286.48 Material costs = 2 cy concrete = \$140.00

Employee costs = 1 employee @ \$20.16 for 4 hrs = \$80.48 1 employee @ \$16.50 for 4 hrs = \$66.00

This time includes 2 hours set up and 2 hours to pour/finish. A savings of \$932.52 or 78%.

### Savings/Benefits to the Community:

Since the work is performed inside our facilities our forces can produce a variety of lids during inclement weather when our typical operations may be suspended. Standard as well as custom sizes can be produced easily where precast producers require lead time which can cause delays in our operations. Forms are kept at the ready to receive surplus concrete that would have gone to waste from various concrete pours in the vicinity of our facility. The reinforcing steel is typically culled from residual pieces from past projects as they are readily available. Our ability to cast and stock as needed saves our residents through time, responsiveness as well as the monetary savings previously discussed.

## Road Saw Hitch Receiver/Carrier: Pennsylvania

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### Contact

Lou Ferretti  
Pennsylvania Department of Transportation  
400 North Street - 6th Floor  
Harrisburg, PA 17120  
717-787-2598  
lferretti@pa.gov

### Problem Statement

When the job required the use of the Road Saw, the saw needed to be loaded on a trailer, transported, and delivered to the job site. This task took time and it was not always easy to maneuver the trailer in a work zone, causing a disruption in the flow of traffic. When the job was complete the trailer would again need to disrupt traffic in the work zone to pick up the saw.

### Solution

How do we make the process of loading, transporting, and delivering the Road Saw Cutter more efficient? The conclusion was to build a lightweight carrier that hooks to a truck and carries the road saw. The invention, called the "Road Saw Hitch Receiver/Carrier" now efficiently carries the saw where it is needed.

### Labor/Materials/Cost

\$40 in labor

### Savings/Benefits to the Community

The receiver allows for a faster and easier transport to a work site. At the site, the truck can quickly maneuver in a work zone reducing the disruption in the flow of traffic. It also eliminates the need to store and maintain another trailer. Buying another trailer to do the same operations, along with maintenance, would run the municipality \$500 to \$3,000.

# Appendix: Additional State Mousetrap Entries

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

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## Colorado: Removable Lockable Bollard

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### Contact

Adam Lancaster  
City of Cañon City  
P.O. Box 1460  
Cañon City, CO 81215  
atlancaster@canoncity.org

### Problem Statement

The City was in need of a removable lockable bollard to be used on the Riverwalk Trail System to prevent motor vehicles from driving on the path.

### Solution

We decided to design and build a removable lockable bollard in-house. We used square steel tubing for the bollard and for the anchor insert base. An internal cable was tied to the base inside the anchor tube to connect to the lockable hitch pin on the bollard. A blueprint drawing is included for your reference.

### Labor/Materials/Cost

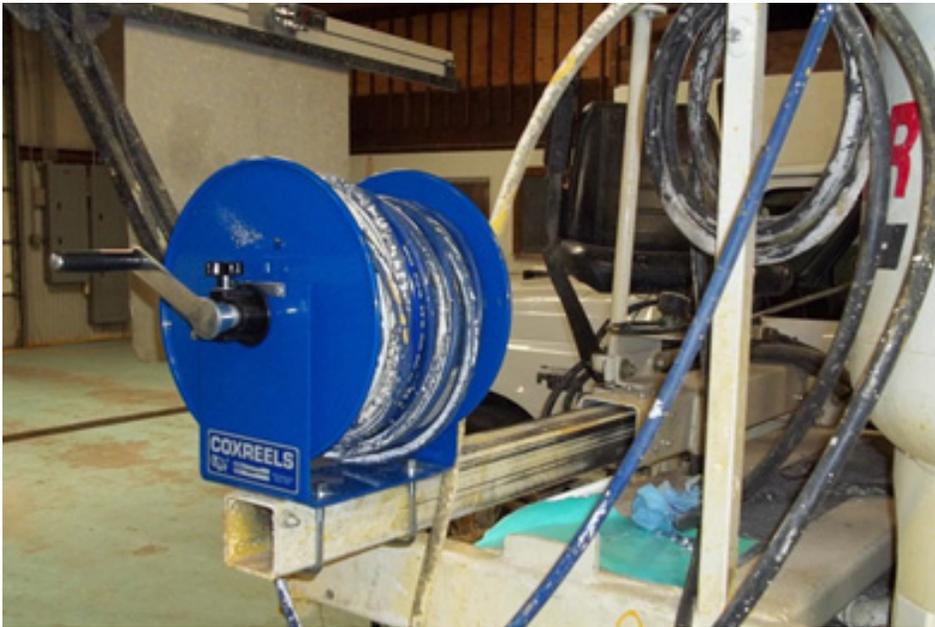
Cost of 4 foot length of 2 inch square steel tubing	\$14.48
Cost of 1 foot length of 2 ½ inch square steel tubing	\$10.35
Cost of 2 foot length of 3/16 inch cable	\$1.78
Cost of 2 3/15 inch cable clamps	\$2.58
Cost of 1 ½ inch lockable hitch pin	\$15.95
Cost of 8 inch long piece of ½ inch rebar (scrap)	\$0.00
Cost of labor	\$160.00

### Savings/Benefits to the Community

Factory made bollards cost about \$360.00 each, so the savings is \$154.86 each. In the trail system, there is the potential for the use of about 20 such bollards. This could be \$3,097.20 in total savings. Safety of pedestrians and bicyclists is improved by protecting trail users from unexpected, unauthorized motor vehicle use.

## Colorado: Hose Reel

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### Contact

Adam Lancaster  
City of Cañon City  
P.O. Box 1460  
Cañon City, CO 81215  
atlancaster@canoncity.org

### Problem Statement

The sprayer hose for the walk behind striper on the paint truck is about 75 feet long. It tends to drag on the asphalt exposing it to damage, wear and entanglement.

### Solution

We installed a manual hose reel on the paint truck.

### Labor/Materials/Cost

Cost of reel and misc. materials	\$200.00
Cost of labor	\$160.00
Total Cost	\$360.00

### Savings/Benefits to the Community

The cost to replace hoses is \$60.00 each. In addition, saving the cost of broken hoses, reduces the City's liability exposure from errant paint released from leaky hoses.



## Colorado: Hot Shop

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### Contact

Kent Twiss  
Yuma County Road & Bridge Dept.  
1310 Blake Street  
Wray, CO 80758  
970-332-5718  
kentycrb@centurytel.net

### Problem Statement

High temperature air was trapped in our shop after shutting our doors at the end of the day. We found that this heated up the floor and everything else in the building overnight to the point that when we came to work in the morning the shop would still be hot and would get hotter rapidly as the Sun came in our east facing windows.

Possible options for this were:

1. Install air conditioning.
  - a. Too expensive.
2. Tint East facing windows.
  - a. Not easy to remove in winter when we need the sunshine, and air in the shop was still hot.
3. Leave windows open and run our exhaust fan all night to draw cooler air into the shop.
  - a. Outside air is still hot into the evening hours and would only heat up the shop further until the middle of the night.
  - b. Animals or intruders would be able to gain access through our unguarded windows.

### Solution

We built shaded guards for our east facing windows that would protect them from intruders and severe weather using salvaged 30 gallon barrels and scrap metal that was on hand. We also purchased a timer that cycles our exhaust fan several times in the night to draw in cool air. This has lowered the temperature in our shop in the morning by a minimum of 20 degrees and the shop stays cooler through the day. Three bolts remove the shades and let sunshine back



in when needed.

### Labor/Materials/Cost

Used Barrels	\$0.00
Materials	\$200.00
Timer (on sale)	\$50.00
Labor	\$600.00
Total	\$850.00

### Savings/Benefits to the Community

Savings and benefits from our design include: Substantially lower temperature in our shop without installing an expensive cooling system; we can remove the shades in the fall and let the sun shine in; and by keeping the shop cooler we are able to work in a healthier environment and get more work done.

## Connecticut: Salt Chute Design for Dump Body Rear Mounted Spinners

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### Contact

Brian Brouillard  
Transportation Highway Maintenance Mgr.  
CT Department of Transportation  
100 North Frontage Road  
Mansfield, CT 06250  
(860) 465-8074  
brian.brouillard@ct.gov

### Problem Statement

The department has many variations of dump bodies with different types of salting and liquid pre-treating systems. The Viking Pro-Line Series 2 dump body is designed with the conveyor chain located in the center of the tub body, running the length of the body, discharging material onto a spinner mounted directly to the rear of the truck. A couple issues were encountered during salting operations; 1) The lack of ability to apply salt directly to the high side or crown of the roadway without crossing over into the opposite lane; 2) Due to the design of the spinner unit, material was being dropped from a height of two feet onto the roadway creating a scattering pattern which became counter-productive in terms of concentrating de-icing materials for optimal effect.

### Solution

A salt chute was designed from in-house materials, including a 60" piece of 15" smooth bore plastic pipe typically used for drainage applications, fabricated the receiving unit out of square and flat stock so it could be mounted onto the truck and added a piece of a rubber tire flap to the end of the chute to channel material directly to the roadway. The original spray nozzle and hose for the pre-wet unit was re-plumbed and attached to the unit. It was also designed so that the operator has the option of swiveling the chute from left to right to best suit the needs of any given moment.

### Labor/Materials/Cost

The materials used to build the unit cost less than \$200.00.



### Savings/Benefits to the Community

The cost in terms of procurement of needed materials, labor towards production and installation is minimal to any department or municipality. The effectiveness of the chute, thereby eliminating scatter and using the appropriate amount of de-icing materials also would be less evasive towards environmental concerns of the bituminous asphalt mix and improves the ride over these repaired sections by the traveling public.

## Connecticut: Curb Feeder Retrofit

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### Contact

Donald Quick  
Highway Foreman  
Town of Cromwell  
41 West Street  
Cromwell, CT 06416  
(860) 632-3452  
dquick@cromwellct.com

### Problem Statement

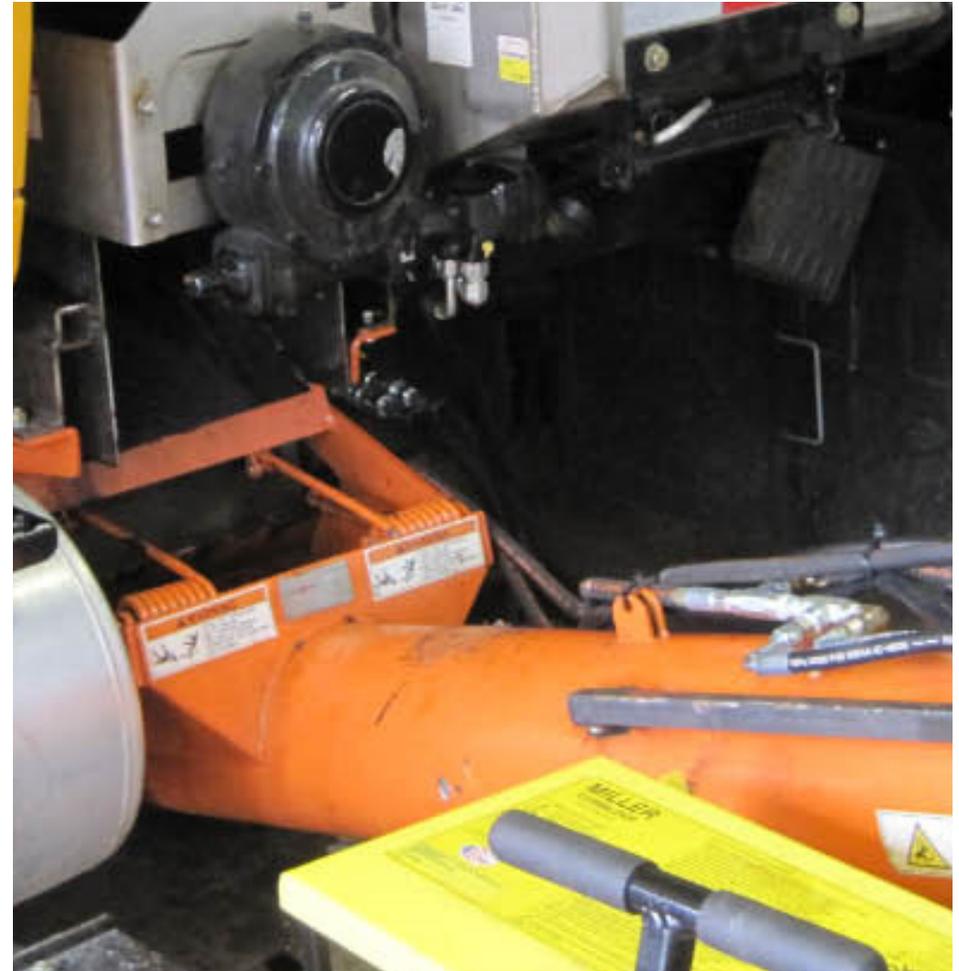
The town was in need of a replacement curb feeder. This attachment is used to backfill curbing and fills the curb machine to perform roadside curbing. The unit cost approximately \$13,000 and includes the conveyor, auger and mounting hardware. Once the department received the new curb feeder attachment we discovered that the unit sat too low on the truck and when the body was raised, the attachment would hit the ground. This may have been a result of the newer model dump trucks having a lower profile. Unfortunately, this was the only model available and the old model was no longer available. Since this operation is critical and the use of such attachments saves time and reduces man-hours, a solution was needed. After much back and forth with the vendor, it was determined that a solution was not available and was concerning for the vendor on future sales and use.

### Solution

As the need still existed and the vendor had no corrective actions or options, the department decided to modify the attachment. The unit was returned and the department purchased an auger, conveyor unit, hydraulic controls and a small amount of steel. The department installed the conveyor unit and auger on the driver side of the truck located in the vicinity of the salt spreader chute. The spinner was replaced with the auger and the conveyor was mounted allowing the driver the ability to control the conveyor and auger from the cab.

### Labor/Materials/Cost

The curb feeder cost approximately \$4,000.00, the hydraulic mod. cost approximately \$500.00 and minimal steel used to fabricate attachments, etc.



cost approximately \$200.00.

### Savings/Benefits to the Community

The benefit of the curb feeder retrofit to our department is that it has allowed the department to continue curbing and backfilling on the new trucks safely and efficiently.

## Kentucky: Manhole Lift

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### Contact

Jeff T. Lashlee  
City of Bowling Green  
P.O. Box 430  
Bowling Green, KY 42102  
270-393-3657  
jeff.lashlee@bgky.org

### Problem Statement

The department needed a safe and effective means of lifting and placing a manhole. The old method using pegs and chairs worked but lacked a means to control the manhole sections. Additionally, the department had safety concerns with this method.

### Solution

The Bowling Green Public Works Department looked to find a better way to move and place manhole sections. The new unit was developed to safely set four foot pre-cast manhole risers that are commonly used for drainage structures. The design and function is to be able to latch on and off the units without any assistance from the ground crew. The operation allows crews to set the pre-cast units in a deep excavation in a safe and effective manner. The manhole lift detaches without requiring employees to enter the excavated area to remove the rigging.

### Labor, Equipment, and Materials Used

Uses 5 lbs. #ER 308 LSI .030 stainless steel mig wire. About 4 hours of labor by a community service person (free labor).

### Cost

The cost for the manhole lift was approximately \$300 for materials and approximately eight hours of in-house staff time.

### Savings/Benefits to the Community

The lift has provided a much safer means of performing drainage projects. The new device has increased production. Upon using this device crews



discovered that it was easier to transport, align, and level the manhole sections. Additionally, the lift took away the guess work of having to chain or worry about slippage while transporting and setting the unit.

## Kentucky: Guardrail Cleaner

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### Contact

Joey Fey  
KDOH District 4  
13051 N. Hwy 261  
Webster, KY 40176  
270-547-0588  
feyrace@bbtel.com

### Problem Statement

Guardrail dirt built up under the rail. Also it can build up dirt or millings behind the guardrail by pushing material under rail.

### Solution

How to clean dirt from under the rail.

### Cost

\$300

### Savings/Benefit to the Community

Can be used without removing guardrail. Saves time and money. This has been loaned to other counties.

## Maryland: Dual-Wing Plow

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### Contact

Kenny Karlheim  
Resident Maintenance Engineer  
5111 Buckeystown Pike  
Frederick, MD 21704  
301-624-8250  
kkarlheim@sha.state.md.us

### Problem Statement

The design for this innovative plow grew out of an effort to improve efficiency in SHA's snow removal operations. Standard snow plows can clear only 8 to 9 feet at once—less than the width of a full highway lane—and are often operated as “plow trains” of two or more plows to clear wider areas. In Frederick County, SHA has about 125 state and contract plows and is responsible for clearing snow from 931 lane miles of roadway.

### Solution

SHA Frederick Shop Chief Steve Henry developed an idea for a dual-wing plow that can do the work of three standard plows, clearing up to 24 feet of roadway, or two full highway lanes, in one pass. Steve began his career driving snow plows in 1972 and now oversees maintenance and repair of the shop's equipment. He worked with manufacturer Henderson Products to custom-order a plow with two 12-foot wings, one on each side, in addition to the 12-foot front plow. The wings are independent from each other and the operator can use one, two, or all three blades in different combinations, allowing greater versatility. The truck is also equipped with a dual-auger system to direct salt to the spinner, eliminating the need for the operator to raise the bed; has a 300-gallon capacity for brine or other anti-icing and de-icing chemicals; and can pre-wet salt using pipes inside the bed before augering it to the spinner. The truck is a useful addition to SHA's fleet year-round. All the plows can be removed to convert the truck to a regular dump truck for hauling.

### Labor, Equipment, and Materials Used

SHA custom-ordered the plow from Henderson Products. The truck is a Western Star Model 4700SB, with a DD13 Detroit Diesel 435 HP engine, a dual-auger style munibody with a direct cast spinner, a Force America



hydraulic system and spreader, 360-degree LED emergency lighting, LED wing lights, and rubber cutting plow edges with a blade saver on the front plow.

### Cost

\$202,000

### Savings/Benefits to the Community

For \$202,000, only about \$8,000 more than a single-wing plow, SHA was able to order a plow custom-built to do triple the work. SHA introduced its first Dual-Wing Plow at the Frederick Shop in the 2012-13 winter season. The plow is used primarily on I-70 and has resulted in great time savings and efficiency in our ability to clear this route faster and keep it in better condition. For this winter, SHA purchased three more dual-wing plows, which are used in Allegany, Garrett and Montgomery counties, for a total of four statewide.

A fact sheet about the plow is available at:

[http://roads.maryland.gov/OC/Dual\\_Wing\\_Plow\\_Fact\\_Sheet.pdf](http://roads.maryland.gov/OC/Dual_Wing_Plow_Fact_Sheet.pdf)

## Maryland: “Sign Theft”

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### Contact:

Butch Snelling  
Cecil County Roads Department  
758 East old Philadelphia Road  
Elkton, MD 21921  
410-996-6270  
bsnelling@ccgov.org

### Problem Statement

People stealing signs (Name Signs, Stop Signs, No Outlet Signs, Deer, Horse, and Cattle crossing signs).

### Discussion of Solution

Put on Rubber Gloves and start smearing car grease all over the sign post and back of the sign.

### Labor, Equipment, and Materials Used

One man, tub of grease, rubber gloves.

### Cost

5 gallon bucket of grease \$103.38 (lasting about a year), rubber gloves \$7.00 box (100 box)

### Savings/Benefits to the Community

Depending how many problem areas (signs) you have; saves the tax payers hundreds of dollars from theft. It helps to keep the theft down so Emergency equipment can find the name of the street if the sign is there and not missing. This has really helped us with our theft problem. Keep in mind this grease stinks so they don't want to get it on them.

# Ohio: Water Fill Station

## Contact

Marty Tackett  
7970 South Suburban Road  
Centerville, OH 45458  
937-428-4783  
mtackett@centervilleohio.gov

## Problem Statement

We use water tanks to water trees, flowers, plants, & shrubs throughout our City. When the crews would fill up the tank the employee had to climb up on the side of the water tank to reach the top of the tank. If the employee had someone working with him the other employee could turn the water on while he/she was standing in position to fill the tank. If the employee was working alone then the employee would have to turn the water on and carry the hose to the fill point while the water was pouring from the hose. This not only wasted water but it also presented a potentially unsafe situation for the employee by pouring water on his/her path to the fill point.

## Solution

To come up with a way so that one employee could fill the water tank alone alleviating the need for a second employee. Also to come up with a way that would not only be safer for the employee but would save and conserve water in the process. We decided to design and install PVC plumbing that could be connected to a fire hose or fill point and install that PVC down the side of the water tank horizontally and then vertically to the fill point.

## Labor, Equipment, and Materials Used

The project required approximately 4 hours of time for one employee to cut and install the plumbing. Equipment included a saw to cut the PVC, wrenches to install the clamps/brackets and a drill with drill bits to mount brackets to the trailer frame. Materials included (2) 10' sections of 4" PVC, (3) 4" PVC 90 degree elbows, (5) clamps to mount the PVC to trailer, (1) 4" -3" PVC reducer to connect to a 3" fire hose and PVC primer & glue.



## Cost

4 hours of labor to install	= \$108.00
(2) 10' sections of 4" PVC	= \$35.42
(3) 4" PVC 90 degree elbows	= \$25.77
(5) clamps to mount PVC to the trailer	= \$60.00
(1) 4" - 3" PVC reducer	= \$2.72
(1) PVC primer & glue	= \$7.48
<b>Total for project</b>	<b>= \$239.39</b>

## Savings/Benefits to the Community

We save by enabling one employee at the water trailer during fill up. We save by not wasting water during fill up. Water is transferred directly from the water source to the fill point. Safety is huge! No unsafe procedures for the employee to encounter from wet surfaces or climbing up to the fill point.

# Ohio: Rescue Truck

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## Contact

Carol Schwab  
6844 Dunwoody Road  
Oxford, OH 45056  
513-756-9576  
Usd2work@yahoo.com

## Problem Statement

Reily Township had a great need for a Rescue Truck to carry rescue tools like the jaws of life, cutters, spreaders, rams, air bags, air chisels, jacks and cribbing to the scene of an accident. Also since the Township is the most rural in Butler County, there are many long driveways and lanes to farms that become impassable during a snowy winter. Emergency crews needed a way to navigate those lanes in case of a fire or EMS call.

## Solution

Reily Township received a 1977 E1 C500 pumper from the city of Monroe who got it from Lemon Township/Lesourdsville, Butler County. There was no cost for this truck as it was 20 years old when obtained by the Township. It remained in service for several years until it was no longer dependable because of age and was no longer a first line pumper. A dealer estimate for a Rescue/Pumper was \$300,000. A truck like that would never fit in the Township budget, so members of the Fire Department worked with the Township Trustees to find a solution and decided to build their own rescue truck from that 1977 pumper.

## Labor, Equipment, and Materials Used

They decided to put a new chassis under the body of the old pumper. It was repainted and the pump was mounted and piped. A heavy duty snow plow frame and V plow was mounted on the front. It is a 4 wheel drive truck and can pump water while moving. That makes it ideal for fighting grass and wildland fires. It has compartments and is able to carry all the rescue equipment for the Fire Department. Up to date lights and radios were added.

## Cost

1977 E1 C500 truck: FREE  
Chassis (4 wheel drive, heavy duty front end) \$ 85,000 purchased on state bid. Regular price: \$121,000.  
Repaint, mount pump and pipe: \$25,000  
Snow plow frame: \$4,500



Used V Snow plow: \$100

Purchased from, Preble County Highway Department at scrap price Lights and Radios: \$5,500

Total Cost: \$120,100

The flames were painted on the snow plow by a professional artist who is a resident of the Township. He contributed his time and supplies.

## Savings/Benefits to the Community

The community members are very proud of this truck and of the members of the department who designed it. It is a terrific truck. Community members, especially the elderly, feel safer knowing that truck can plow their long lanes to reach them in case of a fire or medical emergency. One of the first times this truck was used was during a snow storm for an EMS run. The truck plowed the squad down the long lane to the patient and then plowed the squad the 13 miles to the hospital in Hamilton. The hospital personnel and the city fire department people were amazed that Reily could deliver a patient to the Emergency Room in that weather from "way out in the country".

The savings to the community is another source of pride. The Fire Department and the Trustees were able to put together a \$300,000 truck for \$120,100. That is a savings of \$179,900. Without the innovative thinking of the elected officials and the dedicated volunteers of the fire department, it would be impossible for a small rural community to own such a truck. Innovative thinking like this is one of the reasons Reily Township was selected as the Ohio 2013 Volunteer Fire Department of the Year.

## Ohio: Plate Compactor Caddy

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### Contact

Jeremy Holbrook  
Road & Service Administrator  
12102 State Route 725  
Germantown, OH 45327  
937-855-7881  
Jholbrook1@woh.rr.com

### Problem Statement

The Road & Service Department routinely places 250 tons of asphalt patching that requires a plate compactor for proper compaction. In the past, the compactor had to be carried in the bucket of the loader or worse, in the bed of a pickup. Having the compactor “tethered” to the loader was inconvenient at times, and loading and unloading it from a pickup was heavy lifting.

### Solution

The Road Department noticed that the snow plow hitch on the front of our heavy single axel dump truck. A basket was fabricated from scrap steel that pivoted on two pins located on the snow plow hitch, with the lift cylinder pulling two chains that lift the basket. The plate compactor could now simply be slid onto the floor of the basket and raised hydraulically for transport. The benefit of transporting the compactor this way included, keeping the compactor with the asphalt truck, and eliminating the need to manually lift the compactor into a pickup. When transporting the compactor to the job or asphalt plant, it is secured using a ratchet strap, but while moving short distances between patches, there is no reason to secure it with a strap.

### Labor, Equipment, and Materials Used

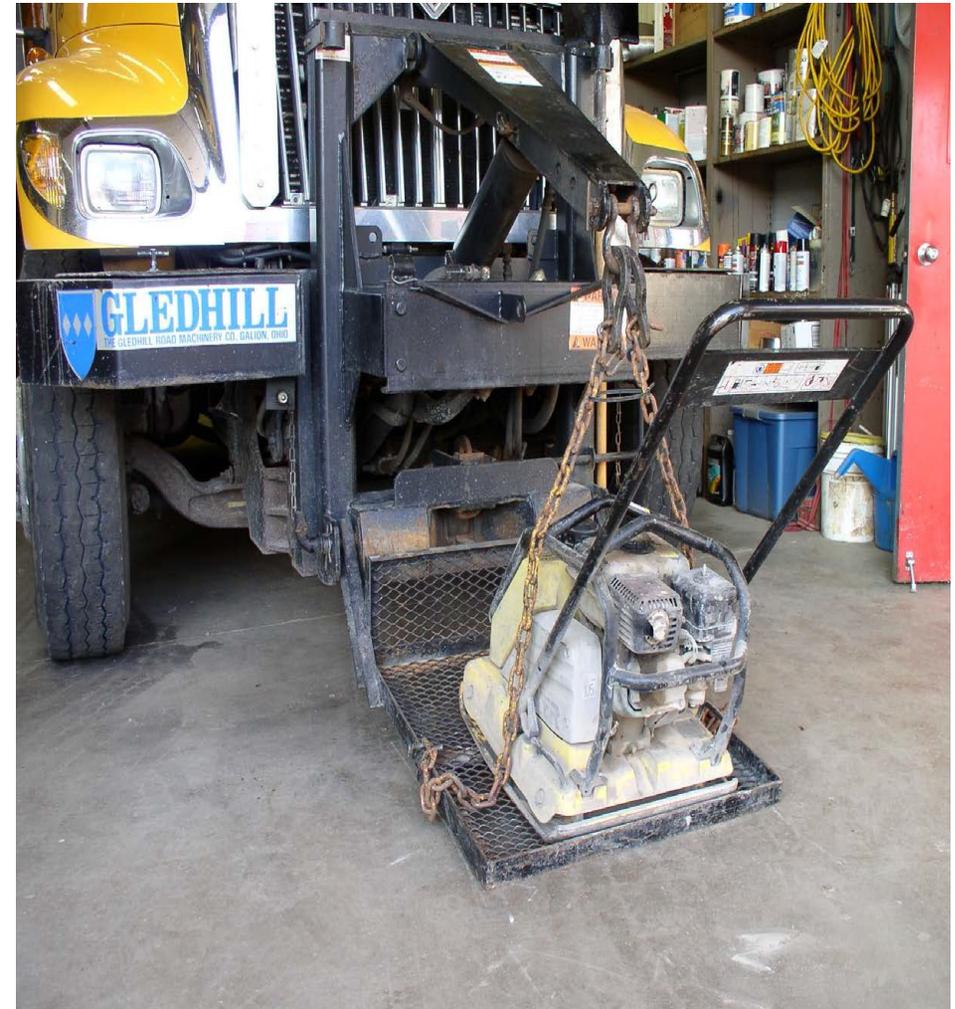
The basket was fabricated in house with scrap steel that was available. If the steel were to be purchased, I estimate that it could be purchased for less than \$100.00. A torch and cut off wheel were used to size the parts and a welder was used to assemble the basket. The entire unit was fabricated by two workers in about 3 hours.

### Cost

\$ 0.00 or less than \$100.00

### Savings/Benefits to the Community

This way of transporting the compactor has saved time by keeping the compactor with the asphalt truck. It has also reduce the chance of injury to workers by lifting the compactor by hand.



# Ohio: Homemade Traffic Cone Holder

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## Contact

Andrew Jones  
Deputy County Engineer  
23194 County Road 621  
Coshocton, OH 43812  
740-622-2135  
andrewjones@coshoctoncounty.net

## Problem Statement

As our crews get smaller in size, so has our fleet as we try to maintain more infrastructure with less resources. One of the things we discovered was having to send out a single axle dump truck with signs and cones for our employees. Previously, we inverted traffic cones and stuck them between the bumper and grill of the truck which ultimately damaged the cones. One of our Highway Maintenance Workers modified several scraps of rebar to create a cone holder which could be easily installed.

## Solution

Several years ago, an employee made a crude but effective cone holder. Michael Clarke, of our office, modified and improved this design. He was able to quickly manufacture these and put them into service with little effort, little costs, and lots of skill.

## Labor, Equipment, and Materials Used

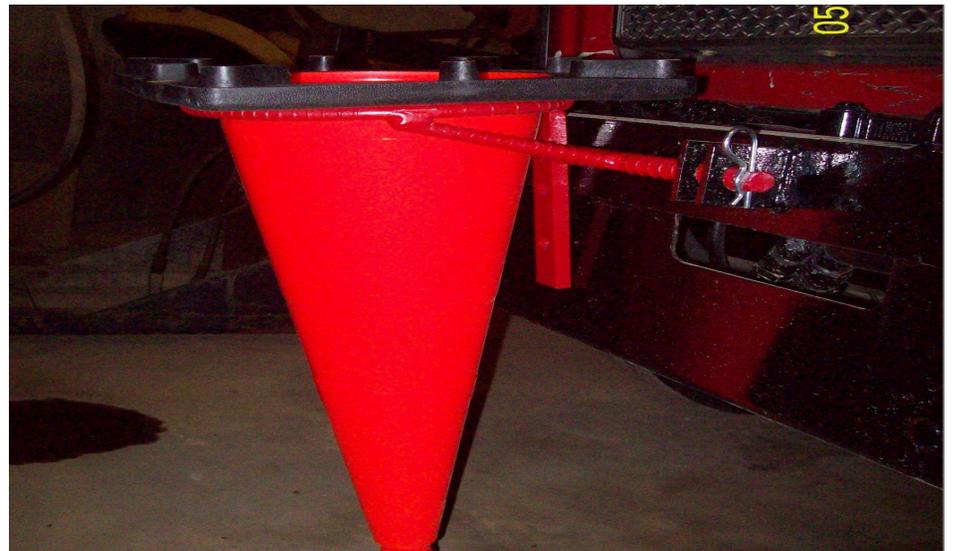
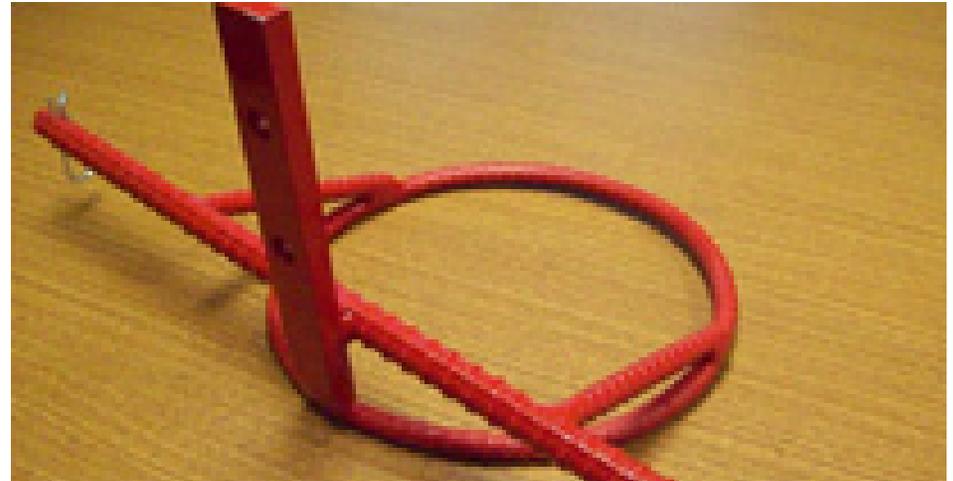
As you can see, the materials are simple scraps of small diameter rebar, welding components, and some primer paint. The cutting and welding took about 30 minutes and the assembly took ten minutes. Painting was another fifteen minutes.

## Cost

The cost is nominal depending upon how much rebar you have on hand. In our case, after several bridge projects, we had many pieces of scrap material laying around to re-purpose for this use. I would place the overall cost at less than \$20 for materials, and \$20 for direct labor.

## Savings/Benefits to the Community

These traffic cone holders can be manufactured very easily and on rain days and it would provide savings of purchasing a commercially available cone holder.



## Ohio: Level Lifter

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### Contact:

Kirk Grimes  
223 West Galbraith  
Cincinnati, OH 45215  
513-946-8420  
matt.yunger@hamilton-co.org

### Problem Statement

The Hamilton County Engineer's Office replaces or installs catch basin lids routinely throughout the year. Often it is necessary to place the lid on masonry work that is still "green". There is much time and effort involved in building an inlet or catch basin with brick and mortar. One of the last issues is usually installing the lid. This is often attempted while the masonry work is "green" or hasn't cured to its potential strength. A crew can complete the project if the lid can be placed without incident thus saving need to have a full crew return to the site just to set the lid after the curing process is complete. Our Eastern Division fabricated a mechanism that can easily adjust to provide a level lift so that when setting the precast lid it can be lowered uniformly onto the masonry. This prevents all the weight being applied to only a portion of the masonry as happens if the lid is not perfectly balanced. The mechanism supports the lid from within the center blockout allowing it to be removed without coming into contact with any part the structure or getting bound between portions of the unit after the tension is released.

The mechanism can be easily positioned to allow for a uniform, level lift even with an off balanced load such as with many offset lids.

When setting lids on cured masonry structure there was still a need for an improved process. Crews were often observed using chains to set precast lids. These chains had a tendency to shift due to an imbalance. Other times lifting inserts would break loose or fail. Both these instances can possibly endanger those in the vicinity. Many times although the lid was set in place the chain would become bound between the lid and base. A spacer block may be utilized to allow the chain to be removed but this too required an employee to lift the unit slightly to facilitate the spacer removal. This also added to the potential for injury. Other times the inserts would not fit the desired chain and clasp.

### Solution

Our crews sketched a lifting mechanism that would be simple, adjustable and easily removed upon lid placement. The area of contact to the lid was maximized by the use of angle iron so up to 4 areas of contact could be achieved. The unit can be used to load the lid onto a truck, left in place, and lifted again to unload. A simple lift of the chain force the contact pads securely into place. These pads never come into contact with the



supporting structure. When the lid is positioned unto its base the pressure is released and the lifting mechanism releases and can be swung onto a vehicle.

### Labor, Equipment, and Materials Used

Stock steel, angle iron, stock chain, mig welder and a little ingenuity was all that was needed. Thankfully our Eastern Division had all the ingredients in stock.

### Cost

Although the steel was from stock it is our opinion that the material costs would be under \$150.00. There was also 4 hours of labor involved for a total \$80.48. A grand total of \$230.48 was spent.

### Savings/Benefits to the Community

There is substantial time saved by having the ability to set a lid quickly and safely. By completing the task in a timely manner the crew, equipment and work zone can be removed from the site saving money and reducing the chance for accidents. Like many agencies we are required to do more with less and that includes employees. Unfortunately we had an employee injure his shoulder while lifting a precast lid off a structure last year. This injury resulted in a workers compensation claim, a substantial amount of time off and the pain and suffering of the employee. This mechanism greatly reduces the need for an employee to physically move a lid.

## Pennsylvania: Roller Attachment

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### Contact:

Timothy Newhouse  
Road Foreman  
7534 Route 59  
Lewis Run, PA 16738  
814-368-5030  
lafaytwp@verizon.net

### Problem

We wanted to be able to compact out road shoulders after they were cut without having to mobilize another piece of equipment. With having the grader, loader, dump truck and broom tractor on site to cut shoulders, a lot of time is spent moving equipment with only two employees. Safety was also a concern as our Township roads have many steep shoulders and a fear of rollovers is always present.

### Solution

We decided to build a roller that would attach to our tractor that we use for sweeping. This would eliminate another trip moving the roller to the work site. The roller was fabricated to connect to our boom tractor. In doing so, we were able to utilize the side deck arm and hydraulics to lower and raise the roller. Not only were we able to simultaneously sweep and compact with one piece of equipment, but using the side deck attachment arm enabled the tractor to stay on level ground eliminating the possibility of rollover danger that is commonly incurred with a steel wheel roller.

### Labor, Equipment, and Materials Used

The project required two days of labor for two employees and was constructed using torches and a welder. Materials used included: concrete, bearings, axel rod and scrap metal.

### Cost

Approximately \$75.00 was spent on materials consisting of concrete, bearings and axel rod. The remainder of the material came from scrap metal collected over the years.



### Savings/Benefits to the Community

This would help other small townships with limited employees save time and complete the task safely.

## Pennsylvania: Plow Mount Sweeper

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### Contact:

Peter Yotter  
897 Clearfield Road  
Nazareth, PA 18064  
610-972-6140  
pyotter30@gmail.com

### Problem Statement

The reason I thought of the idea to build a sweeper was to make the job sites cleaner instead of having all the guys out sweeping by hand especially on busy roadways due to safety. Another reason was for faster clean-up after storms. Also to eliminate the cost of hiring outside contractors to sweep.

### Solution

The sweeper can be adapted to any one of our plow trucks with one man. It still utilizes the existing hydraulic hook-up for power. Being that it only takes one man and one truck, it benefits us now cost-wise and safety-wise on site.

### Labor, Equipment, and Materials Used

I used an old plow frame and a sweeper set-up from a John Deere tractor. I altered the framework on the plow frame, relocated the wheels and welded new brackets for the sweeper head mount. All we purchased were new bristles for the sweeper and 2 hydraulic hoses. Overall time was three days in-house.

### Cost

2 hydraulic hoses for \$184.00 and new bristles for sweeper \$47.38. Total cost = \$657.88

### Savings/Benefits to the Community

We don't have to be at the mercy of a sweeper outfit to come in to sweep for us, saving us money. We can sweep roads quickly after a storm, clean-up to keep roads open for safe travel and keep workzones clear of debris.

## West Virginia: Traffic Control Flash Module Relay Tester

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### Contact:

Steve Riggs  
Traffic Engineer  
City of Huntington  
304-751-0086  
sriggs@cityofhuntington.com

### Problem Statement

The City of Huntington's Traffic Engineering Department did not have a method to determine if one side or both sides of their traffic control flash relay modules were burned out.

### Solution

The Traffic Engineering Department staff discussed how they could better test the flash modules. They discussed what materials they had available in-house and materials they would need purchased. They also brainstormed different ways the flash module could be assembled. David Howard, Traffic Engineer-Technician II came up with the concept and final product design.

### Labor, Equipment, and Materials Used

The Traffic Engineering Department staff discussed how they could better test the flash modules. They discussed what materials they had available in-house and materials they would need purchased. They also brainstormed different ways the flash module could be assembled. David Howard, Traffic Engineer-Technician II came up with the concept and final product design. Two hours of labor was involved in assembling the flash module relay tester.

### Cost

The purchased materials cost \$28.85.

### Savings/Benefits to the Community

Developing this tester eliminates throwing away flash modules that are still good. The modules cost \$45.00 each to replace, so over time, this is an expense that mounts up.

## West Virginia: Brine Truck Converted From Old Vacuum Truck

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### Contact:

Damien Davis  
Interim City Engineer & Public Works Director  
City of Morgantown  
304-284-7398  
ddavis@cityofmorgantown.org

### Problem Statement

The City of Morgantown Public Works Department had an old vacuum truck with a broken suction motor and a badly rusted debris body. However, the frame and motor were still in good shape.

### Solution

City of Morgantown Public Works employees removed the debris body from the truck frame. A flat bed was purchased from a junk yard and fitted to the frame. The employees built a new battery box and fit the truck with a new gas tank. An existing 500 gallon tank was installed, along with a spray bar that was built from plumbing fittings. This completed the conversion of the vacuum truck to a brine truck for winter maintenance.

### Labor, Equipment, and Materials Used

Old vacuum truck, junk flat bed, 500 gallon tank, electric pump, miscellaneous plumbing fittings. It took two-weeks of labor to do this conversion.

### Cost

Around \$2,000.

### Savings/Benefits to the Community

The savings were thousands of dollars and one of the main benefits is having an additional truck to use for winter maintenance.

