

2013 Iowa County Engineers Research Focus Group  
**LOW COST SOLUTIONS AND IDEAS**  
-National LTAP Build a Better Mouse Trap  
-MODOT Innovations Challenge



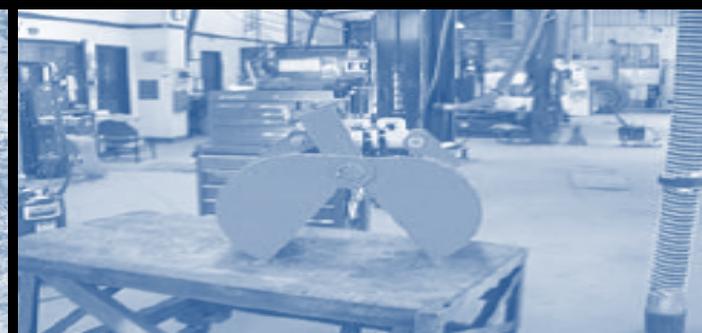
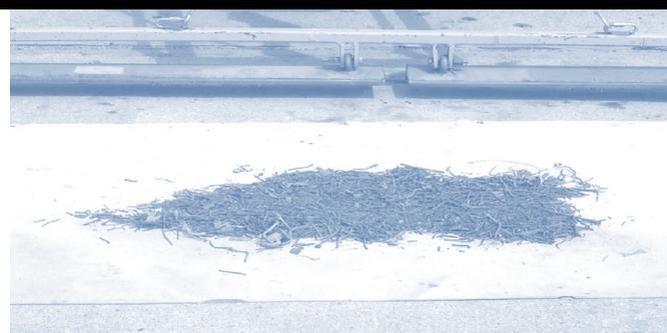
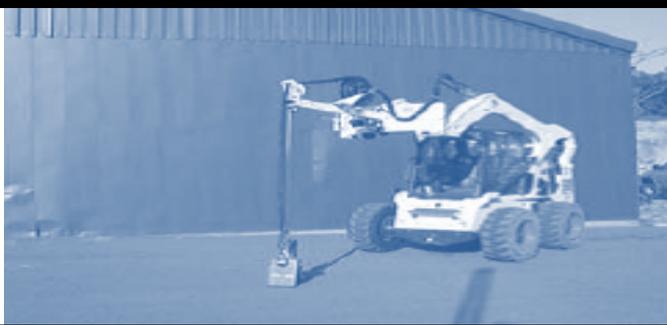
Images from the 2012 Build a Better Mousetrap National Competition

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# FHWA LTAP/TTAP Build a Better Mousetrap: National Competition

*National Entry Booklet 2009*



*Images from the 2009 Build a Better Mousetrap: National Competition*

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## **What is the National Entry Booklet 2009?**

The National Entry Booklet is a compilation of all the entries from the FHWA LTAP/TTAP 2009 Build a Better Mousetrap: National Competition, representing LTAP/TTAP Centers from around the country. The Build a Better Mousetrap: National Competition's purpose is to collect and disseminate real world examples of Best Practices, Tips from the Field, and assist in the Transfer of Technology. The competition is a fantastic way for innovative ideas to be exchanged with others that may benefit from different concepts and perspectives. It is also a great way for local and county transportation workers and other LTAP/TTAP clients to get some well earned recognition for their hard work.

## **What is the FHWA LTAP/TTAP Program?**

For over 25 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 [www.ltapt2.org](http://www.ltapt2.org) or contact Susan Monahan at the FHWA LTAP/TTAP Clearinghouse at [smonahan@artba.org](mailto:smonahan@artba.org) or (202) 289-4434.*

**Colorado LTAP**

***1<sup>st</sup> Place Winner in the 2009 Build a Better Mousetrap: National Competition***

**CULVERT INLET IMPROVEMENT TO EXISTING RURAL CULVERTS BY ADDING LOW COST DROP INLETS**

**Town of Snowmass Village, Colorado**

**Contact:**

Will & Scott Binegar  
Road Division, Public Works Department  
3745 Owl Creek Road  
PO Box 5010  
Snowmass Village, CO 81615  
(970) 923-5110

**Problem Statement:**

Old Culvert inlets get covered up, plugged or lost over time.

**Discussion of Solution:**

By adding a low cost in-house built drop culvert that is durable, heavy rain, run-off and snowmelt will not stand a chance with this system. Also, maintenance is minimal and quick.

The Town of Snowmass Road Division designed a Drop Culvert using a sonotube, sackcrete, a steel manhole ring and a 24" slotted lid. The final product allows for the preservation of culvert inlets by adding protection from debris, run-off, rocks, etc.

**Labor, Equipment, & Materials Used:**

- 30" Round Sonotube
- 24" Round Sonotube
- Sackcrete
- 24" Slotted Lid
- 24" Steel Sewer Riser Ring



**Cost:**

30" Sonotube: approx. \$1.60 per ft.  
24" Sonotube: approx. \$1.40 per ft.  
Bags of Sackcrete: \$7.00 per bag  
Old Steel Sewer Riser Ring: no cost  
24" Slot Cover: \$90.00



## ***2<sup>nd</sup> Place Winner in the 2009 Build a Better Mousetrap: National Competition***

### **MAGNET SYSTEM FOR ROAD DEBRIS**

**District #3, Phillips County, Colorado**

**Contact:**

Mike Salyards  
District #3 Supervisor  
433 E Fletcher  
Haxtun, CO 80731  
mikespc3@schollnet.com

**Problem Statement:**

Rural residents complained of flat tires due to road maintenance.

**Discussion of Solution:**

Devised an automatic, trouble free magnet system. It is intended to remove nails, wires, screws, staples, and any other small metal pieces from the road surface while performing routine road maintenance without added operations. Magnet system raised by the Maintainers built in air system.

**Labor, Equipment, & Materials Used:**

Welder, Metal Saw, and Drill. Miscellaneous square tubing and hardware, air cylinder, electric micro-switch, electric operated solenoid valve, 2 forty-eight in yard magnets. We also used two days of in-house labor.

**Cost:**

Miscellaneous iron and hardware: \$40  
Air Cylinder: \$80  
Electric Micro-switch: \$38  
Electric operated solenoid valve: \$55  
Magnets: \$535  
The total cost was \$748.



**Savings & Benefits:**

No direct savings to Phillips County; however, indirect savings are seen in the motoring public spending less to repair flat tires that occur on Phillips County gravel roads.



*Magnet shown in the "up" position*



*Shows one days collection of nails, screws, and other miscellaneous metal retrieved from the road surface. Approximately 10 lbs*

### **3<sup>rd</sup> Place Winner in the 2009 Build a Better Mousetrap: National Competition**

#### **ASPHALT EQUIPMENT CLEAN-OUT SYSTEM**

##### **Boulder County, Colorado**

##### **Contact:**

Ted Plank, Road Supervisor  
 Boulder County Transportation Department  
 1288 Alaska Ave.  
 Longmont, CO 80501  
 (303) 441-3962  
 tplank@co.boulder.co.us

##### **Problem Statement:**

Our challenge was to find a way to clean out oil distributor trucks and tack oil tanks after use, without creating a mess or causing environmental impact. We needed some way to empty our spray bars of the diesel fuel/tack oil without just spraying out on the ground, parking lot or roadway.

##### **Discussion of Solution:**

The current system is the third generation of the idea we had about 12 years ago. A 20-foot section of culvert is cut in half lengthwise. The section of culvert sits in a metal frame with steel plates hinged to create covers that can be closed when the system is not in use. The frame and culvert are elevated at one end to create flow. The ends of the culvert were sealed using a lid from a 55-gal drum, cut in half. A nipple is threaded to the bung of the 55-gal drum lid, and attached to the nipple is a 2 ½ "suction hose that leads to a 300 gallon tank.

To use the system, a distributor truck backs up to the culvert and empties the spray bars into it. The used diesel/tack flows from the culvert into the tank. When the tank is full, we contact a waste-oil company for pick up.

##### **Labor, Equipment, & Materials Used:**

Two employees (including one with welding experience) can construct the system. Equipment included hand tools, a welder and a front loader. Materials included:

- 20 feet of 24" diameter culvert
- Steel for frame and covers



2 ½" suction hose  
300 gal plastic tank  
Miscellaneous parts (screws, caulk, etc.)

**Cost:**

The current system is much enhanced over our first attempts at creating a cleanout method; a similar system can be constructed for much less.

Materials: \$845

Labor: \$720

Equipment: \$200

Total: \$1,765

In addition, we paved our approach ramp, and added containment for the holding tank at an additional cost of approximately \$1,500.00. We have a contractor empty the tank about twice annually at a cost of approximately \$500 each time.

**Savings & Benefits:**

Like many counties, cities or paving contractors, we had nowhere to spray the diesel fuel/tack oil residue from cleaning out spray bars and tanks after paving or chip seal operations. This system allows us to quickly and efficiently clean paving equipment and dispose of the residue without impacting the environment or creating a mess.



## SELF LOADING WATER TANKER WITH SPRAY SYSTEM

### Garfield County, Colorado

#### Contact:

Jake B. Mall  
 District 3 Road Foreman  
 Garfield County Road & Bridge Department  
 902 Taughenbaugh Blvd., Ste 305  
 Rifle, CO 81650  
 (970) 625-8601

#### Problem Statement:

The tanker we used started out as a hot oil tanker that was purchased in Denver. After we received it the insulation was removed from around the tank. It was then plumbed for a gravity flow system with a 6-inch outlet and a splash pan installed to spread water.



We needed a water tanker of that capacity to haul water a long distance for our Mag. Chloride program. We also purchased a self priming trailer mounted pump with a 4-inch outlet and inlet to load with. Loading time was around 30 to 40 minutes under ideal conditions. The tanker was used one season with the gravity flow system and was not very efficient as the water spread would not cover a half a road at a time.

#### Discussion of Solution:

This summer we purchased a 3-inch Honda powered pump to install on the tanker. We built a platform in front of the tires to mount the pump on. We reduced the 4-inch outlet to 3-inch and plumbed it to the inlet side of the pump with a hand controlled lever valve and a tee to install a suction hose so we could load out of any water source. From the outlet we installed a flex pipe with cam lock fittings to another tee. One side of the tee was fitted with an air controlled spray head, the other side of the tee with an air controlled butterfly valve. This was done to re-circulate the water back into the tanker or to the spray head.

The tanker will now spray a road width pattern at a faster speed. This adds 4 to 5 loads of water sprayed in a shift. With both 3-inch and 4-inch inlet fittings the tanker can be loaded in around 15 minutes. The 3-inch pump alone will load the tanker in about 45 minutes in a water source where the 4-inch pump will not work due to low water volume.

**Savings & Benefits:**

The water tanker this year has been the main reason our Mag Chloride program has continued, due to the drought we have had to haul water as far as 20 miles to continue our Mag. program. To rent an equivalent unit would cost \$85.00 per hour, for a 10 hour shift this is a total cost of \$850.00 per day.

The design and labor of my shop mechanic Pat Antonelli and one of my operators Jim Stewart made this conversion from a hot oil tanker to a highly usable water spray tanker an efficient time and money saving project.

## ROCK CRUSHER CAMERA MONITORING SYSTEM

### Routt County, Colorado

#### Contact:

Bernie Andraish  
Road & Bridge Dept.  
P.O. Box 773598  
Steamboat Springs, CO 80477  
(970) 736-1051

#### Problem Statement:

Last fall, the Mining Safety and Health Administration issued a citation for noise violation on the county's gravel crushing operation. The operator on the primary crusher could run it only one hour per eight-hour shift to comply with MSHA noise regulations. This person was exposed to deafening noise levels, choking dust and flying rock chips. It was a hazardous work environment even in good weather. You had to stand on a shaking platform looking down into the jaws usually for eight hours a day.

#### Discussion of Solution:

We had to do something to stay in business. Most of the rock crushers are set up with an operator's booth. The cost of an operator's booth was between \$10,000 and \$90,000. Cameras and monitor's allow you to operate this piece of equipment from a safe location. This option was clearly the most cost effective and safest choice.

#### Labor, Equipment, & Materials Used:

The setup was installed and field-tested by two highly skilled mechanics in less than 100 hours. Two cameras were located on the primary crusher. One looking down into the jaws and another viewing the control speed setting were all we needed.

A third camera was mounted on a nearby van to help keep an eye on the rest of the operation. One of the two control motors fabricated on this camera is a windshield wiper motor. It lets us scan the gravel pit for incoming inspectors and other VIPs. The camera cables were strung to the monitors mounted inside the van next to the rest of the control panels. The crusher boss can now run two pieces of equipment from inside the climate controlled van.



We purchased a total of two monitors, four cameras, and enough camera cable to view any distant equipment in the pit. One monitor can view two cameras. The cameras have audio capabilities so we can tell when parts sound like they might be breaking.

**Cost:**

The cost of the cameras, monitors, and cables was about \$2,000.

**Savings & Benefits:**

Our biggest savings were in eliminating an operator's position and salary. Nobody liked this dirty job anyway. It was a tough position to fill. The five-month crushing season per year costs \$18,545 in wages to pay someone to stand on the primary crusher. The first year we will save about \$16,545. Since the cameras and equipment are paid for, we should save at least \$18,545, possibly more depending on insurance and other cost increases next year.



## ONE MAN CULVERT LOADER

### Gilpin County, Colorado

#### Contact:

Earl Robinson or Gordon Thompson  
 278 Jankowski Dr.  
 Golden, CO 80403  
 (303) 582-5004  
 erobinson@co.gilpin.co.us  
 gthompson@co.gilpin.co.us

#### Problem Statement:

Having the manpower and the equipment needed to load, transport, and unload culvert safely.

#### Discussion of Solution:

We originally purchased a 25 foot gooseneck trailer to transport our mini excavator and various other small equipment and products, including culvert. Thinking it usually takes two men, a truck with trailer, and a piece of equipment to load culvert, we began looking at adding a crane to our trailer. After looking at several types of cranes we purchased an N H Log Loader. This crane is equipped with a continuous rotation 39" grapple; it will lift 893 pounds at its maximum reach of almost 14' and is powered by a 16 hp electric start hydraulic power pack.

The assignment to modify the trailer and make this an efficient piece of equipment was given to David Rich, an Equipment Operator II with an abundance of skills and talents. With many suggestions from almost everyone in the department Dave began cutting apart a brand new trailer and crane. The deck planks were cut and the crane was lowered and mounted between the main frame beams. The power pack was removed from its original stand and fit under the decking. The outriggers were cut from the crane and fit to the trailer. The original fuel tank was replaced with a more suitable tank for our application. Access doors were fabricated for easy access to the power pack and lower crane. Deck plate was added to the section of deck the grapple will operate most times. An operator's station with all hydraulic controls, ignition switch, choke, and throttle, adjustable seat with seat belt and foot rests was all fabricated and mounted to the main upright boom of the crane. This allows a bird's eye view and a safe location for the operator. This project took about 160 total hours, including design, locating and obtaining parts and materials, and build time.



**Cost:**

Trailer: \$10,850.00

Crane: \$10,700.00

Steel and Misc. Parts: \$700

Total: \$22,250.00

**Savings & Benefits:**

One man can now safely load, transport to jobsite, and unload culvert saving us countless man hours. This piece of equipment will also be a one man operation for log hauling, rip rap hauling, and ripping and hauling willows from road shoulders. More uses remain to be discovered and when not being used for crane operations it is still used to transport our equipment.



## PHILLIPS COUNTY LANDFILL

### Phillips County, Colorado

Matt Meusborn  
221 S. Interocean  
Holyoke, CO 80734  
(970) 854-2166

#### **Problem Statement:**

In 2004 we upgraded from burning trash to our new bailing system. We needed an efficient way to haul our bails to the cell.

#### **Discussion of Solution:**

We discussed whether or not to use a truck with its own hydraulics or a trailer with a loader. We decided on a trailer as it would be more efficient in our application. The loader hauls the trailer to the cell, dumps the trailer, unhooks and stacks the bails all in one trip. The operator never has to leave the cab. To make it most efficient we built two trailers, one is being filled while the other is being dumped. This way the bailer never has to shut down.

#### **Labor, Equipment, & Materials Used:**

Two landfill employees

Normal shop tools and welder

We stripped down the old burner and used 65% of the metal to build the trailer frames (two trailers). We used two old truck axles for the main wheels. The only money spent was on the two small wheels and 35% of the metal was purchased.

#### **Cost:**

In the two trailers was \$2,000 in materials and about \$1,800 in labor.

#### **Savings & Benefits:**

Materials, labor, and engineering of the two trailers saved \$4,000 per trailer. By using the loader and trailers together we are saving more than 50% in haul time. We are saving in down time with the bailer. There is only one piece of equipment to maintain. Fuel cost is cut in half because trips are cut in half. Operation can be run efficiently with one person when necessary.





HAULING BAILS



STACKING BAILS

## **ROUTT COUNTY ROAD ROLLER**

### **Routt County, Colorado**

#### **Contact:**

Steve Kernen,  
Routt County, District 2 Heavy Equipment Mechanic  
P O Box 773598  
Steamboat Springs, Colorado 80477  
(970) 276-4603 or (970) 879-0831

#### **Problem Statement:**

When doing maintenance on a gravel road, compaction and moisture are lost creating an unstable surface. In the past, our operators usually wheel rolled the bladed section or a drum roller and operator were brought to compact the newly bladed road section.

The problem with using a roller is that there are never enough operators to man the roller so ultimately no rolling occurred so the blading of the road did not last as long and repeat blading occurred more often. This added additional costs to the operation of gravel road maintenance.

#### **Discussion of Solution:**

Why not do the blading and rolling all in a single pass with one piece of equipment? After doing some research I discovered there are commercial motor grader mounted roller attachments available. Pricing on commercial roller attachments start at approximately \$11,000; I knew that the \$11,000 price tag would be out of reach for Routt County Road & Bridge. So I started checking at our local salvage yards and metal distributors. I found that a great deal of the materials needed for such a roller attachment could be purchased at salvage cost or at a reduced price. So I decided to make a motor grader mounted roller.

#### **Labor, Equipment, & Materials Used:**

It took approximately 2 weeks to design and fabricate this attachment. Using 1" plate doubled up, I made the lift frame portion of the roller. This lift frame attaches into two ripper pockets on the ripper lift frame. Then using a piece of 4 x 6 x 1/2 "wall box tubing and some 1" plate the roller frame was built. The roller itself was made from 24" gas line 3/8 wall. 2" shafting was used to rotate the drum with bulk heads welded into both end and one in the center. A local concrete company donated the concrete to fill the drum for added ballast. Two pillow block bearings were used for the drum to roll on.



**Cost:**

Materials: \$2,061

Labor: \$1,300

Total Cost: \$3,361

**Savings and Benefits:**

By using the motor grader mounted roller attachment the road surface can immediately be compacted saving moisture and insuring a more stable road surface. The stable road surface requires less maintenance. The other added benefit is the elimination of the need for an additional operator to man a roller.



## **CATTLEGUARDS**

### **Morgan County, Colorado**

#### **Contact:**

Richard Early  
Morgan County  
17303 MCR S  
Fort Morgan, CO 80701  
(970) 542 -3560  
Fax (970) 542-3569  
dearly@CO.Morgan.CO.US

#### **Problem Statement:**

How to construct CHEAP cattle guards that were heavy enough as to be immune to road graders, farm machinery, oilfield traffic, blowing sand, and were wide enough for all the aforementioned, but would be relatively maintenance free or easy to maintain. The problem was meeting all those requirements and also keeping cattle from walking across the open gateway.

#### **Discussion of Solution:**

We designed a cattle guard using scrap 2 -3/8" oilfield pipe, pieces of 16 x 42lb per foot bridge girders. The base is constructed of the girder steel welded into a rectangle 24 feet long and 8 feet wide, with two separate grates constructed from the oilfield pipe that are supported from inside the base and may be removed separately.

#### **LABOR, EQUIPMENT, AND MATERIALS USED:**

30 - 2-3/8" x 11'-4" pipe  
86 - 16" x 42lb Steel I-beam  
Approximately 160 man hours  
Cutting torches, angle grinders, arc welders

#### **Cost:**

Zero materials cost! The materials we used were all scrap from our bridge construction. Our only cost was the labor involved. We only worked on this project when there was inclement weather or we had slack time between other jobs. We probably used \$50.00 of cutting torch gases and \$50.00 worth of welding rod.

**Savings & Benefits:**

We got price quotes from different sources that were in the five to six thousand dollar range. Their durability was possibly equal, but not superior to what we built. We have been building and using these cattle guards for over fifteen years and have only repaired one. The removable grates allow us to leave half of the roadway open to local traffic while we are cleaning accumulated trash and gravel out of the base box, or under the grates. They are wide enough that most farm machinery can fit through without tearing up the machinery. Thus, making the taxpaying landowners happy! They are strong enough to support any type of legal truck load. We have had numerous houses moved across these cattle guards and none the worse for it. Building cattle guards when the weather is bad allows us to keep our employees occupied. The cost is minimal and the product is superb!



## TRAILER WALKWAYS

### Yuma County, Colorado

#### Contact:

Leroy Wright & Terry McArthur  
Yuma County Road & Bridge  
1310 S. Blake Street  
Wray, CO 80758

#### Problem Statement:

An employee suffered a broken leg after slipping and falling while performing maintenance on a belly-dump trailer tarp. There is no good place to stand while lubing or adjusting the tarp. A walk-way was needed for good footing. Ranco Trailers, our supplier, did not have a step or walk-way offered.



#### Discussion of Solution:

We were able to purchase light weight "galvanized grip strip" from Wray Machine Shop, a local business. Each piece was 12 feet by 12 inches by 2 inches thick. The cost was \$120.00 per piece. 12 feet of "grip strip" is enough to do 1 trailer when cut in half, 6 foot for each, front and back. Each trailer required 8 5/16 inch by 6 1/2 inch carriage bolts and 8 5/16 lock nuts. These were purchased from our local hardware store for about \$1.00 each for a total of \$8.00 per trailer. Each trailer required 16 inches of 1 by 1/4 inch strap iron. This was cut into 4 inch lengths with a 3/8 inch hole drilled into each end. The strap iron was scrap from another project. Our best estimate would be \$2.00 for strap iron per trailer. Labor was 30 minutes to cut, drill, and install; approximately \$7.00 total labor cost for each trailer.

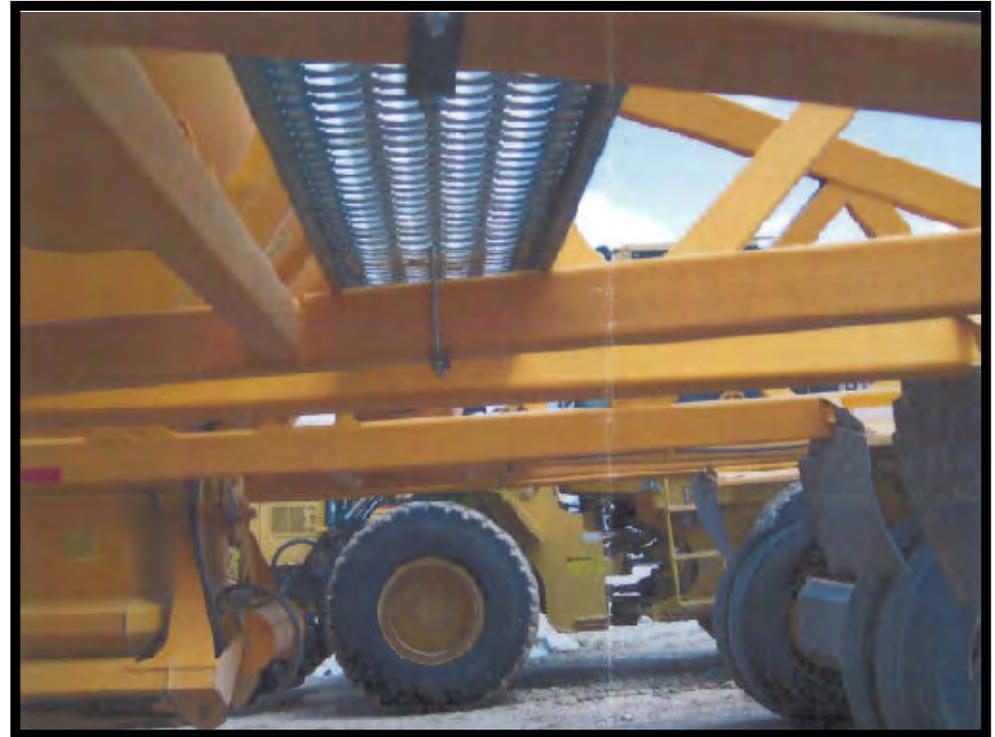
#### Cost:

Labor: \$7.00  
Bolts & Nuts: \$8.00  
Strap Iron: \$2.00  
Grip Strip: \$120.00  
Total: \$137.00

**Savings & Benefits:**

Our employee was injured in April, and still had not been released for full duty in August – best estimate for workers compensation claim, including doctor's bills and x-rays, MRI, mileage, and lost wages is \$15,000. There has also been 90 days of lost productivity.

We hope that our walkways will prevent a repeat incident. We operate up to ten tractor trailers, so the opportunity for a repeat incident is likely. Our walkways are completely portable and can be removed from one trailer and attached to another in the event that we trade trailers.



## Connecticut LTAP

*Honorable Mention in the 2009 Build a Better Mousetrap: National Competition*

### SAFETY INCENTIVE PROGRAM

#### City of Milford, Connecticut

**Contact:**

Bruce C. Kolwicz  
 Director of Public Works  
 City of Milford  
 83 Ford Street  
 Milford, CT 06461  
 (203) 783-3269  
 BKolwicz@ci.milford.ct.us

**Problem Statement:**

To control the escalating costs associated with Worker's Compensation.

**Discussion of Solution:**

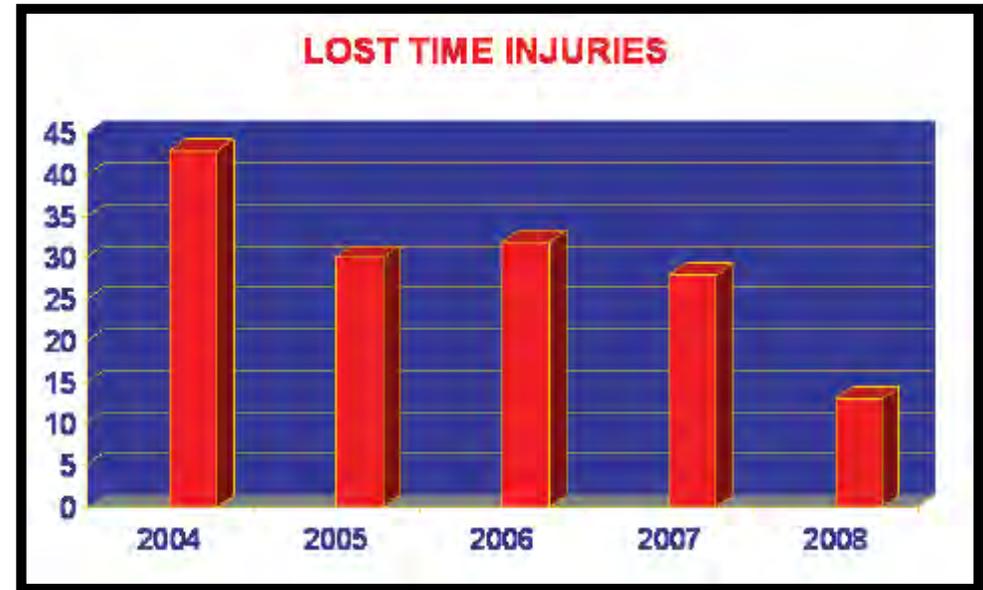
Teams are created in each of the Public Works Divisions. A Team that remains accident free per quarter (3 months) is then eligible for the Safety Luncheon and Award. Any individual who remains accident-free for the entire year is eligible for a \$500.00 cash drawing.

**Cost:**

Approximately \$2,000.00 to \$2,200.00 quarterly; cost includes lunch and then award. 150 employees – average 110 winners per quarter.

**Savings & Benefits:**

Each team tends to work just a little bit safer than they did before this program was initiated. "Peer Pressure Works."



## ***Honorable Mention in the 2009 Build a Better Mousetrap: National Competition***

### **PINCHIE THE BASIN CLEANER**

#### **Town of Simsbury, Connecticut**

##### **Contact:**

Tony Amaral and Don Bordanaro  
 Town of Simsbury, Public Works Department  
 P.O. Box 495, 66 Town Forest Road  
 Simsbury, CT 06070  
 (860) 658-5278  
 cbelli@simsbury-ct.gov

##### **Problem Statement:**

We cannot call a Vac Truck for one clogged catch basin. Running water limits the use of a Vac Truck in the event of a flooded basin.

##### **Discussion of Solution:**

Unit quick couples to a skid steer machine and offers a 30' depth of debris removal capability. Operator can choose a sand-removal bucket or a debris-removal bucket.

##### **Cost:**

Approximately \$1,015.00

##### **Savings & Benefits:**

This will clean a clogged catch basin without sending a man down in it. It will also remove a catch basin top that has been dropped in.



## REUSE OF SWEEPER BROOMS ON A BOBCAT

### Town of Mansfield, Connecticut

#### Contact:

Lon Hultgren, Director of Public Works  
Town of Mansfield  
4 South Eagleville Road  
Mansfield, CT 06268  
(860) 429-3332  
hultgrenlon@mansfieldct.org

#### Problem Statement:

We were sweeping with our Bobcat with a rotary broom.

#### Discussion of Solution:

Adapted the front broom attachment of the Bobcat Skid-steer loader so that used sweeper brooms could be reused on the Bobcat.

#### Cost:

No cost to implement the program. However, there have been substantial savings associated with the program.

#### Savings & Benefits:

A cost savings has been realized in reusing brooms that would otherwise be thrown away.



## **LOCAL WORK ZONE SAFETY POSTERS**

### **Town of Mansfield, Connecticut**

#### **Contact:**

Lon Hultgren, Director of Public Works  
Town of Mansfield  
4 South Eagleville Road  
Mansfield, CT 06268  
(860) 429-3332  
hultgrenlon@mansfieldct.org

#### **Problem Statement:**

Crews were experiencing fast work zone traffic.

#### **Discussion of Solution:**

Locally designed signs (posters) displayed at town facilities and some businesses to help raise awareness for work zone speeds and safety.

#### **Cost:**

The only cost incurred was the price of the paper.

#### **Savings & Benefits:**

A higher awareness displayed by the crews and others of work zone safety and speeds.

## PIPE SITE TRUCK

### Town of Thomaston, Connecticut

#### Contact:

Paul Pronovost  
 Superintendent of Highways  
 Thomaston Highway Department  
 158 Main Street  
 Thomaston, CT 06787  
 (860) 283-4030  
 towngarage@snet.net



#### Problem Statement:

We needed one truck that could carry our pumps, compactors, signs, barricades, fittings, tools, etc.

#### Discussion of Solution:

We obtained a truck that the Town of Thomaston Fire Department was planning to use in a "jaws of life" training drill. After replacing the clutch, the entire crew from the Highway Department went to work in their spare time to install shelving for various items. We also installed a trailer hitch which has allowed us to tow our mixer; light tower and trailer that we made to haul 20' lengths of pipe.

#### Cost:

\$165.00 for a new clutch and one of the guys' fathers painted a "Hagar the Horrible" to match our department.

#### Savings & Benefits:

All the supplies you need are on site. The truck has a security system so it can be locked and kept on the jobsites overnight. This eliminated going back and forth to the garage for supplies and reduced the use of fuel. Also, set-up and clean-up times have been reduced by leaving the truck on site for the duration of the job. We've gained about 45 minutes per day in construction time.

## Hawaii LTAP

### *Honorable Mention in the 2009 Build a Better Mousetrap: National Competition*

#### **SUCK'EM DRY MOLOKAI**

##### **Maui District, Hawaii**

##### **Contact:**

Jordan Canha  
Hawaii Department of Transportation, Maui District

##### **Problem Statement:**

The Molokai Maintenance crew has long been burdening other agencies by borrowing their pumps during the rainy periods for flooding in the low-lying areas of Kamehameha V Highway.

##### **Discussion of Solution:**

Maui District Highways Division recently fabricated the "Suck'em Dry Molokai" all-weather, portable hydraulic pump. This "Frankenstein" was created using a demolished variable message board sign as the trailer base, a used motor from a disposed herbicide sprayer, old sign posts, and old highway signs. The only new parts used are the pump, hoses and fittings, gas tank, and muffler.

Bridge Maintenance Worker Jordan Canha, cut, bent, hammered, and welded the surplus materials to create this all-weather workhorse. This pump is light, versatile, and can be towed using a small pickup and can run in the worst inclement weather because of its vented, enclosed shell.

Don't let its "showroom" good looks fool you, it's equally as functional. This motorized "sponge" is outfitted with a rebuilt four-stroke, 8-horsepower, gas-operated, automatic ignition Briggs and Stratton motor that can pump 300 gallons per minute.



## Montana LTAP

### *Honorable Mention in the 2009 Build a Better Mousetrap: National Competition*

#### SCARIFYING BLADES

##### Missoula County, Montana

##### **Problem Statement:**

There is the need to reshape a gravel road periodically to restore overall shape and drainage. The material is primarily recovered gravel that can be used on the road. When cutting gravel road surfaces, cutting edges can wear unevenly.

##### **Discussion of Solution:**

The bits of these scarifying-blade systems are easily replaced and are made of carbide steel for greater resistance to abrasion. These large picks allow for deep cutting with less wear. They require less horsepower to pull. Scarifying blades perform better where there is embedded shelf rock.



## TEMPORARY SIGN POST

### Hill County, Montana

#### **Problem Statement:**

When repairing roads Hill County Road Supervisor Jerry Otto knew the importance of temporary traffic control signs to keep his crew members safe and to warn the traveling public of an existing work zone. His problem was the wind blowing the signs down.

#### **Discussion of Solution:**

Given that repairs take place on gravel roads, Hill County devised a rod on the warning sign that could be driven into the ground thereby keeping the sign upright during the temporary road repair job.



## SIGN TRUCK

### Chouteau County, Montana

#### **Problem Statement:**

The importance of signage and sign replacement was brought to the attention of Chouteau County Road Department Supervisor Russ Albers when attending his first Safety Congress sponsored by LTAP. His problem was transferring signs, a generator, miscellaneous sign equipment, and a drill to different trucks when installing or replacing signs in a timely manner.

#### **Discussion of Solution:**

Assign one truck with all equipment components and thereby have other vehicles available for other jobs. This keeps all sign equipment organized and ready to go at all times.



# FHWA LTAP/TTAP Build a Better Mousetrap National Competition

*National Entry Booklet 2010*



*Images from the 2010 Build a Better Mousetrap: National Competition*



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### **What is the National Entry Booklet 2010?**

The National Entry Booklet is a compilation of all the entries from the FHWA LTAP/TTAP 2010 Build a Better Mousetrap National Competition, representing LTAP/TTAP Centers from around the country. The purpose of the competition is to collect and disseminate real world examples of Best Practices, Tips from the Field, and assist in the Transfer of Technology. The Build a Better Mousetrap National Competition is a fantastic way for innovative ideas to be exchanged with others that may benefit from different concepts and perspectives. It is also a great way for local and county transportation workers and other LTAP/TTAP clients to get some well earned recognition for their hard work.

### **What is the FHWA LTAP/TTAP Program?**

For over 25 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 [www.ltap.org](http://www.ltap.org) or contact Susan Monahan at the FHWA LTAP/TTAP Clearinghouse at [smonahan@artba.org](mailto:smonahan@artba.org) or (202) 289-4434.*

***1<sup>st</sup> Place Winner in the 2010 Build a Better Mousetrap National Competition***

**LARGE TIRE TRAILER TRANSPORT**

**Towner County, North Dakota**

**Contact:**

Larry Halvorson  
Road Foreman  
RR 1, 850 9<sup>TH</sup> St.  
Cando, ND 58324-6458  
(701) 968-4366

**Problem Statement:**

With motor graders and front end loaders located throughout the county, it is necessary to do tire repair on sight, hauling tires in for repair. Manually handling these tires is very difficult and can be unsafe for the individual if not handled properly.

**Discussion of Solution:**

Larry and his staff built a small trailer as shown in the photo to transport the large tires to and from the work site as necessary. The trailer has a two (2") inch axle with 16 inch wheels. The trailer carriage is five (5) feet long, two (2) feet wide and thirty nine (39) inches high, using 1 1/2 inch square steel tubing. The trailer bed is pinned at the front to the trailer hitch for easy tilting in the back. The tail gate is hinged and can then be dropped to the ground level, making it very easy to roll the tire into the cage. The top of the tailgate has a chain attached to partially raise the tailgate when the tire is placed thereon. When the trailer is tilted down in front the tire rolls ahead and the tailgate can be closed. There is a winch located on the trailer hitch to assist in pulling the trailer carriage into place and the pin reinserted. The procedure is reversed for unloading the tire.

With this design they are able to transport the tire on the roadway within the posted speed limit to the repair shop. This is working out very well and three trailers will be built to serve the road maintenance shops in the county.



**Cost:**

New material was purchased for this at a cost of approximately \$600.00. All labor was done in the shop by the operators, working on this during slack periods of time in the winter when there was no snow removal required. The 16" wheels were purchased so as to have more availability of used tires.

**Safety:**

Handling these large tires is very difficult. It required two individuals to load them into a truck (pickup), and with the heavy lifting required, a possibility existed for injury. With the trailer, very little lifting is required, and therefore less possibility for injury. One individual can handle the removal, loading, unloading and replacement of the tire.

***2<sup>nd</sup> Place Winner in the 2010 Build a Better Mousetrap National Competition***

**OBJECT MARKER SPRING-LOADED POST HOLDER**

**Buffalo County, Nebraska**

**Contact:**

Mike Mitchell  
9730 Antelope Ave  
Kearney, NE 68847

**Problem Statement:**

Inability to keep object markers (OM-3) up at bridge sites.

**Discussion of Solution:**

By use of this object marker spring-loaded post holder our problem has basically been eliminated. We have tested this for about a year now and it has worked great.

**Labor, Equipment, & Materials Used:**

Labor: 45 min. per unit

Equipment: welder, drill press & band saw

Materials: 2" sign post anchor; 1 3/4" slide in sign post; (1) adjustable spring; (1) 1 1/2" flat bar for pivot; misc. bolts.

**Cost:**

\$32.00 per unit

**Savings & Benefits:**

Fuel and labor has been the greatest savings by not having to go back to the same bridges week after week. In this area farm equipment is always getting bigger and the ability for them to safely cross the bridges without having to weave around our markers is a benefit for everyone.





### 3<sup>rd</sup> Place Winner in the 2010 Build a Better Mousetrap National Competition

#### ELECTRIC UTILITY SAFETY CONE ZONE PROGRAM

San Luis Valley, Colorado

**Contact:**

Jim Clare  
San Luis Valley Rural Electric Coop  
San Luis Valley, CO

**Problem Statement:**

Performing various tasks near or around electric utilities is dangerous and can lead to serious injury or death when contact is made with a power line. A program was established to help with the identification and protection of the public and workers in the area of accidental contact with overhead electric utilities and underground electric utilities.

**Discussion of Solution:**

After a fatal contact accident at a jobsite while conducting a paving operation, *Electric Safety Cone Zone* was developed to help with the prevention of accidental contact of electric utility lines. There are 3 important parts to the program that make this possible and workable. The first is to communicate the availability of this resource to the people that are or may become involved with a power line contact. Second, is the implementation of the program once it has been communicated to those in the area at risk. Third, is the equipment used which is simple to acquire and set-up such as the 28" traffic cones and reflective sleeves.



When overhead electric lines or underground electric lines cross the path of any operation or the lines run parallel within 15 feet of the operation, the Cone Zone is put into operation for the safety of workers and public. Once the Cone Zone is put into effect, all workers in the area should pay special attention while working in the immediate area of the electric utility hazards.

Once the equipment is in place, it should help detour contacts with the three hazard alert items used to warn of hazards. Those are the *Signal Word Panel*, *Message Panel*, and the *Safety Symbol Panel*. These are a part of the warning sleeve that fits over the cone. Not only does the hazard alert item help but also the reflective lime green colored sleeve catches your attention, day and night.

The program can also be expanded to let the utility do an on-site "Job Safety Analysis" of the work area and communicate with the people who would be working in the area. This would help to give a clear view of the program and the dangers that could

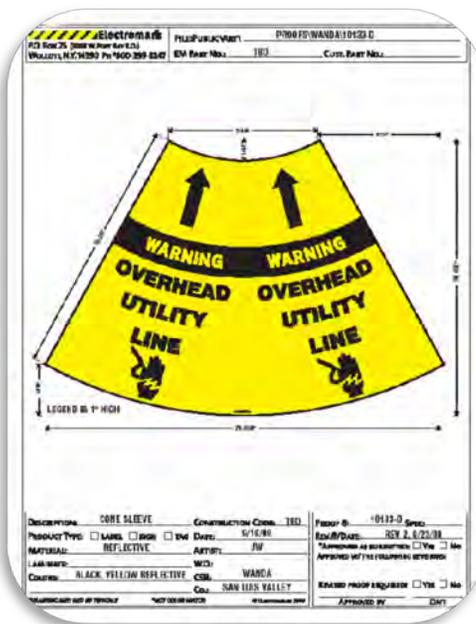
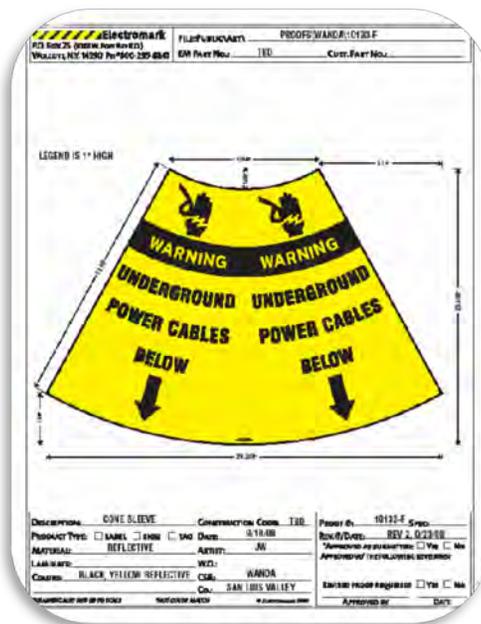
happen from an accidental contact. The program is also set up to not just warn of overhead utilities, but to give attention to an area that has underground utilities.

#### **Labor, Equipment, & Materials Used:**

28" tall traffic cones are used that are covered with a reflective and lime-green color sleeve developed specifically for this project which are about \$30 each. The wording **WARNING OVERHEAD UTILITIES** or **WARNING UNDERGROUND POWER CABLES** with an arrow on the signage pointing to the hazard area is used.

Items of the program that make it functional are listed below:

- A letter explaining the program is sent out to local contractors, various farm agencies and the County Road and Bridge contacts from participating utilities.
- Any serviceman or electric utility employee has the authority to implement the program if they see an area of concern during their travels throughout the utility's service area.
- Any construction, farm/ranch, maintenance or contracting firm has the option to request the safety cone zone program from any utility using the system in the area.
- Once an area is identified, do an onsite safety review (Job Safety Analysis) of hazards and concerns with the entity doing work in the area of the safety cone zone if requested. Ask how hazards will be managed with the work crew prior to work commencing.
- State laws prohibiting work within a certain distance of overhead electric lines should be obeyed. The Utility Notification Center in your state should be called before any work is started around underground utilities.
- The program restricts the raising of dump beds or any type of construction or farm equipment while in the Cone Zone area which would be 10 feet either side of the most extreme part of the overhead utility facility in relation to the road. Underground utilities would require the working approach distance as stated by the Utility Notification Center.
- Employees or personnel shall not have any physical contact (from equipment to ground) with any equipment while it is moving under an overhead line or digging in the immediate area of underground utilities.
- Night time operations are marked the same as daytime operation markings. Additional markers, lights and spotters are suggested.
- Inform working entity that in case of broken line to stay clear and contact utility immediately as line may or may not become energized.
- A standard to initiate the program would be if an electric utility crosses over or under the area of work or runs within 15 ft parallel to the work area.
- If an object or piece of equipment of high profile must be moved under an overhead line make sure a spotter has been appointed and if the safe distance of less than 10 feet will be reached the utility should be at the site to direct the operation in a safe manner. Also the utility could apply protective cover-up if considered necessary for the location.



- Notify entity working in the area if equipment does come in contact with over head line or underground cable, the operator is to stay on the equipment and that workers in the area are to stay clear of the equipment that has come in contact with the electric line until the electric utility has arrived.
- Inform the entity if the operator must clear the equipment because of fire or other emergency; make sure they understand to jump clear of the equipment with both feet together. Make sure to never contact the equipment and ground at the same time. Once off of the equipment, hop away keeping both feet together and hand and arms close to one's side.
- Inform the entity if equipment is operational and can be moved without doing further damage to the line,

poles or underground wire, do so. Do not step off of the equipment as long as it is in contact with the electric line until the utility arrives.

### Savings & Benefits:

With thousands of contacts each year, it was felt that it is good safety sense to promote prevention of accidental contacts of electric utility high voltage lines, above or below the ground. The program emphasizes safety by promoting the Do Not Exceed the 10 foot approach distance while working in the zone area. This includes but not limited to raising dump beds, loaders, forklifts farm equipment, backhoes, excavators, irrigation equipment or other equipment/hazards in the zone area. It is hoped that this useful safety resource can be promoted state wide as an option for utility hazard recognition to prevent accidental contact with high voltage lines. *Cone Zone* is very visual with the cones and sleeves and can be verbal when promoted with an onsite visit to help workers understand the dangers of electricity. ***All of this can save lives.***



## ***Honorable Mention in the 2010 Build a Better Mousetrap National Competition***

### **MULTI-USE WATER TRUCK**

#### **Bloomfield, Connecticut**

#### **Contact:**

Scott C. Short  
Operations Manager  
Bloomfield Public Works  
21 Southwood Road  
Bloomfield, CT. 06002  
sshort@bloomfieldct.org  
(860) 243-1480

#### **Problem Statement:**

We wanted to build a water truck with a cab controlled, pressurized spray delivery boom. It evolved into a multi use truck to service many needs for portable water for our dept.

#### **Discussion of Solution:**

We mounted and inter-connected two 500 gallon aluminum tanks on a truck chassis, incorporating a hydrant fill connection. It has a mounted portable pump for water distribution with a mounted hose reel with assorted nozzles. We also mounted a hot water pressure washer, and tool box for additional hoses. The back of the vehicle has a spray boom for street application, with its own cab controlled electric pump. All of the accessories are permanently plumbed, but have ball valves or fittings for service or repair. As the operator of this vehicle also cleans out offset basins and corner, two flat shovels and a street broom were mounted as well. We also added additional surplus safety lighting including an arrow stick with an ample supply of safety cones for hazards found and securing parking areas for sweeping operations.

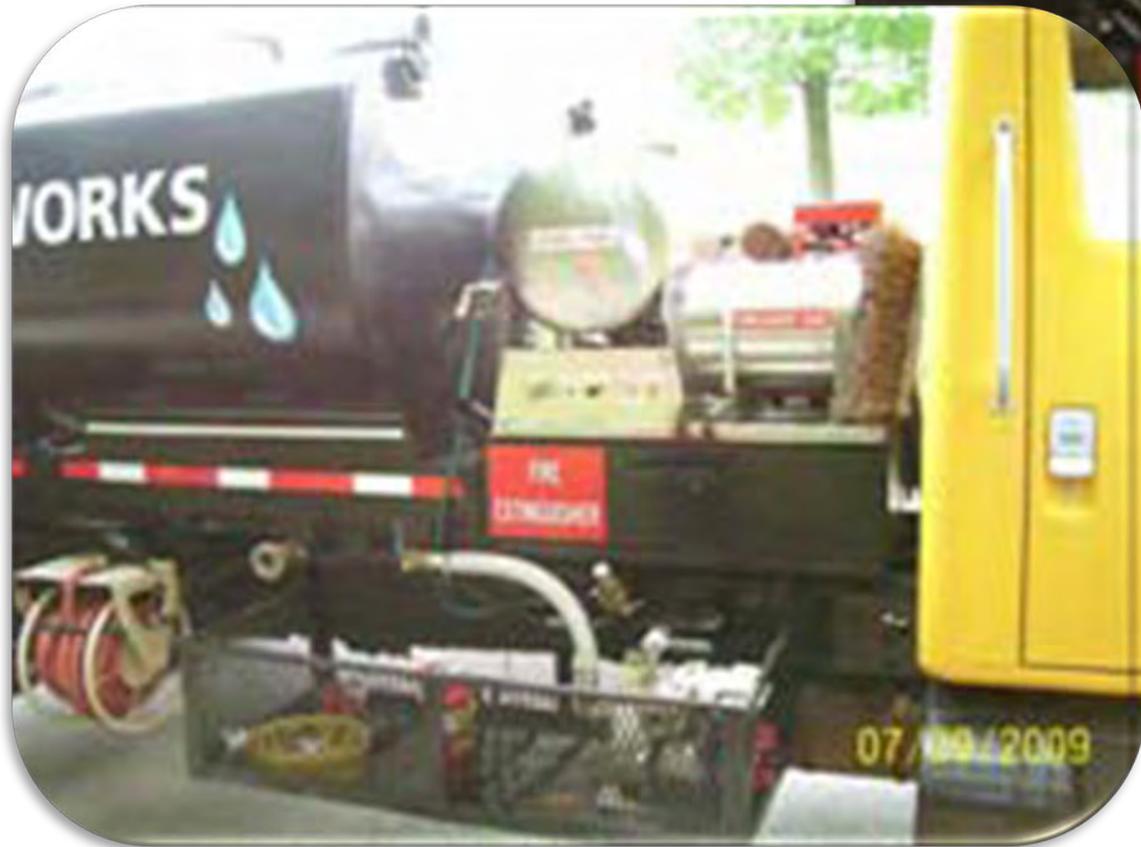
#### **Cost**

\$950.00

#### **Savings & Benefits:**

We wanted a vehicle capable of performing multiple tasks efficiently and realized we would have to build one to meet those needs. We utilized an older truck and military surplus tanks (state surplus) and a portable hot water pressure washer (state surplus), previously not being utilized.





*Honorable Mention in the 2010 Build a Better Mousetrap National Competition*

**BRIDGE BUILDING PROCESS – TIME AND SAFETY IMPROVEMENTS**

**Tuscarawas County, Ohio**

**Contact:**

Joseph S. Bachman, County Engineer  
832 Front Avenue SW  
New Philadelphia, OH 44663  
(330) 339-6648  
engineer@co.tuscarawas.oh.us

**Problem Statement:**

For many years we have constructed bridges completely with county forces, including pre-casting our own concrete beams for bridges up to 31' in length, building new abutments for longer concrete beams that were purchased, and bidding them furnished and set. The issues we wanted to address were the reduction of road closing/construction time from six weeks and the improvement of safety conditions by reducing the time working below grade building forms and tying steel.

**Discussion of Solution:**

Starting with engineering-standard abutment wall cage design, we were able to order our rebar for each abutment so that it was bent and shipped in kit form. We designed cage-tying jigs and had them fabricated by an outside vendor. We also purchased a lifting beam to load and set cages and forms. This allowed us to pre-assemble abutment wall cages in the off season along with our precast bridge beams. This also saved significant time and exposure spent below grade tying steel and setting form panels individually. Form panels were shop-assembled and lowered into place along with the pre-fabricated wall cages. Numerous other labor-saving and safety-related equipment and items were purchased and are outlined under costs.

**Labor, Equipment, & Materials Used:**

- Cage-tying jigs fabricated externally
- A purchased rebar-tying gun to reduce time
- A purchased, pre-engineered lifting beam to handle cages and form panels
- Bridges, jigs, and wall braces engineered in-house



- Racks for form trailer fabricated in-house
- Form supply cabinet fabricated in-house

**Cost:**

- Fabrication of cage-tying jig: \$1800.00
- Lifting beam – pre-engineered manufactured unit: \$15,500.00
- Rebar tie gun: \$2200.00
- Form trailer – 6 ton: \$4600.00
- Form supply cabinet: \$500.00
- Steel form braces: \$1900.00
- Used stretch trailer (for transportation of cages and forms): \$8500.00
- Form walk planks: \$1520.00

**Savings & Benefits:**

- Reduced inconvenience to the traveling public as road closures were reduced from six to four weeks
- Reduced labor costs by utilizing a three-person crew and spending fewer hours on site
- Created additional off-season work for bridge crew
- Allowed for efficient and productive work for county forces, saved profit costs of using outside contractors, and saved taxpayer dollars
- Improved safety by reducing work below grade by 90%
- With time saved, we are now able to build additional bridges during the construction season (an average of eight per year)



## ***Additional Entries***

### **Connecticut LTAP**

#### **MODIFIED SALT CHUTE**

##### **Connecticut Department of Transportation**

**Contact:**

James F. Wilson  
Training Coordinator  
Connecticut Department of Transportation  
Bureau of Highway Maintenance, District 2  
(860) 823-322

**Problem Statement:**

The modified materials chute is a conceptual model that was created and field tested to determine the feasibility of improving the Department's effectiveness to apply snow and ice control materials to the State's roadways during winter storm conditions. Over-scattering of snow and ice control materials is a contributing factor leading to the ineffectiveness for deicing materials to work at maximum capabilities.

**Discussion of Solution:**

By bypassing the truck's salt spinner, this chute allows for maximum flow of a material onto the middle of the roadway, increasing the effectiveness of the material and allowing the brine solution to work more efficiently. Tests show greatly reduced scatter and experience has shown a reduction in the amount of material used.

**Cost:**

The cost to research and create the modified materials chute will be minimal to the Department. The chutes were made from recycled street signs that were designed to conform to the various designs of our 9-ton dump trucks.

The Department uses three basic styles to accommodate the different types of vehicles in our fleet. The only cost incurred would be the labor to manufacture the modified chute. The testing chutes were created with a few basic hand tools and work bench, our production chutes will be produced by a metal brake to department specifications.



**Savings & Benefits:**

In addition to the benefit of greater control over the placement of snow and ice control materials, operators reported that they noticed they used less snow and ice control materials during various types of storms. It appears that the increased concentration and the placement of snow and ice control materials reduced the time needed to create a salt brine solution. In some cases it extended the time between reapplication of the snow and ice control materials. Some operators decreased their application rate in response to the results of the modified materials chute effectiveness.



## TRAFFIC CONTROL VEHICLE

### Bloomfield, Connecticut

Peter Joseph  
General Foreman  
Bloomfield, Public Works Department  
21 Southwood Road, PO Box 337  
Bloomfield, CT 06002  
(860) 726-9394  
pjoseph@bloomfieldct.org

#### Problem Statement:

The Bloomfield Public Works Department has always stressed the safety of its employees. Following training, one employee found it challenging to properly apply Work Zone Safety to his work environment. With consultation and assistance from CONN-OSHA, and some additional training with the crew chiefs, it was determined the best way to integrate work zone safety was to make it part of the job, and as easy as possible.

#### Discussion of Solution:

Much Traffic control was stored in the building in various locations, or on various trucks, and shuttled around on an as needed basis. A step van surplus to our needs was very slightly modified with some additional exterior lighting, a step platform and grab handles, and some interior lighting for night use.

#### Cost:

Exterior lighting and lettering cost maybe \$600.00. The van and all the contents were already here, in various locations and it took 2 to 3 workdays in the shop for the step and up-fitting.

#### Savings & Benefits:

Each traffic control device stores in the van, so it is simple to deploy and the truck itself is usable as a barrier to traffic. While a single function vehicle, it is usable as is by Public Works, Police, the Fire Departments, etcetera, so all town traffic control events are serviced by one unit.





## CONTEXT SENSITIVE SALT SHED

### East Haddam, Connecticut

#### Contact:

Frederick G. Thumm, P.E.  
Director of Public Works  
Town of East Haddam, Public Works Dept.  
P.O. Box K  
East Haddam, CT 06423  
(860) 873-5023  
pwdirector@easthaddam.org

#### Problem Statement:

East Haddam has an area of 56 sq. mi. and 119 miles of road to maintain. Remote storage for sand/salt at a second site is necessary; but budget constraints would not allow a pre-engineered conventional salt shed building.

#### Discussion of Solution:

Pre-cast 6'x6'x3' concrete blocks were available at no cost from a bridge job recently completed in Town. Town forces did the site preparation and layout. Sixty blocks were moved to the site and set in place by the Town. The Town issued a performance-based "design-build" scope for a carpentry contractor to create a structure in compliance with performance standards identified by the Town's Director of Public Works. There was no architect or engineering firm employed. Contract administration and quality assurance was performed in house by the Town's Public Works Director and Road Foreman. The Town's Building Official provided plan review through the permitting process.

#### Cost:

Estimate \$29,000 for all carpentry work and material. This does not include the value of the Town's labor or donated concrete blocks. We believe this represents a cost savings of more than \$60,000 compared to a conventional dome or gambrel topped structure for this use.

#### Savings & Benefits:

The benefit is an effective covered storage building that will safeguard the environment, reduce over-the road truck time to refill during storm events and do so in an aesthetically pleasing, economical way.





## Ohio LTAP

### CONCRETE BOX CARRIER

#### Clinton County Highway Department

##### Contact:

Randy Mitchell, Highway Superintendent  
David Krazl, Engineering Technician  
1326 Fife Avenue  
Wilmington, OH 45177  
(937) 382-2303  
cchdsuperintendent@yahoo.com  
dkrazl@clintoncountyengineer.org

##### Problem Statement:

Our county government agency is unique in the fact that it is one agency amongst a few small, local transportation agencies that actually makes its own pre-cast, concrete, three-sided box culverts. The problem was moving the recently-poured pre-cast concrete structure out of the culvert shop and into the yard safely. The boxes weigh anywhere from six tons to ten tons depending on their sizes; this made using the forklift difficult (if not dangerous) to move over a long distance to the yard. The main concerns were upsetting the forklift, point-loading of the box onto the forks, and the box sliding off the forks en route to the yard.

##### Discussion of Solution:

One idea was to back a flatbed semi-trailer into the culvert shop and load the boxes. However, this process was cumbersome and time-consuming. Another problem was the difficulty of maneuvering around obstructions within the narrow confines of the culvert shop.

The solution was to design a carrier to transport the boxes safely to the yard without damaging the culvert boxes and, more importantly, to eliminate any possible injury to the workers. We also needed to build a carrier that could withstand the weight of the boxes. The carrier needed to be narrow and maneuverable enough to fit in the culvert shop and around any obstructions.

The box culvert is lifted from the curing station and set safely onto the box carrier using the stationary crane. The carrier is then pulled out into the yard using a forklift. The box is then lifted off the carrier using the same forklift and set onto the surface safely. Additionally, with the pull of a few pins, the carrier can be adjusted to accommodate the different-sized box culverts that are pre-casted during any given season. The tires are solid-filled; this eliminates any punctures. Another attribute is that the





carrier is light enough to be moved around by one person guiding with the tongue, yet still strong enough to haul a 10-ton box culvert.

**Labor, Equipment, & Materials Used:**

We were fortunate that very little expense for materials was needed for the fabrication of the carrier. The basic running gear came from a donated, dated "C" container hauler from a local air freight shipping company. The steel rails and tubes that the box culverts sit on were from some material from a steel bridge that was replaced. Fabrication of the carrier was done by two of our skilled mechanics. Hours of labor, including modifications and painting, were just under twenty.

**Cost:**

Original "C" container running gear: Free

Additional steel for modifications: Free

Misc. Parts (hardware, welding rods, paint): \$100.00

**Savings & Benefits:**

The most important benefit of the carrier is that it minimizes the risk of injury to our workers who are transporting the heavy concrete boxes, which is of immeasurable value. Secondly, the carrier reduces possible damage to equipment and to the concrete boxes. Third, by speeding up the process of moving boxes to the yard because of the maneuverability of the carrier, we recognize a cost savings.



## **DEBRIS RAKE**

### **Pulaski Township, Ohio**

#### **Contact:**

Ray Boucher  
06646 SR-127  
Bryan, OH 43506  
(419) 636-2472

#### **Problem Statement:**

Many Pulaski Township farmers use the No-Till farming method which leaves bean stubble, corn stalks, dead weeds, etc. on the land. When we get flooding rains, the debris is carried to the ditches and catch basins, causing overflow to the roads and plugged basins and drains.

#### **Discussion of Solution:**

The debris from No-Till farming needed to be cleaned up to keep water flowing and the catch basins clear, and using the front loader bucket to scrape was destroying the ditch banks. The idea I came up with was to put a rake on the backhoe in order to pull debris from the ditch without destroying banks and catch basins. This rake causes little damage. The debris is then pulled onto the roadway, picked up with a loader, taken to the Township building's mulch pile, and recycled with leaves and grass clippings.

#### **Labor, Equipment, & Materials Used:**

Two hours in-house labor  
Welder  
Torch  
Miscellaneous flat iron

#### **Cost:**

Misc. flat iron: \$25.00  
Three-point rake: \$500.00

#### **Savings & Benefits:**

We spend little time repairing damaged ditch banks, and the flood waters recede quicker due to the clear basins; this means less time is spent monitoring flooded roads and citizens with flooded properties. An added benefit is that the township citizens use the mulch in their gardens and flower beds.

## FIRE HYDRANT PREVENTIVE MAINTENANCE

### Dublin, Ohio

#### Contact:

Harold Dellenbach  
Gary Browning  
6555 Shier-Rings Road  
Dublin, OH 43016  
(614) 410-4750  
HDellenbach@dublin.oh.us  
GBrowning@dublin.oh.us

#### Problem Statement:

Sometimes fire hydrants are very hard to open, resulting in broken stems and couplings. This is an annual problem (sometimes twice a year) that occurs when our local Fire Department flushes all hydrants. Repairs and parts can become very expensive very fast, and O.O.S. hydrants are unsafe.

#### Discussion of Solution:

Our Water Department employees figured out a way to prevent this damage and lengthen the life of the hydrant's internal parts. On the American Darling #73-2 they removed the pipe plug part #73-5-3. They then installed an appropriate-sized grease zerk fitting in the opening. Next, the operating nut was filled with food-grade grease through the grease fitting. The Fire Department could then easily open the hydrant during emergencies as well as not break the stem or coupling parts. This will also aid in future maintenance as an employee can add a few squirts of grease during summer painting schedules.

#### Labor, Equipment, & Materials Used:

Labor is minimal and takes less than fifteen minutes per hydrant. Simple hand tools and food-grade grease complete the task.

#### Cost:

Food-grade grease: \$11.00 per tube / \$0.85 per hydrant  
Grease fitting: \$0.81 per hydrant  
Fifteen min. of labor: \$6.00



### Savings & Benefits

The benefits are fewer broken hydrants and a lower overall cost for maintenance (maintenance cost is \$7.66 vs. \$187.00 for a broken hydrant). In the event of a fire, the hydrant will operate appropriately.



## SIGN TRUCK / WORK ZONE SET-UP TRUCK

### Bowling Green, Ohio

#### Contact:

Brandt Corral, Public Works Sign Shop  
Brian Craft, Public Works Director  
304 N. Church Street  
Bowling Green, OH 43402  
(419) 354-6227  
bcorral@bgohio.com  
bcraft@bgohio.com

#### Problem Statement:

We needed to replace a badly deteriorated bed of a sign truck with one that would be sufficient in design so as to be able to carry all needed supplies on a daily basis, including signs for an emergency if needed. At the same time, we needed to maintain a safe work area and have a highly visible truck that allowed for the largest possible work area.

#### Discussion of Solution:

We have now actually built three sign trucks in-house for Bowling Green Public Works. This design utilizes a 1999 International Chassis already in use. The chassis has a short wheel base that allows it to maneuver into tight areas. The truck has an Atlas 60.1 crane with two knuckles with a 27' reach from the base. At the end of the extension boom is a Fairmont hydraulic hammer capable of 1800 BPM. The hammer has been modified and is hard-attached to allow for precise control from the ground using the controls of the truck and operated by a single operator. At the end of the boom is a large hook used to attach a chain for pulling posts, lifting concrete basins, and even for pulling small equipment stuck off the road (i.e., a mower).

The bed has four tool boxes, two being Diamond plate; the first is a 24" square torch box with a torch set and shovels, while the second is a storage box that holds tow straps, two portable sign stands, two roll-up STOP signs, and two roll-up ROAD CLOSED signs, along with other tools. The third and main box was custom-made ten years ago, again in-house, and was designed to hold up to fifty signs of different sizes without scratching the face of the signs. It also has a storage area for bent or very large signs and custom-built tool boxes that fit into the sign storage areas. The fourth box is a hand tool box that fits into a cut-out on the floor so that all hand tools can be reached from the ground or the bed of the truck. At the rear of the truck is a recycled, aluminum ambulance bumper/step that extends the width of the truck, with each side having two additional steps for access into



the bed of the truck (the bottom step is attached using recycled rubber). This way, if the steps hit anything they will bend up out of the way. At bed height are stainless steel hand rails on each side that were made from a recycled swimming pool ladder. The bed has two steel posts mounted to it that hold cones and keep them neatly stored on the bed. Built into the rear of the bed is a storage area for carrying posts up to 12' in length.



Even with all this equipment, a very large area for two people to work at the same time or for storing work zone signs/a hundred or more cones still remains. Also, on the end of the truck is a directional arrow used when setting up work zones or during other unexpected jobs, accidents, or emergencies. The truck is fitted with an overhead strobe light along with strobes at each corner of the truck, and the bed was updated with all new LED lights.

**Labor, Equipment, & Materials Used:**

All labor was done in-house by our mechanics/fabricators. The steel for the bed was purchased through local suppliers and was used to build the bed from scratch.

**Cost:**

The total cost of supplies was less than \$2000 which includes all steel, lights,

paint, and wood for the decking.

**Savings & Benefits:**

The city has the benefit of knowing that a traffic sign can be replaced in a matter of minutes when the sign truck pulls onto the scene of an accident, and that time is not wasted in trying to find supplies. Also, only one truck is needed to perform several duties and can go from one kind of job to a completely different task without wasting time, fuel, or man hours. In addition, city employees built the truck which saved thousands of dollars in taxpayer money.



## **ENCLOSED RAIN BARREL VALVE NUT WRENCH**

### **Sheffield Lake, Ohio**

#### **Contact:**

William Lee Gardner  
609 Harris Road  
Sheffield Lake, OH 44054  
(440) 935-1432  
williamlgardner@yahoo.com

#### **Problem Statement:**

The City bought food-grade, one-piece 60-gallon barrels for residents to use as converted two-valve rain barrels. This program improves water quality, conserves and reduces treated water, and controls erosion run-off. Over fifty rain barrels have been installed in the City.

#### **Discussion of Solution:**

Due to fixed lids on the barrels and the desire to reduce the mosquito population, we needed a tool to be placed inside the barrel that included a valve nut that could be screwed on to the two shut-off valves that were uniquely placed in the barrel. No human hand could reach the locations.

#### **Labor, Equipment, & Materials Used:**

John McCallie, our City mechanic, used the following materials to weld washers on to rebar, cut to the valve nut size. Duct tape was used to hold the washer to the tool. The material used was two pieces of rebar (24 inches and 48 inches), two one-inch flat washers notched by torching or grinding to washer size, and a piece of duct tape. The welding and cutting took fifteen minutes with one tool having a seven degree off-set angle and the other one at 45 degrees to the rebar. The total time needed to manufacture these two tools was fifteen minutes.

#### **Cost:**

Project materials: \$4.10  
Labor, including fringe benefits: \$10.00

**Savings & Benefits:**

The Street Department is responsible for sheet run-off and street flooding. These project tools allowed homes to collect rain water and delay run-off as well as reduce water needed for their gardens and rain gardens. These barrels have reduced road repairs by reducing street water puddling. Removing sealed barrel tops is not practical, and by buying one-piece barrels the City saved \$23.00 per barrel. These tools can be adapted with different washers to provide nut holders for tight and enclosed applications.



## SALT MIXING TO ACHIEVE OPTIMUM RESULTS

### Ottawa County, Ohio

#### Contact:

Joe Verb  
8247 W. State Route 163  
Oak Harbor, OH 43449  
(419) 898-6463  
jverb@co.ottawa.oh.us

#### Problem Statement:

Salt prices almost doubled, and the salt availability was cut by 25%. Our budget was already stretched to the point where it was about to be broken, and we needed a way to provide safe roadways during the winter months with less salt. Even if we were able to afford our allotted amount of salt, we may not have been able to get the amount we needed to provide the safest roads possible.

#### Discussion of Solution:

We determined that the best way to control costs would be to mix the salt with a fine limestone at a 50/50 ratio, and then add a deicing liquid to it. One of the fears was whether or not we could do it efficiently and effectively with just a loader and a spray hose. We were afraid that there would be instances where the mix would have areas that would be nothing more than limestone, thus not giving us any deicing properties at all. We discussed using a rotary blender to achieve a mix that was even throughout. After getting prices on new rotary stainless steel blenders, we determined that we could not afford one. We then called a local concrete company to see if they had any old, used concrete mixing trucks they wanted to sell, since they were in essence the same as a rotary blender. We found and purchased a concrete mixer and set out to find a conveyor to load the mixer. We talked to the local quarry which had a conveyor deemed useless; we bought it for scrap price. We brought the conveyor back to the shop and replaced the worn-out parts and the belt. We then made a loading hopper to direct the material onto the conveyor. Once all the parts were put together, we placed the conveyor and hopper by the salt barn and had an electrical contractor run the wiring to power the conveyor. Once all the pieces were in working order, we started mixing at a 50/50 ratio and adding a deicing liquid.

#### Labor, Equipment, & Materials Used:

The mix consists of nine tons of rock salt, nine tons of Ohio #9 limestone, and 200 gallons of deicing liquid. We can currently mix at a rate of approximately 36 tons per hour. We use the concrete mixer and a loader to charge the mixer. One person is in the mixer, and one is in the loader at all times during the operation.





### **Cost:**

Considering the FEMA rates for the loader and the concrete mixer truck, labor rates for two people, and the actual cost of the materials, we made a salt stone mix that was \$60.49 per ton. During this winter season, salt prices are \$73.82 per ton. The difference is \$13.33 per ton, and at that rate we would break even on the project if 2,152 tons of mix were used. Our total salt usage for the prior year was 4,313 tons. Total cost to set up the mixing process was \$28,686.41, which included the mixer, conveyor, load hopper, and electrical wiring.

### **Savings & Benefits:**

There are many benefits to the mix. The loads do not freeze in the trucks, there is instant traction with the limestone, the salt works faster, and the liquid has a longer residual effect than plain salt. If it were not for the mixing, there would have to be a lot less liquid in the mix due to leeching. When the loads are not frozen in the trucks, the trucks are on the road and not having to try to get clumps of salt out of the spreading systems. The cost for the '07-'08 winter season for ice control materials

was \$160,660.00, and the cost in the '08-'09 season was \$159,050.00. However, the numbers alone do not show the savings as salt actually increased by \$36.57 per ton between the two periods. The mixing operation provided the same level of service to the public at the same cost even though salt prices almost doubled. The plow drivers also noted a definite benefit when they first started using the mix.



## UNDER BODY PRESSURE WASHER ADAPTER

Atwater Township, Ohio

### Contact:

Tim Whittlesey  
P.O. Box 9  
Atwater, OH 44201  
(330) 947-3494  
t.whittlesey@hotmail.com

### Problem Statement:

Salt builds up and corrodes the chassis of trucks. Washing under trucks thoroughly is hard with a normal pressure washer.

### Discussion of Solution:

We needed to build a simple tool to clean under trucks. The tool must be easy to use and incorporate our existing pressure washer.

### Labor, Equipment, & Materials Used:

It took less than an hour to build, and all that was purchased was a 50" lance extension, a street elbow, and a quick disconnect.

### Cost:

50" lance extension: \$23.00  
1/4" NPT street elbow: \$4.00  
Quick disconnect: \$10.00

### Savings & Benefits:

This saves time and helps do a better job of washing equipment. Trucks and equipment should now last longer and need fewer repairs from salt corrosion. No one washes underneath like we do.



## COMPLETE SALT CONVEYOR SYSTEM

Butler County, Ohio

### Contact:

Scott Bressler  
1921 Fairgrove Avenue  
Hamilton, OH 45011  
(513) 785-4128  
bresslers@bceo.org

### Problem Statement:

We needed to come up with a way to stack salt into our dome quickly so we didn't hold up the drivers bringing the salt to us. Drivers are paid by the load delivered and will haul to other agencies first if they can get more loads off. Whatever we came up with needed to be efficient and inexpensive.

### Discussion of Solution:

We knew we most likely needed some type of belt elevator, either one with its own power source or one powered by existing equipment. We didn't want to spend a lot of money for the conveyor and hopper. We looked at similar systems used statewide, which cost \$40,000 to \$80,000, and decided to purchase an agricultural belt elevator powered by the PTO from our mowing tractor. The hydraulics from the tractor also powered the conveyor system, which needed to be raised or lowered. The next concern was the issue of getting the salt from the delivery truck onto the elevator quickly. We decided to use a retired V-box which we mounted on a running gear from an agricultural wagon. The V-box conveyor is powered by the hydraulics from the same mowing tractor used to power the conveyor. The tractor is also used to move both pieces of equipment into place. With the hopper we were able to have the delivery trucks simply dump the salt next to the hopper where we would then load the hopper.

### Labor, Equipment, & Materials Used:

We used a welder, torch, and grinder. Miscellaneous steel, hardware and paint, an agricultural conveyor, a v-box, used running gear, and a hydraulic motor were also used. We also used one week of in-house labor.

### Cost:

Agricultural Conveyor: \$14,000

V-Box: \$1,000

Used Running Gear: \$800

Hydraulic Motor: \$250

Miscellaneous Steel & Hardware: \$400



Paint: \$100  
Labor: \$3560  
Equipment: \$100  
Total Cost: \$20,210

**Savings & Benefits:**

Like most agencies, we needed to find a way to keep the salt deliveries coming in and a safe way to stack salt in the dome. This all needed to be done in the most efficient and least expensive way possible. We were able to do this for the above-mentioned cost, when it could have cost us upwards of \$80,000 for a commercial salt conveyor. The benefits we have noticed are that the drivers who bring salt to us like the fact that they can pull in the yard, dump, and leave quickly. The loader operator does not have to stack salt in the dome, which takes time and is unsafe. Most of all, we can stack the dome full, using every square foot of the dome's capacity.



## **CRACK SEALING DE-TACK TRUCK SYSTEM**

### **Dublin, Ohio**

#### **Contact:**

Gary D. Browning  
6555 Shier-Rings Rd.  
Dublin, Ohio 43016  
(614) 410-4703  
gbrowning@dublin.oh.us

#### **Problem Statement:**

We purchased a new Crafcro Supershot Melter to begin in-house crack sealing. However, we had no efficient way of spraying de-tack solution on the fresh sealant to prevent the public from tracking it on to their vehicles. Sand was not an option due to EPA concerns along with additional sweeping costs for clean-up. Flooding the road with a de-tack solution seemed like a waste of money as well. Our only current option was a hand-help pump sprayer or backpack sprayer.

#### **Discussion of Solution:**

With the constraints upon me and the necessity of keeping the roadway open at all times, I began to draft a plan to retro-fit our chase truck to apply de-tack. The configurations included using the existing plow mount to provide a kind of quick coupling device that could easily be changed from crack sealing to snow and ice purposes. The tank and pump being mounted to the steel skid also allowed for quick mounting and dismounting procedures. The steel skid is bolted in with hardened bolts to provide load securement.

#### **Labor, Equipment, & Materials Used:**

All items used were either scrap materials or items already acquired: 4-cycle water pump, 150 gallon poly tank, retractable hose reel, garden hose, steel stock, and fittings. Labor included only two employees to set up.

#### **Cost (Estimated):**

Pump \$350  
Hose Reel \$100  
Hose/fittings \$50  
Tank \$150  
Steel Skid/Extra Steel \$350  
\$ 1000 +/-

**Savings & Benefits:**

Now, the truck and operations are very efficient. We have eliminated the need to burden the City of Dublin with budgeting for another specialty vehicle. Employees are not burdened by carrying a hand sprayer all day and filling it every half hour to an hour. This set-up could also easily benefit other applications. When de-tack is not in use, the system could be used for spraying other materials (salt brine, etc.) onto aprons and walkways in the winter or watering plants in the summer. An additional reel and hose could be added to the steel skid with a Y-valve in order to spray from the rear when plowing is needed. Special thanks go to mechanic Scott Herd for his help in making this possible.



## CONE AND BARRICADE TRAILER

### New Albany, Ohio

#### Contact:

Brian Strayer  
7800 Bevelhymer Road  
New Albany, OH 43054  
(614) 855-0076  
bstrayer@villageofnewalbany.org

#### Problem Statement:

Every time cones and/or barricades were needed for an emergency road closure, parade, or special event, equipment had to be loaded into the bed of a truck or onto a trailer after it was unloaded from storage. Response to an emergency could take upwards of 1 ½ hours. Expensive equipment was being damaged due to its movement from one place to another, it sliding around in the bed of vehicles, and it being stored outside in the sun.

#### Discussion of Solution:

The New Albany Service Department designed a 20' trailer with a 4' rail to store barricades and cones. The rail has five openings for access. Each opening has two chains across it to prevent equipment from falling out. Type III barricades were placed upright in the front of the trailer. Cones were stacked in the middle of the trailer.

Two problems came to light while using the trailer. One was the difficulty of unloading and loading the barricades. Our staff fabricated and mounted a rack to the front rail to hold the barricades off the floor. A bar was mounted to the floor to prevent the "feet" from sliding.

Another issue we ran into was trying to keep the stacks of cones upright. During transportation, stacks of cones would move around and fall over onto other stacks. The staff designed a cone-shaped base to mount to the floor. For the most part, this has held up very well. Staff also mounted strobe lights for increased visibility on three sides and hooked them into the parking lights.

#### Labor, Equipment, & Materials Used/Cost:

Trailer: \$2555.00

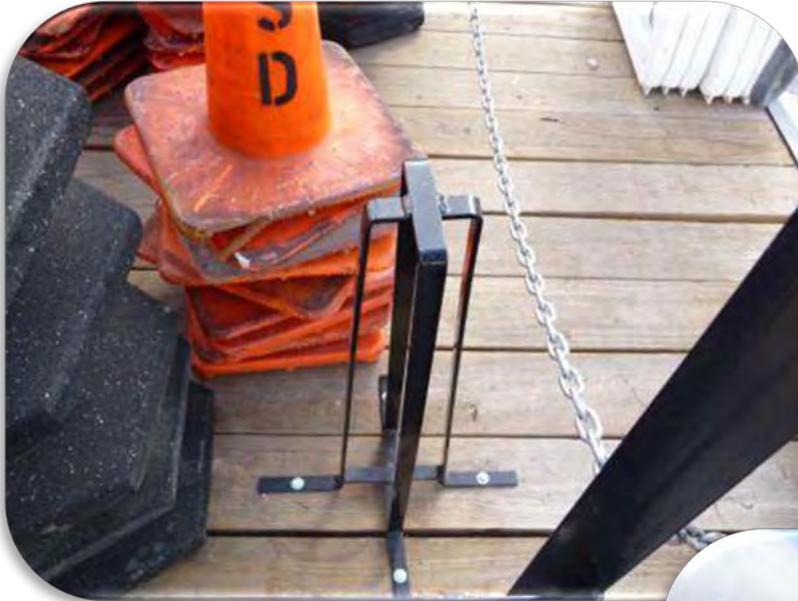
Miscellaneous Materials: \$650

Labor: \$1200



### **Savings & Benefits:**

The largest benefit is increased efficiency. Currently, when a call comes to respond, staff simply must hook any truck with a hitch to the loaded trailer and go. It is backed into the garage and easily accessible. There is also a reduction in lost time since crews are not loading and unloading equipment to make room for the cones and barricades. Another cost benefit is less damaged equipment since everything is secured. The life expectancy of the equipment is greater, requiring less frequent replacements. In the past, set-up and tear-down for parades required three to four trucks and two trailers. Currently, we use two trucks and one trailer to complete the same tasks.



## **BERM INSTALLER AND GRADER**

### **Newark, Ohio**

#### **Contact:**

Brian Morehead  
40 W. Main Street  
Newark, OH 43055  
(740) 670-7725  
Morehead@newarkohio.net

#### **Problem Statement:**

We were looking for a better way to install gravel berms on newly paved streets. The previous method was to distribute the gravel by hand or with a motor grader. These methods were time-consuming and did not do a neat job.

#### **Discussion of Solution:**

The idea was to add an improvement to the belt-driven gravel spreader (the white unit shown.) The spreader is hydraulic-driven and can distribute material from either end. We took this unit and built a frame (painted orange) that would hook to the back of a large dump truck, similar to a "Buckeye Box". When the dump bed is raised, the steel wheels under the unit would run on the pavement. An operator would have an area on the back on which to ride and operate the entire unit. The side shoe on the left side of the unit can be set from 12" to 24" wide to fill berms of varying widths. The operator can also adjust the depth of the berm by lifting or lowering the shoe.

#### **Labor, Equipment, & Materials Used:**

A Street Department mechanic and employees built the additional framework using 2" and 3" square box tubing, deck screen, sheet metal, and angle iron. The two steel roller wheels came from a local junkyard. The hookup used is from an old snow plow truck that was going to be sold.

#### **Cost:**

The cost of the steel materials was approximately \$400. Several hours of planning, cutting, and welding were not documented.

#### **Savings & Benefits:**

This unit allows the Street Department to berm the newly-paved streets at a much faster rate. There is very little hand work needed. The work is much neater, less material is wasted, and the berm is more uniform in width and depth. The berming is completed in about half the time, which allows the City to do work with its employees as opposed to hiring an outside contractor.

## **WORK ZONE SET UP TRUCK**

### **Newark, Ohio**

#### **Contact:**

Brian Morehead  
40 W. Main Street  
Newark, OH 43055  
(740) 670-7725  
Morehead@newarkohio.net

#### **Problem Statement:**

Our Street Department maintains several miles of four-lane State Route 16. This maintenance often requires closing one lane for patching, storm sewer cleaning, sweeping, etc. We needed a vehicle that would have all traffic signs and cones in a handy location and be easy to deploy and collect afterwards.

#### **Discussion of Solution:**

We used a Ford F-250 pickup truck that had a rusted-out bed. We removed the bed and built a flat bed with compartments for all of the traffic control items. The truck now carries 100 cones and sixteen different signs. Six-inch plastic pipe holds 3' x 3' plastic signs, and the sign brackets are also carried onboard. The rear deck allows the cones to be set or picked up, and the seat can be mounted on either side of the rear deck. The bed has a walkway up the middle so that workers can reach the cones or signs from the inside or outside of the bed.

The seat described above has been equipped with a seat belt for safety purposes.

#### **Labor, Equipment, & Materials Used:**

A Street Department mechanic and employees cut out the two-inch square tubing, 1 1/2" angle iron, and sheet steel and welded the unit together. Six-inch plastic sewer pipe was mounted to hold collapsible signs. The seat is from an old asphalt paver that was sold.

#### **Cost:**

The pickup truck is a 1995 model, retired from everyday use. The cost of the steel material is approximately \$1000, and the cost of the pipe is approximately \$100. Labor cost was not documented.

#### **Savings & Benefits:**

The small truck is more versatile and efficient than a large truck. It also eliminates the need for a separate trailer to haul these items. The traffic control items are deployed and collected faster, keeping traffic disruptions to a minimum on this State Route. It can also be deployed quickly in emergency situations.

## **LEAF BLOWER HITCH ASSEMBLY**

### **Chagrin Falls, Ohio**

#### **Contact:**

John Brockway  
21 W. Washington  
Chagrin Falls, OH 44022  
(440) 247-5053  
John@chagrin-falls.org

#### **Problem Statement:**

Several of our village parks, along with a large cemetery, contain many mature deciduous trees. Leaf removal from these areas is necessary throughout the fall season. Previously, both push blowers along with backpack blowers were used to remove the leaves. This resulted in much equipment wear, fuel cost, and additional man hours. Some years we were unable to remove all the leaves before snowfall, resulting in damage to turf areas.

#### **Discussion of Solution:**

We designed a hitch assembly to hook up to and pull our existing push blowers behind our riding lawn mowers. The hitch assembly is bolted onto the existing framework of the push blowers. This new assembly allowed for a more efficient and effective leaf removal. The blower can be disconnected simply by removing one pin in order to operate it manually.

#### **Labor, Equipment, & Materials Used:**

Band saw, grinder, welder, and drill press  
Approximately 4 man-hours  
4' 1 1/2 x 1 1/2 x 1/4 square stock  
6" 2 x 2 x 1/4 square stock  
8" 1/2 x 1 1/2 flat stock  
12" 1/2 x 1 1/2 flat stock

#### **Cost:**

Materials: \$63.00  
Labor: \$92.00

#### **Savings & Benefits:**

The cemetery crew is now free to clear leaves from other village properties. This mower/blower system results in greater leaf removal ability. The new system also saves time, fuel, equipment wear and tear, and overtime costs. Another benefit is that this system is physically less demanding on personnel.

## **SCOOTER PARKING PROGRAM**

### **Columbus, Ohio**

#### **Contact:**

Randall J. Bowman, P.E.  
Administrator, Div. of Mobility Options  
109 N. Front St.  
Columbus, OH 43215  
(614) 645-2464  
rjbowman@columbus.gov

#### **Problem Statement:**

The number of moped, motor-scooter, and motorcycle users is growing as a result of increased fuel and parking costs as well as the desire to cut carbon emissions. The use of these vehicle types should be promoted in order to enhance mobility options for the motoring public.

#### **Discussion of Solution:**

The City of Columbus initiated a program, commonly known as Scooter Parking, in 2008 to provide parking for two-wheeled motorized vehicles – motorcycles, motor scooters, and mopeds – in the central business district and two adjoining historic districts. These fuel-efficient vehicle types have become increasingly popular in Columbus and other metropolitan cities. The first phase of this program created 23 parking locations which were free to all riders. The second phase of the program began in 2009 and required riders to purchase annual permits to park in these locations.

#### **Labor, Equipment, & Materials Used:**

City forces erected signs and installed pavement markings to designate the Scooter Permit parking areas. The areas are permit areas from 8:00 AM until 5:00 PM, Monday through Saturday and are free to riders at other times. The city fabricated signs and printed permits to be sold to riders.

#### **Cost:**

The cost of providing signage and pavement markings for these areas has totaled \$27,500. The City expects that over time, the annual permit fees generated will pay for all costs associated with establishing and maintaining the program.

#### **Savings & Benefits:**

The Scooter Parking Program has provided safe and convenient parking for scooter users visiting, working, shopping, or living in the urban core. Riders can now park within steps of their destinations in many cases. 27 locations have been created to date that provide 302 parking spaces. The City has sold 147 annual permits for \$50 each as of November 2009, which is considered a bargain when the least expensive automobile parking permit is \$50 per *month*.

## **CURB CLEANER**

### **Walbridge, Ohio**

#### **Contact:**

Steve Smith  
111 N. Main St.  
Walbridge, OH 43465  
(419) 466-7459  
walbridgesteve@aol.com

#### **Problem Statement:**

Residents complained about parking issues when large amounts of snow were plowed against the curb. Parking a car and opening the door in the permitted areas became impossible. In an effort to get around this problem, residents would park further into the street, making travel difficult and hazardous.

#### **Discussion of Solution:**

Different techniques for snow removal had been experimented with, all of which being costly and requiring a shut-down of at least one lane of traffic during snow removal. The idea was to modify a loader bucket that would remove enough snow from the curb area to allow cars to park and doors to open. The piece of equipment could be operated without disruption of traffic or lane closures.

#### **Labor, Equipment, & Materials Used:**

Labor included one employee for eight hours with normal shop tools and a welder, one scraper blade from our scrap pile, miscellaneous scrap steel, and one piece of rubber belting. We also used a handful of miscellaneous bolts.

#### **Cost:**

Materials: \$0  
Labor: \$160

#### **Savings & Benefits:**

The use of this single piece of equipment eliminates multiple pieces of equipment. Therefore, it cuts labor expenses and prevents lane closures. This equipment creates a safe and fully functional parking area that allows our residents to park and open doors without damage to their cars and prevents them from having to climb over mountains of snow. This also allows residents to park within designated areas and not partially in the traffic lanes.

## LIFE-CYCLE EXTENSION CALCULATOR

### Westlake, Ohio

#### Contact:

Colin Durante  
Pavement Technology, Inc.  
24144 Detroit Road  
Westlake, OH 44145  
(440) 892-1895  
cdurante@pavetechinc.com

#### Problem Statement:

Asphalt pavement deteriorates due to asphalt binder dryout, water absorption, etc. When a pavement preservative tool is selected, the various elements of deterioration can be delayed by using the right treatment on the right pavement at the right time. In turn, the pavement's life cycle is extended and annual cost to own the pavement is reduced.

#### Discussion of Solution:

This "calculator" is intended to help the pavement management professional compute how the use of preservation tools can extend a road system's life in years, and thereby reduce the overall annual cost to manage their system. The first five field's values are selected by the user. The third, fourth, and fifth fields default to our Reclamite product. However, these fields are changeable by the user to any preservation tool desired, like chip seal, slurry seal, etc. The "calculator" also indicates how to pay for preservation by diverting a small amount of paving dollars to preservation and calculates the additional lane miles possible. Next, the "calculator" allows a review of the effect of a second round of preservation. Keep in mind that no commas or decimal points should be used on entries.

Following computation of life-cycle extension in years and reduction in life-cycle cost, the "calculator" offers another benefit. The "Green Effect" of extending the time between resurfacing also reduces CO2 or greenhouse gas emissions. Therefore preservation allows the calculation of the pounds of CO2 abated by less frequent operation of production plant, trucking, and pavement lay down operations.

#### Labor, Equipment, & Materials Used:

Not applicable, as the life-cycle extension calculator was designed and produced by industry and made available to the public works professionals at no cost.

#### Cost:

Free to public works professionals at [www.pavetechinc.com](http://www.pavetechinc.com) or on a CD from Pavement Technology, Inc.

**Savings & Benefits:**

When pavement preservation is employed, the annual dollars to maintain roads decline. In turn, public agencies are able to do more with their dwindling budgets. The "Green Effect" or CO2 reduction achieved by employing preservation can have a positive effect on the environment.

## **JOINTBOND LONGITUDINAL JOINT STABILIZER**

### **Westlake, Ohio**

#### **Contact:**

Colin Durante  
D & D Emulsions, Inc.  
24144 Detroit Road  
Westlake, OH 44145  
(440) 892-1895  
cdurante@pavetechinc.com

#### **Problem Statement:**

The longitudinal construction joint in an asphalt pavement is the weak point in the structure. This is due to reduced compaction approximately one foot on each side of the new joint. This is the most significant problem in need of a solution according to the FHWA.

#### **Discussion of Solution:**

To mediate this joint deficiency, we developed JOINTBOND, which is composed of maltene oils identical to those found in asphalt binder together with an SBR polymer. JOINTBOND is a cationic emulsion that is spray-applied in a two-foot wide strip over the longitudinal joint at controlled rates of 0.06 to 0.15 gallons per square yard at ambient temperature. The emulsion is absorbed into the pavement and fluxes with the in-place asphalt binder, adjusting its viscosity and creating an in-depth seal.

#### **Labor, Equipment, & Materials Used:**

The labor involved in application consists of a traffic control crew of two to four men and an operator of the spray-applicating equipment. The applicator is usually an asphalt distributor truck. The JOINTBOND material is applied at a variable rate of 120 to 150 gallons per mile of joint, depending on porosity of a given pavement.

#### **Cost:**

JOINTBOND, contractor-applied, has a cost complete in place of about \$3500 per mile. The material cost should average about \$1000 per mile in general.

#### **Savings & Benefits:**

Tests performed by the Tennessee Department of Transportation indicated no surface distress in the treated areas after three and five year observations. To date, about 200 miles of joint have been preserved with JOINTBOND, with an anticipated life extension of three to six years beyond the normal time for needed resurfacing.

## Nebraska LTAP

### RETRACTABLE TRUCK BED EXTENSION

#### Scotts Bluff, Nebraska

##### **Problem Statement:**

With limited truck bed length, delivering material to a job site was always a challenge. Delivering corrugated metal pipes which can be damaged with too much unsupported length being transported was also an issue. A longer bed could have been a solution but a short bed in many instances is more manageable on a day to day basis.

##### **Discussion of Solution:**

Truck with an extendable flat bed

Using existing flat bed, Scotts Bluff County built a retractable truck bed extension that will allow an additional four feet of support for over length materials. When dumping materials the extension allows the material to be supported closer to the ground. The extension can then be slid back into the bed frame when not needed. Since the extension was built in the frame, the bed height was not altered.

##### **LABOR, EQUIPMENT, AND MATERIALS USED:**

The extension was built in the County shop by Scotts Bluff County employees and took about fifty man hours to fabricate. Much of the material used was on hand.

The extension will provide an extra four feet of support for over length materials. The rails that ride inside the existing frame are 1/2" x 4 1/2" x 10' cold rolled steel. The rails are held in place in the frame as shown in the photos with 3/16" in the middle of the frame and 1/2" gussets at the rear end of the frame. The tubes in the center are 1 1/2" o.d. square and 2" o.d. square mild steel. The function of the tubes is to help with the alignment and to provide a way to secure the extension in the open or closed position with the use of a 5/16" lynch pin. The end support was made of 3" x 6" x 6' heavy tubing. The end support sits on top of the rails to align with the bed of the truck. The end support has the ends closed with 3/16" steel and is attached to the rails with 3/16" gussets. A 1" diameter tube was welded between the rails to keep the rails from twisting in the open position.

##### **Savings & Benefits:**

- Two bed lengths on one truck.
- When in use the extension will add four feet of additional bed length.
- Since the extension was built in the frame, the bed height was not altered.

FHWA LTAP/TTAP  
BUILD A BETTER MOUSETRAP  
NATIONAL COMPETITION  
National Entry Booklet 2011

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*Images from the 2011 Build a Better Mousetrap: National Competition*

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### **ADDENDUM, ADDITIONAL STATE MOUSETRAP BOOKLETS/ENTRIES:**

**Connecticut Creative Solutions Guide**

**New Hampshire Build a Better Mousetrap Competition**

**Ohio LTAP Center Build a Better Mousetrap Competition Entry Booklet 2011**

## What is the National Entry Booklet 2011?

The National Entry Booklet is a compilation of all the entries from the FHWA LTAP/TTAP 2011 Build a Better Mousetrap National Competition, representing LTAP/TTAP Centers from around the country. The purpose of the competition is to collect and disseminate real world examples of Best Practices, Tips from the Field, and assist in the Transfer of Technology. The Build a Better Mousetrap National Competition is a fantastic way for innovative ideas to be exchanged with others that may benefit from different concepts and perspectives. It is also a great way for local and county transportation workers and other LTAP/TTAP clients to get some well earned recognition for their hard work.

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## 1st Place Winner Cutting Edge Lift: North Dakota

### CONTACT:

Dunn County, North Dakota  
Randy Keller, designer  
711 1ST Avenue S.W.  
Halliday, ND 58636  
701.938.4485

### PROBLEM STATEMENT:

The changing of cutting edges on a piece of equipment has been a hardship to employees because of their size and weight. An eight foot cutting edge can weigh up to 110 pounds. Cutting edges are normally stacked in piles and must be lifted and moved to a piece of equipment to be mounted. It requires two people and they are still prone to injury. Back and foot injuries are very common.

### SOLUTION:

Randy built a cutting edge lift as shown in the photo to transport a cutting edge from a stack to the piece of equipment to be mounted. This cutting edge lift is unique because it has multiple adjustments. The adjustments include being able to raise the lift arm by a means of a ratchet from ground level to a height of six feet. The cutting edge can be secured to the lift arm by two screw clamps on each end of the arm. The angle of the lift arm can be angled so a single person can remove an old cutting edge and mount a new cutting edge on a piece of equipment without getting on the ground or under the equipment. The cutting edge lift can be used to mount cutting edges on motor graders, front end loaders, and snowplow truck wings and plows. On a motor grader the moldboard can be angled so the old cutting edge can be removed and a new one mounted from a standing position. Randy has built two lifts to date.



### COST:

The cost of the material to build the cutting edge lift was approximately \$200. That included the purchase of a ratchet, three caster wheels, and various sizes of steel square tubing. The cost of labor was 10 hours @ \$30 an hour for a cost of \$300. All the labor was done in the shop during slack periods of time in the winter when there was no snow removal required. Total cost of material and labor was approximately \$500.

### SAFETY:

Cutting edge removal and replacement on equipment is very labor intense and employees are prone to injury. The weight of cutting edges and positions it requires operators to place themselves into to get the job done is hazardous. Back, foot, knee and hand injuries are very common in this work activity. The design of this cutting edge lift requires minimal manual lifting. It has multiple adjustments which limit the amount of lifting and the need for an operator to get under a piece of equipment which is dangerous. Other cutting edge lifts designs are built from modified jacks having limited height capabilities and still require two operators to do the job safely. Randy's designed cutting edge lift eliminates hazards from manual lifting and getting into awkward working positions.

## 2nd Place Winner

### Highway Division Plow Blade Rack: New Hampshire

#### CONTACT:

Town of Merrimack, NH  
Bruce Moreau, Foreman  
80 Turkey Hill Rd.  
Merrimack, NH 03054  
603.423.8551

#### PROBLEM STATEMENT:

Plow blades were being stored in the highway garage on blocks of wood or pallets on the floor. Employees had to bend down very low to pick up the blades. Some of our blades weighed in at 160 pounds a piece and were very cumbersome to carry. With the variety of blades we need to inventory, we used up a lot of scarce floor space, which resulted in trip hazards as employees usually had to step over the blade stock for the one they needed. We recognized that we had a bad fall or a back injury waiting to happen.

#### SOLUTION:

We wanted to raise the blades higher off the ground so they were more easily accessible in a limited space and organize them by application and size. We wanted the heaviest blades as high up off the floor as possible to minimize bending. We could utilize the area under the rack for our lighter three and four foot blades.

#### LABOR AND EQUIPMENT:

Material consisted of 100 feet of 3 1/2 inch channel steel and 50 feet of 2 inch angle iron. We used in-house saws and welding tools to cut it up and put the materials together. In-house personnel did all the labor as time allowed in between snow used: and ice activities. The completed rack takes up approximately 9.5 feet X 5.5 feet of garage floor space (5.5 feet tall).

#### COST:

At current prices the steel order would come to around \$410.

#### SAVINGS/BENEFITS TO THE COMMUNITY:

Our biggest concern was the prevention of back, hand, and foot injuries as well as tripping hazards as we tried to get a blade from the back of the pile. The savings from the lack of injuries come under the category of cost avoidance from worker's comp insurance rates and claims. Another benefit is that since blade changes by operators are a common occurrence in the wintertime, this also helps avoid a lost time injury by a driver that would further result in a plow or spreader route not being covered. We gained more floor space as well. We have seen no downside to having this rack.

#### NOTE:

Fortunately we recognized the need for a plow rack many years ago and did something about it. Unfortunately, I don't have any 'before' pictures that would have shown the risk potential.



## 3rd Place Winner

### Concrete Cylinder Cure Boxes, and Carriers: Nebraska

#### CONTACT:

NDOR District 6  
Josh Willard, Highway Project  
1321 N Jeffers  
PO Box 1108  
North Platte, NE 69103-1108  
308.530.3325

#### PROBLEM STATEMENT:

Needed a place to securely keep concrete test cylinders on the jobsite where chain of evidence could be maintained.

#### SOLUTION:

Create a storage box that one field inspector could manage physically and would provide a safe and secure place for concrete cylinders to cure and be accounted for.

#### COST:

Preformed box = \$18  
Expanded Polystyrene (foam board) all sizes = \$5  
Construction Adhesive = <\$1  
Hardware (nuts, bolts, etc.) <\$3

The cost was around \$25 - 30 per box to build. We bought the Styrofoam in 4x8 sheets. 8 boxes were built with the foam and we still have some left-over, the same for the construction adhesive a single tube of adhesive was enough for several boxes. We figured the cost was very comparable to building a box entirely out of raw materials (plywood etc.) but the amount of labor needed to build a box from scratch was 10 times as much. Once the templates were made a box could be assembled in about 2 hours utilizing 2 people. (\$12/hr avg per person) The insert trays cost about \$5 each in raw materials (handle and hardware). After a template of these was made a single person could build one in about 15 minutes making the labor cost very minimal. Low cost solution to improve the quality control inspection procedures on publically financed concrete transportation construction projects.



## Extended Temporary Sign Post: Colorado

### CONTACT:

CDOT Colorado Springs  
Lawrence Wilke  
1480 Quail Lake Loop  
Colorado Springs, CO 80906

### PROBLEM STATEMENT:

Many 2-lane roadways have little or no shoulder along areas with metal post guard rail. Temporary sign placement becomes an issue for the following reasons:  
a. The signs and stands encroach into the lane of traffic, causing larger vehicles to cross the center line, into oncoming traffic. b. The signs obstruct the visibility of the motoring public on the narrow winding highways.

### SOLUTION:

To make a safer environment for the motoring public and maintenance personnel; a device was made that allows for temporary signs to be placed behind a metal post guard rail. This device keeps the driving lane unobstructed and improves driver visibility. The main device was constructed from scrap highway maintenance material. In addition to the device a delineator post and sign clamp are needed; both are available through the supply room.

### LABOR, EQUIPMENT, MATERIALS USED:

Employee time to fabricate a device takes about 1 hour. The material needed is:

- 24" of steel guard rail post (scrap)
- 3" of angle iron (scrap fence brace)
- 3" of square tube (scrap from the county sign post)
- a small amount of cutting and welding material.

The cost to fabricate 1 device is basically 1 labor hour.

### COST:

The mounting device is made using scrap material.

1 each - 24" length of damaged, steel guard rail post.	\$ 0.00,	1 each - 4" length of damaged, 2" square tube sign post.	\$ 0.00
1 each - delineator post 7" (storeroom)	\$ 5.08		
1 each - jaw clamp for cloth signs (storeroom)	\$16.00		
(2 each required for metal signs)			
1hr of labor	\$20.00		
Cutting and welding supplies	\$ 5.00		
Total Cost:	\$46.08		

### SAVINGS/BENEFITS TO THE COMMUNITY:

Patrol has used this device several times, and it has been used with both cloth and metal signs without any problems. It makes for a safer environment for the motoring public and roadway maintenance personnel. A flag could also be added to the sign to attract additional attention.



Roadwork sign with typical installation



Roadwork sign with proposed device

## Gantry: Connecticut

### CONTACT:

Andy Kennedy, Supervisor of Fleet Operations  
Chris Lodice, Welder  
Frank Piselli, Equipment Mechanic  
City of Bridgeport, Municipal Garage  
475 Asylum St.  
Bridgeport, CT 06610  
203.576.3916

### PROBLEM STATEMENT:

We needed a safer and more efficient way to remove and install heavy salt spreaders from truck beds. Our shop space and overhead lifting capabilities are limited.

### SOLUTION:

It works by means of quick connecting to a wheel loader forks. The Gantry has a telescoping boom and is constructed with 4-5 chain lifting points. The Gantry can lift 2,020lbs with the boom fully extended.

How does it perform? It performed great and is the most efficient safe way we have been able to lift the large heavy spreaders. During this past winter we had a couple of spreaders break down in the middle of a storm. We were able to remove, repair and reinstall the salt spreaders in a short period of time.

### COST:

\$1,500

### SAVINGS/BENEFITS TO THE COMMUNITY:

The benefits are: cost effective to build in-house, created a safer work environment and prevented damage to heavy spreader like equipment from lifting improperly. We now remove and install then repair the spreaders anywhere in the shop or outside. This has freed up shop space, reduced down time and reduced labor costs. We also found many more uses than it was originally intended for.

Some of the solution was inspired by other sources. One being the construction industry the way they lift and transport equipment. Our main inspiration was necessity we needed to be able to lift, move around and repair the spreaders safely and efficiently.



## Mini Paver: Minnesota

### CONTACT:

City of Cottage Grove  
Jennifer Levitt  
7516 80th Street South  
Cottage Grove, MN 55016  
651.458.2890

### PROBLEM STATEMENT:

Longitudinal cracks develop along curb lines and centerline streams, forcing crews to hand-patch certain areas in order to preserve the integrity of the bituminous surface. This presents a number of problems. Hand-patching does not stay in place through the freeze/thaw cycle, nor does it uniformly seal the joints. The drive quality of the road is also reduced by hand-patching.

### SOLUTION:

Use the Mini Paver to repair roadway instead of hand-patching. The Mini Paver was tested under four different applications including skin-patching along the concrete curb line, overlay application along curb line, centerline or crown area paving, and gravel shouldering. Using the Mini Paver more than doubles the amount of patching that can be completed in a day. There will be a uniform, neat patch, and roads will remain in better condition longer, increasing the life expectancy of the road. The Mini Paver has two different screed plates for paving operations, one is a flat plate along the bottom and the other has a 3/8" crown in the center for paving roadway crowns. Both screed plates can be adjusted manually during the paving operation. The paver can be mounted on the right side or center of a skid steer, depending on the application. The Mini Paver can also be used to install Class 5 for shouldering material. The Mini Paver is convenient to utilize on trails, where large equipment cannot be used.

### COST:

The initial cost of labor to build and test the equipment was 200 hours equaling \$8,000. Testing of the Mini Paver was done under 4 different applications; Test#1 Skin patching along the concrete curb line- curb line skin patching was applied utilizing the Mini Paver. Monitoring took place over a one year period. Test#2 Overlay application along curb line. Test#3: Centerline or crown area paving. Test#4: Gravel shouldering. Breakdown of cost available upon request, Total costs \$2,000

### SAVINGS/BENEFITS TO THE COMMUNITY:

Utilization of the Mini Paver will more than double the amount of patching that can be completed in a day. There will be reduced back injuries/workers compensation claims. There will be a uniform and neat patch. Money will be saved, and roads will remain in better condition longer. This will help increase the life expectancy of a road. The City of Cottage Grove continues to use the Mini Paver extensively for paving applications. This project could lead to implementation at city, county, and state levels because of possible savings in time and labor cost.

## Monthly Road Inventory Sheet: Ohio

### CONTACT:

Madison Township, Hancock County  
Jeff Rettig, Trustee  
13081 County Road 24  
Arlington, OH 45814  
419.365.5693

### PROBLEM STATEMENT:

Improve procedure(s) for maintaining road sign inventory and monthly road inspections.

### SOLUTION:

Redesign inspection sheets to eliminate completely handwritten reports. Provide visual records of sign placement(s).

### LABOR, EQUIPMENT, & MATERIALS USED:

1. Using a digital camera, I took pictures of all Madison Township road signs and noted their locations. Computer generated pictures and printed copies.
2. Established for each township road a master sign inventory sheet. Identified and entered every sign with . Code # on master road sheet. (Used newly acquired Ohio Manual of Uniform Traffic Control Devices.)
3. Prepared a computer generated monthly inspection sheet with all township roads listed. Also noted are roads co-shared with other townships, the county and the state.
4. All master road sign inventory sheets and monthly inspections sheets were inserted in a hard bound folder. Folder is kept in the township office and is available to all trustees to make monthly notations. Inspection sheets for last year are retained and filed. New blank monthly sheets are placed in folder.

### MATERIALS:

One hard bound folder. Paper sheets for individual road and attached pictures of all signs, etc. Access to digital camera and computer to generate pictures. Completed in three cold, snowy, working days after pictures were taken. (Includes time spent reading New Sign Manual, coffee breaks, sitting at computer and desk.)

### COST:

No major cost involved. Used personal digital camera for all pictures. All copies done on township paper and copier. Sign manual is supplied by the State.

### SAVINGS and BENEFITS:

The biggest savings is the time saved in handwriting the monthly inspection sheets. All road information is contained in the master folder. Trustees monitor township roads weekly. The prepared monthly sheets are completed easily. It's all about safety for the community. I am sending copies of our Madison Township Sheets as examples. Also these pictures served us well when an accident damaged several of our signs (pictures attached). We had a picture and documented sign placement for the insurance company. We anticipate using these pictures for many years.

## Electric Infrared Seamless Pot Hole Repair: Utah

### CONTACT:

Larry Griffin, President  
Heatwurx  
136 Heber Avenue, Suite 304  
Park City, UT 84068  
435.647.0519

### PROBLEM STATEMENT:

Patching potholes is a temporary solution for most cities and towns. Within a short period of time pot holes tend to reflect up and need repair frequently. Edges of the potholes crack during winter and wet weather allowing the repaired are to return within a few months. In addition, the repair of relatively small areas may require major rehabilitation to fairly large areas in order to be cost effective. Rural damage is even a larger problem. If the repair area is dozens or hundreds of miles from fresh asphalt plants, the cost to repair this damage may be so prohibitive as to cause transportation departments to wait for the damage to risk create vehicle damage before repairing.

### SOLUTION:

The self-contained Heatwurx infrared heater and asphalt processor. The surface can be heated to a depth of 6 inches, RAP added with a rejuvenator, and mixed with an asphalt processor attachment to a skid steer bucket. The repair will often outlast the surrounding road surface if properly rejuvenated. The Heatwurx solution can recycle, in place, the existing and damaged asphalt to a state similar to, if not superior to, new asphalt and seamlessly integrate the repaired roadway into the surrounding viable material. In addition, because this solution can be applied directly to fairly small (30 sq. ft.) areas independently, this process can repair only what is damaged and leave intact roadway that can still be used for long periods.

### MATERIALS:

The solution uses the HWX-30 heater to bring the treated area to a pliable 300 degree Fahrenheit and the HWX-AP 40 to till and screed the area. Both Heatwurx machines are operated by and/or set into place by a standard skid steer with capacity to lift at least 3500 pounds. Because the solution is primarily automated and machine driven, the labor factor can be reduced to as few as two skilled operators: one to drive and operate the skid steer with both Heatwurx attachments and one on the ground to integrate rejuvenating oil, direct the skid steer operator, manage RAP and excess asphalt on the ground and to operate the roller. In addition to the machinery, RAP and Heatwurx Rehab rejuvenating oil mix are required materials for nearly all jobs.

### COST:

The equipment (HWX-30 and HWX-AP 40) have a single unit price of approximately \$35,000 (discounts may apply for volume orders) for both machines, not including the skid steer or the 45 KW generator necessary to operate the heater. On a contract basis, the repair work can vary based upon location and season, but has been often quoted at \$5-10 per square foot depending upon the aggregate area being repaired through a single contract and other pricing variables such as time constraints and/or hours (e.g. night only) of operations.

### SAVINGS and BENEFITS:

This process has demonstrated cost savings of 30-60% over traditional methods while achieving better overall results. In addition, this process recycles existing asphalt creating a benefit to the community due to its "green" aspects. By rehabilitating and recycling what is already in place, Heatwurx is also able to reduce the impact to the local community by reducing the impact of road closures and/or allowing traffic to pass sooner than full roadway replacement.



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**BUILD A BETTER MOUSETRAP**  
**NATIONAL COMPETITION**  
National Entry Booklet 2012

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Images from the 2012 Build a Better Mousetrap National Competition

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## 1ST PLACE WINNER

### REPURPOSING USED TRUCK TIRES FOR WING PLOW CUTTING EDGE: MICHIGAN

#### CONTACT:

Ottawa County Road Commission  
Jeff Johnson  
14110 Lakeshore Drive  
P.O. Box 739  
Grand Haven, MI 49417  
(616) 850-7223  
jjohnson@ottawacorc.com

#### PROBLEM STATEMENT:

In 2006 the Ottawa County Road Commission began using 9 ft. wings on their tandem axle plow trucks. The wings proved to be beneficial for more efficient plowing, but Ottawa CRC found the cutting edges did not last very long and they were expensive to replace.



#### SOLUTION:

After trying various manufacturer recommendations, which ranged in cost from \$102 to \$1,400 per blade, Ottawa CRC Operations Superintendent Jeff Johnson devised a solution that used strips of recycled truck tires as cutting edges. To begin, Johnson found a source for tire processing that charged \$7.00 each to process used Ottawa CRC tires. Each tire yielded a strip of rubber nine inches wide and seven feet long. Johnson was especially excited about reusing tires for this purpose because he had been paying \$10.00 each to dispose of used tires. After the tires were cut into strips, Johnson experimented with attaching them to the wing plow. He found that two strips held in place with a worn out steel blade from an underbody scraper provided the best balance between ease of installation in the shop and durability on the road.

#### LABOR/MATERIALS/COST:

Materials: \$36.00 Labor: \$84.00 Total: \$120 per truck

#### SAVINGS/BENEFITS TO THE COMMUNITY:

Ottawa CRC pays \$3.00 less per tire to process their used tires into cutting edges for wing plows, and the resulting product performs better and is considerably less expensive than commercially-available products. A cost and performance comparison is as follows:

Reversible steel blade \$102.00 1 season

Nylon blade \$800.00 1/2 season

Repurposed car tires \$1,400.00 1/2 to 3/4 season

Repurposed truck tires \$36.00 1-1/2 to 2 seasons

## 2ND PLACE WINNER

### UNDER VEHICLE WASHER: CONNECTICUT

#### CONTACT:

Town of Vernon  
Jeff Schambach  
Town of Vernon Public Works Department  
375 Hartford Turnpike  
Vernon, CT 06066  
(860) 870-3500  
jschambach@vernon-ct.gov

#### PROBLEM STATEMENT:

The use of winter de-icing chemicals was having a tremendous corrosive effect on the trucks. The salt material gets caught in a lot of hidden areas under vehicles and cannot be reached by rinsing with a regular hose and nozzle.

#### SOLUTION:

The unit is connected to a hose - preferably with good water pressure. The unit is then moved under the vehicle and water is turned on. The operator (employee) then moves it around under the vehicle rinsing the underside from all different angles. The holes were placed at varying angles along the copper pipe to maximize reach and coverage.

#### LABOR/MATERIALS/COST:

Depending on in-house supplies or parts that can be recycled from other things, the cost estimate would be around \$100 (if all parts needed to be purchased). Prior to building this product, we researched and sought quotes for undercarriage washing systems but prices were very high - into the thousands. To save money, we developed this unit.

#### SAVINGS/BENEFITS TO THE COMMUNITY:

The unit performs very well and removes salt, sand, rust and other debris that gets lodged in areas that normally do not get rinsed or can be seen. The benefit to us is that it allows employees to easily perform a better rinse and wash on town vehicles - prolonging the life of the vehicles and deterring the effects of corrosion on the equipment. Getting even one additional year out of a truck will easily save thousands of dollars. Extending the life of our fleet is a tremendous benefit to our community.



## 3RD PLACE WINNER

### SNOW PUSHER: NORTH DAKOTA

#### CONTACT:

Mercer County, North Dakota  
Joe Retterath  
PO Box 412 Beulah, ND 58523  
(701) 873-5586  
mercerhd@westriv.com

#### PROBLEM STATEMENT:

Large amounts of snow get piled up in sheltered areas and intersections. These walls of snow make it difficult to continue to plow and move snow far enough back for additional storage area for more snow. Every time additional snow is received or the wind blows, snow fills in causing the road to block. The intersections are dangerous for the traveling public because of poor visibility created by snow. With conventional snow removal equipment it is not possible to move the snow unless you drive into the ditches. Oftentimes equipment gets stuck requiring additional personnel and equipment to pull it out, costing time and money.

#### SOLUTION:

It was necessary to design a piece of equipment to push snow back far enough from the roadway without getting equipment stuck. The Snow Pusher makes that possible with the added 12 ft. of length. A junked snowplow was modified by cutting the top portion off. Eight inch I beams ten feet long were added to get the length required. A quick attachment from an old plow was added for easy mounting on a 950 H Cat loader. The snow pusher makes it possible to stay on the road and avoid driving into the ditch reducing the possibility of getting stuck.

#### LABOR/MATERIALS/COST:

Three 8 in. I-beams 10 ft. long; 80 ft. on drill stem pipe. Junked snowplow modified by cutting off the top portion; built quick hitch attachment from 1 in. by 5 in. strap iron. Welding and cutting supplies. 40 hours by two people equals 80 hours of labor. Most of the material used was strap iron or parts from a junked snowplow. The cost of material was approximately \$300. The labor cost was approximately \$1,000. The total cost was \$1,300.

#### SAVINGS/BENEFITS TO THE COMMUNITY:

Prior to the county building and using the snow pusher they would attach a snow blower to the loader. The snow pusher can move more snow in one hour than the snow blower could move in three hours. The rental rate for the loader and snow pusher is \$145/hour compared to the loader and snow blower which is \$295/hour. The loader with snow pusher attached can also travel faster than the loader and snow blower attached saving time and fuel. Over the course of a long and snowy winter the savings are considerable. Another benefit is the savings in manpower and equipment by not requiring them to pull out the loader and snow blower which would often get stuck in the ditch. The road system is also improved in the spring because the snow has been pushed back and the run off is in the ditch and not on the roadway which causes soft spots and damage. Impossible to measure is the safety to the traveling public by the improved visibility at intersections. Snow piled close to intersections causes vehicle accidents because the public does not take the time to ensure that the intersection is clear before crossing. The snow pusher moves the snow away from the intersection to give better visibility and reduce the chances of vehicle accidents and save lives.



## SIGN REPAIR STAND: COLORADO

### CONTACT:

City of Cherry Hills Village Public Works Street Department  
Ralph Mason, Street Superintendent  
2450 E. Quincy Avenue  
Cherry Hills Village, Colorado 80113  
(303) 789-2541 x4  
rmason@cherryhillsvillage.com

### PROBLEM STATEMENT:

Two of the Street Departments many tasks include maintaining all of the City's information and regulatory signage (name signs, speed limits, stops, etc.) and low to the ground right of way tree trimming around signage and other structures. Unfortunately the City is not resourced with a vehicle (bucket truck) specifically designed for these duties. As a result we would end up with somebody standing in the back of a pickup or climbing a ladder to do these low to the ground maintenance repairs. We feel climbing a ladder always represents a risk factor, especially on uneven rights of way, during all forms of weather conditions. We further felt that climbing in and out of a pickup bed, reaching out over the edge of the bed, and just standing in a wet or snow covered pickup bed while doing repairs was too great a risk for staff members to continue doing. A new truck, mounted with the appropriate attachments and safety protection, was not a feasible option. We needed a low budget solution that was both practical and safe.

### SOLUTION:

The Street Department is fortunate to have a Crew Leader that is very knowledgeable in area of steel fabrication. When faced with the task of building some kind of a sign repair stand, it was desired to find a low cost solution that would fit in the bed of a pickup, be easily installed or removed by two men, and provide the safety measures needed for personnel doing repairs. The Crew Leader, Josh English, talked with other crew members and quickly came up with the following design.

### LABOR/MATERIALS/COST:

Total Cost of Sign Repair Stand: \$380.00

### SAVINGS/BENEFITS TO THE COMMUNITY:

Having knowledgeable manpower, all power tools needed, and budgeted time, the City feels it saved somewhere in the neighborhood of \$2,000 on this project. Professional welding fees alone could have exceeded these costs. Of far more importance to the City than savings is the tremendous increase in safety for its street personnel. With a tailgate ladder to enter and exit the bed of the truck, nobody has to climb over a tailgate. The sign stand has a railing at just below waist level, allowing a worker to reach beyond the edge of the truck. The grip strut decking allows for sure footing while inside the stand and on the step while entering and leaving the stand. There is a safety chain to close off the entrance to the stand to eliminate accidental falling backwards out of the stand. The stand is bolted to the truck body to prevent it from moving when in use. The stand also elevates the worker an additional two feet from the pickup bed floor, allowing an expanded work area without having to do dangerous reaching for signage or tree limbs.



## CATCH BASIN MAINTENANCE/REPAIR TRAILER: MINNESOTA

### CONTACT:

City of Lakeville Streets Division  
Chris Petree or Troy Grossman  
20195 Holyoke Avenue  
Lakeville, MN 55044  
(952) 985-2714  
cpetree@lakevillemn.gov

### PROBLEM STATEMENT:

The City of Lakeville Streets Division has rehabilitated many storm sewer structures and catch basins over the last few years. In order for crews to have everything they needed to complete the repairs at each job site, the necessary tools, materials, and equipment were loaded into two or three trucks.

### SOLUTION:

An existing 15,000-pound trailer would be designed specifically for catch basin repairs and maintenance. All of the necessary equipment and materials would be readily available on the trailer when projects arise. The city fitted an existing trailer with all of the equipment needed for catch basin repairs. Procedure: The city had a service crane installed on the rear curb side of the trailer for easy access to the catch basin manhole, and it also purchased a cement mixer, water tank, and storage container for use on the trailer. City staff fabricated the steel and placed all equipment on the trailer.

### LABOR/MATERIALS/COST:

\$7,600

### SAVINGS/BENEFITS TO THE COMMUNITY:

The trailer has been in service for a short time, but the city has already recognized savings in several ways. When crews are required to complete a repair, it is as simple as connecting the trailer. Time spent in the shop loading and unloading tools, supplies, and materials is no longer an issue, allowing for time savings on both ends of each project. The trailer also allows for improved safety, with the crane and cement mixer installed on the curb side of the trailer to keep crews out of the traffic lane whenever possible. The Streets Division uses a one-ton truck with a dump body to pull the trailer. When a project requiring the trailer arises, two staff members take the trailer to the job site. Before the trailer was available, it would require two or more trucks to transport all of the equipment to and from the site.

### NOTES:

Please also check out the video about the Catch Basin Maintenance/Repair Trailer at: [http://www.youtube.com/watch?v=tAJVP8p\\_\\_ZI](http://www.youtube.com/watch?v=tAJVP8p__ZI)

## TRACTOR REAR WINDOW GUARDS: MONTANA

### CONTACT:

Blaine County Road Department  
Tom Fairbank, County Road Supervisor  
PO Box 715  
Chinook, MT 59523  
(406) 390-2457  
tfairbank@co.blaine.mt.gov

### PROBLEM STATEMENT:

Our county leases tractor mowers for summer and fall to mow roadway shoulders, most of which are on gravel roads. Because of debris – such as rocks, flying up from tires and mower – the rear window was taking a beating and visibility would become limited when grass stuck to the rear window.

### SOLUTION:

Because the mower tractors are leased, the county did not want to invest in attaching anything permanent to the mower tractor to correct this problem. The solution was to design something removable. After several prototypes were developed, the rear window guard provided a sustainable design. Three point pins are used to attach the guard to the tractor mower. The guard stops rocks and other flying debris from hitting the rear window. To clean the rear window guard, the operator just pulls the top pins and pivots the guard down for ease of wiping off grasses with a rag. The guard can be moved from mower tractor to mower tractor because it is held in place with just the point pins. It remains with the county after the leased mower tractor is return to the tractor company at the end of the mowing season.

### LABOR/MATERIALS/COST:

One person @ \$17 x 5 hours = \$85 Materials Listed above = \$150 Total = \$235

### SAVINGS/BENEFITS TO THE COMMUNITY:

The savings and benefits from this rear window guard include protecting the rear window from flying rocks and debris; protecting the operator from broken glass, and not having to replace a broken rear window. Time is saved at the end of the shift by just pulling the pins, lowering the guard, wiping off grass, cleaning the rear window, and re-pin. The other benefit is removing the guard at the end of the lease when the tractor mower is returned and the guard can be used again with another tractor mower.



## MOTOR GRADER WEED SPRAYER: NEBRASKA

### CONTACT:

Saunders County  
Dave Ludvic, Saunders County Motor Grader Operator  
Saunders County, Nebraska  
County Seat Wahoo, Nebraska

### PROBLEM STATEMENT:

As almost everyone knows, weeds can be tough to address. Weeds and vegetation on the edge of the traveled way can cause various safety issues. As vegetation creeps in on roadway shoulders, the road appears to be narrower to the traveling public than it actually is. The vegetation can cause drainage issues and taller weeds can cause sight distance issues.

### SOLUTION:

Mr. Ludvic built a weed sprayer that could be transported and used with a motor grader utilizing the front mount attachment assembly. The 25 gallon sprayer is adjustable with the side bar on sprayer and up or down with the motor grader front bar assembly. The sprayer is controlled by a toggle switch inside the cab. Various chemicals such as brush control can be applied as needed.

### LABOR/MATERIALS/COST:

The tank, pump assembly and wiring cost about \$185.00 the remainder was built with scrap material and scrap sign posts.

### SAVINGS/BENEFITS TO THE COMMUNITY:

Safety has been improved due to roadsides being cleaned up and drainage more manageable. Roadsides are easier to maintain. Farming community appreciates the effort. Note: He does not spray around acreages.



## SIMPLE SIGNS REDUCE ACCIDENTS: OHIO

### CONTACT:

Knox Township – Columbiana County  
Gregory R. Carver, Knox Township Trustee  
4038 Homeworth Road P.O. Box 106  
Homeworth, OH 44634  
(330) 525-7544  
grcarver12@yahoo.com

### PROBLEM STATEMENT:

The Homeworth Volunteer Fire Company had responded to seventeen (17) accidents within a six-year period at a dangerous curve on County Road 401 (Homeworth Road) in Columbiana County. Out of the seventeen (17) accidents, there was one (1) fatality. This does not include the time of local EMS personnel to respond, treat and transport accident victims as well as the time of investigation by the Ohio State Patrol in Lisbon, Ohio.

### SOLUTION:

Working as a team, Fire Chief Brian Baker and Assistant Chief Tracy Windham worked with me, Gregg Carver, Township Trustee and Homeworth Firefighter, to see how many accidents had occurred, the direction of travel, and a possible solution to help the motoring public in our township. After we had obtained the documentation on the number of accidents that had occurred in this one particular area, and the time involved by the fire department, emergency responders, Ohio State Patrol and towing services, we felt the need to move forward. Our solution was to light up the curve area with reflective arrow chevrons. We also used the expertise of Columbiana County Engineer, Bert Dawson, and his staff as the road was under his jurisdiction in Columbiana County.

### LABOR/MATERIALS/COST:

Total cost of labor: County - \$42.00, Township - \$32.00, Fire - \$0.00 = \$74.00 Total cost of materials: Sign Posts - \$52.90, Chevron Arrows - \$35.66, High Intensity Strips \$32.00 = \$120.66 Total project cost for labor and materials: \$194.56

### SAVINGS/BENEFITS TO THE COMMUNITY:

From the time of placement of the signs in February 2007 until this point, January 2012, we have had only three (3) additional accidents. In one instance, a deer ran into the path of the vehicle, and in the other two (2) accidents, weather (snow and ice) contributed to the cause of the accidents. Because of increased awareness in all cases, the motorists were uninjured and damage to the vehicles involved was minimal. By spending less than \$200 to erect simple signs time and money has been saved by parties, and possibly someone's life.



## CURB-A-LYZER 2010: ASPHALT CURBING DEVICE: PENNSYLVANIA

### CONTACT:

Richland Township  
Gerald Reichart  
4011 Dickey Road  
Gibsonia, PA 15044  
(724) 444-3955  
rt799jerry@zoominternet.net

### PROBLEM STATEMENT:

We do not do our own paving, so we do not have a paving machine; however we do our own asphalt maintenance and repairs. Often when doing a base repair or other maintenance we need to replace asphalt wedge curb. We also have a number of more rural roads with areas that do not have existing curbs, where we sometimes find ourselves installing long sections of curb by hand. As you can imagine, getting a nicely shaped and straight curb installed by hand can be a challenge.



### SOLUTION:

We tried a lot of things like stretching string lines, placing backing boards, and all sorts of devices to help shape and align the curb. We finally decided we would try affixing a curbing attachment like you see on some paving machines to our skid steer. So we measured a typical wedge curb in our town and went to work. We copied the basic shape from a curbing attachment from a local paving company and fashioned it to form a wedge curb to match the other curbs installed in our township.

### LABOR/MATERIALS/COST:

Materials: \$100  
Labor: \$250  
Total: \$350

### SAVINGS/BENEFITS TO THE COMMUNITY:

We get professional looking results and use less material to form curbs whether they are replacement or newly installed curbing. With input on the design from all of our six man crew, old salt John Arthur welded the contraption together and mounted it to our skid steer bucket. We first lay a windrow of asphalt out with the conveyor on our dump truck and then follow behind with the skid steer. The operator follows behind using a reference line (the painted white line or a reference line we paint) to guide the "Curb-a-Lyzer" to form the wedge curb. After that first use, we came up with a few modifications to improve the operation. We remounted the device with a little more offset from the bucket so that the wheels would not run over the front edge of the curb when on a radius. We also mounted a bracket to accommodate our propane tank and torch to apply heat to the wedge and leading plates. We have since installed about 500 feet of curb that you would never know was not part of the original pavement.

## HOSE REEL FOR RUBBER PATCHING RIG: PENNSYLVANIA

### CONTACT:

Providence Township  
Jim Grube, Jr.  
200 Mt. Airy Road  
New Providence, PA 17560  
(717) 786-7596  
jim@providencetownship.com

### PROBLEM STATEMENT:

Before we made this mount for the air hose it was difficult to control the hose used to blow out cracks before rubber sealing. When the hose was run over by the truck it would scratch the hood and get in the way of the driver; then, when you wanted to move to the next job, you had to wrap up the hose and disconnect the wand and put it in the bed of the truck.

### SOLUTION:

We made a removable mount to attach a retractable hose reel, so that the hose and wand would always be in front of the truck and ready at any time. We then fished an air hose along the frame of the truck, and attached quick connects on either end for easy disconnect and hook up. By creating this mount, we can move to the next job in minutes.

### LABOR/MATERIALS/COST:

\$375: Retractable hose reel with 1/2 in. hose  
\$9: Box tubing  
\$12: Angle Iron  
Total: \$396

### SAVINGS/BENEFITS TO THE COMMUNITY:

The mount makes it easier and faster to maintain roadways by only using one vehicle which results in less fuel usage and smaller work zones.



## COST COMPARISON OF SAFETY EDGE EQUIPMENT USING SSD SAND: PUERTO RICO

### CONTACT:

Betterroads Asphalt Corp. & Robles Asphalt  
Angel Cartagena and/or Eugenio Montes & Moises Estrada  
Street 845, Km 1.4, Cupey Bajo, Rio Piedras, PR 00926 PR-14, Bo. Coto Laurel, PR 00780-2170  
(787) 413-4443  
acartagena@emdi.net & moise\_estrada2000@yahoo

### PROBLEM STATEMENT:

Lane shoulder drop-off is a very hazardous condition on the roadside of our existing rural network. Roadside departure related accidents are a major problem which affects safety of our road users. Safety edge provides an option to allow a vehicle to return safely to its normal path if constructed adequately. Training of asphalt crew prior to going to the field and using saturated surface sand as the material in the hopper, installing different safety edge devices in different pavers and laying down the mix simultaneously can be a cost effective and a fun way of training asphalt crew on how to properly lay down safety edge.

### SOLUTION:

Installing each safety edge device to be evaluated in a particular paver, while simultaneously operating each paver with sufficient saturated surface dry (SSD) sand deposited on the hopper; laying it down at the appropriate paver speed, and measuring the resulting safety edge angle in a pavement strip made of sand of 100 ft., can be used to evaluate the effectiveness of each safety edge device for the same SSD sand mix. This approach is cost effective since you do not need to permanently lay down hot-mix asphalt (HMA) or warm-mix (WMA) to actually verify if the safety edge device is installed properly. You can also clarify doubts with the asphalt maintenance crew and contractors that are using the safety edge device for the first time. You can take advantage of the opportunity by placing a poster next to each paver describing the major components of the safety edge device and its benefits, therefore transferring technology in a real-time setting.

### LABOR/MATERIALS/COST:

Minimum of two pavers, approximately 900 to 1,000 cubic ft. of SSD sand to lay down two 100 ft. strips that are 12 ft. wide and 4 in. thick; TransTech: Shoulder Wedge Maker; Advant-Edge: Ramp Champ; front end loader; sweeper to clean the job site after finishing the demonstration; digital level to measure the slope and angle of the safety edge; maintenance crew that will be doing the job in the field (with their corresponding safety vests and all related safety devices) and the poster outlining a description of the equipment and related specifications. The open space in a parking lot that will be rented for the demonstration (or free if provided by the particular county/municipality that is interested in the training); the cost of renting or loaning the pavers; front end loader and sweeper; and the time of each maintenance crew that attended the demonstration and the instructors time.

### SAVINGS/BENEFITS TO THE COMMUNITY:

The primary benefit can be attributed to the method of training the asphalt crew. In this approach the asphalt crew is trained prior to going into the field using this technique with SSD sand as the material in the hopper. The other benefit is that the training process provides hands-on and real-time training in a fun way. The second primary benefit of this approach is cost effective, since you do not need to permanently lay down HMA or WMA to actually verify if the safety edge device is installed properly. Furthermore, the instructor can clarify any doubts that the asphalt maintenance crew and contractors might have in the installation of the particular safety edge device and how to adjust the safety angle to meet the applicable state or federal specification of the project.

# YOU SHOW US CONTEST 2012



# North Dakota: Wheel Rake

- Matt Monson and Jim Anderson  
*Griggs County*



# North Dakota: Wheel Rake

## *Problem*

- Mowed grass from ditch blows onto roadway.
- When blading, grass mixes with gravel causing big mounds and ridges.
- 2- 3 feet of mowed grass ends up narrowing road width
- Hazard to the traveling public, potential for accidents

# North Dakota: Wheel Rake

## *Solution*



- Modified wheel rake to mount on front end of a motor grader to remove loose grass prior to road blading.
- Rake attaches to dozer blade with multiple adjustments for angle and height.
- Loose grass raked into the ditch blows away or deteriorates.

# North Dakota: Wheel Rake

## *Labor & Materials*

- Wheel rake discarded by local farmer = \$0
- Modifications: flat iron, telespar tubing, nuts & bolts = \$50.
- Labor: 2pp x 8 hrs x \$35/hr = \$280
- **Total cost: \$330**



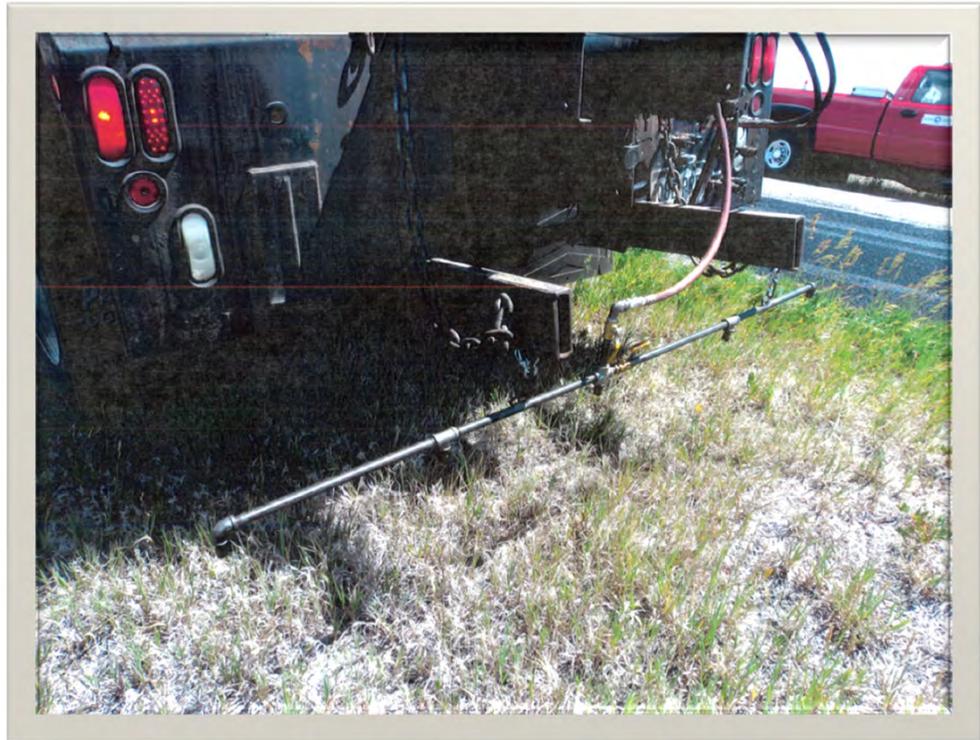
## North Dakota: Wheel Rake

### *Savings & Benefits*

- Safety to traveling public greatly improved by eliminating mounds/ridges of mixed grass and gravel.
- Road is wider and gravel is more evenly distributed.
- Making just one pass while blading saves time and money.
- Employee and public safety is improved with limited time spent on road surface.

# Colorado: Asphalt Spray Bar System

- John McMinn  
*El Paso County*



# Colorado: Spray Bar System

## Problem



- When patching large areas, like "blade patching", used truck mounted spray wands to apply the tack oil
- Doing by hand resulted in uneven application, too much product, or during wind – getting covered in tack oil
- A distributor truck for relatively small jobs was "overkill"

# Colorado: Spray Bar System

## *Solution*

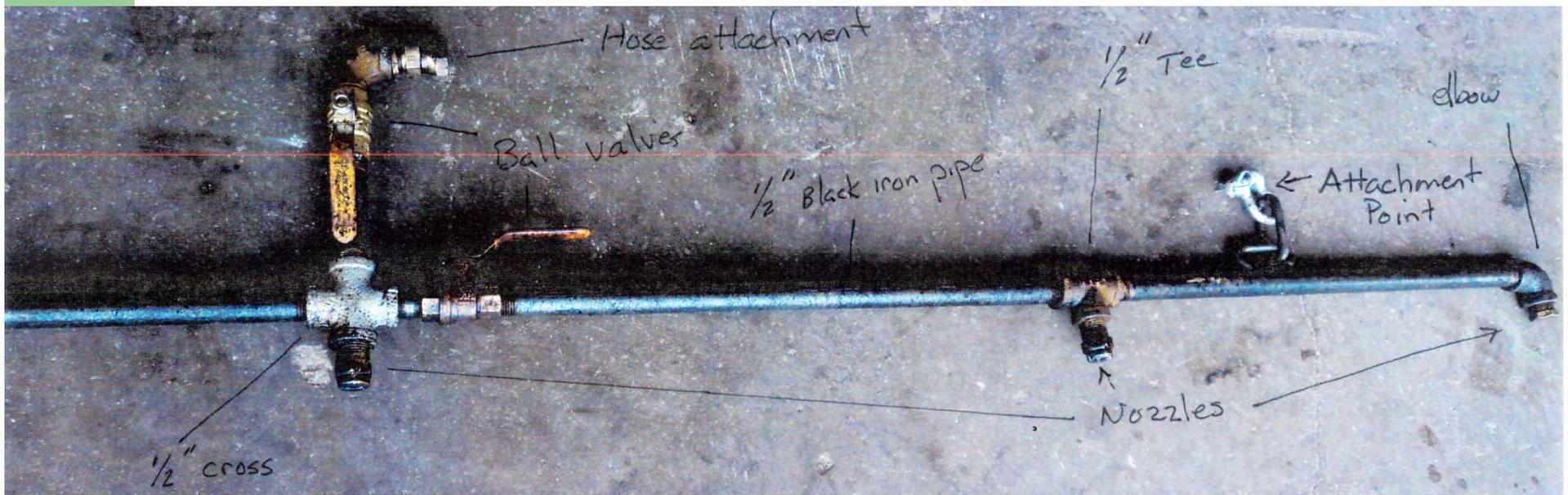


- A "spray-bar" that hung on back of asphalt patch truck, on lift arms for patch roller.
- The hand wand can be quickly disconnected, and hose attached to the spray-bar.
- Has several valves to control width of spray area
- Roller lift can raise/lower bar changing thickness of pattern
- Can all be turned on/off from inside cab while on move

# Colorado: Asphalt Spray Bar System

## Labor & Materials

- Spray nozzles, 1/2" iron pipe, 1/2" tees, ball valves
- **Total Cost: ~ \$40**



## Colorado: Asphalt Spray Bar System

### *Savings & Benefits*

- More even application, resulting in better final product
- 1/3 less oil used - saving money
- Operators no longer going home "wearing" layer of oil, keeping it out of eyes and off clothes

# South Dakota: Loader Scaffold

- Dennis Clark  
*Brookings County*



# South Dakota: Loader Scaffold

## *Problem*



- Need to cut trees or limbs that overhang roads
- Crew members stood in loader bucket while cutting with chain saw. Safer operation needed since a man fell from bucket after cutting a large limb.
- Cost prohibitive to purchase a bucket truck
- Difficult to hire service in emergencies

# South Dakota: Loader Scaffold

## *Solution*



- A safety scaffold that mounts at front of loader bucket
- Railing surrounding front and sides of bucket
- Strong mesh floor for safety in preventing slips
- Safety harness and lanyard attached to a ring

## South Dakota: Loader Scaffold

### *Labor & Materials*

- All material salvaged, except safety mesh for floor.
- Materials: \$200
- Labor: \$800 (estimate)
- **Total cost: ~\$1,000**



*A locking device installed on loader controls in cab so bucket cannot be tilted or raised/ lowered while work is being done from bucket.*

## South Dakota: Loader Scaffold

### *Savings & Benefits*

- Risk manager for public liability pool inspected the scaffold and gave approval for doing overhead work
- One serious or minor injury from fall far outweighs cost of building scaffold
- No injury of any kind sustained in overhead work since its use

# MONTANA: Intake Backing Plate

- Steve Kurk  
*City of Bozeman  
Street Dept*



# MONTANA: Backing Plate

## *Problem*



- Backing plates covering stormwater drains damaged by heavy equipment or struck by snow plows in winter
- Backing plates are required by City's Engineering Dept to protect debris from getting into stormwater drain systems
- Old method of replacing damaged plates required digging out old broken plates embedded in concrete

# MONTANA: Backing Plate

## *Solution*



- Removal of concrete and infrastructure took approx 3 days in labor to replace entire backing structure
- A viable solution was to bolt a metal cap onto the remaining infrastructure of the damaged plate

# MONTANA: Backing Plate

## *Labor & Materials*



- Shop time to cut and mold cap plate to specific intake plate location + labor to replace plate:
- 1pp @ \$25/hr x 3 hours = \$ 75
- Equipment: Metal Cutter; Metal Folding Equip, Wrench
- Materials:  $\frac{3}{16}$  Metal Plate, Bolts, Paint to Match = \$ 25
- **Total Cost: \$100**

# MONTANA:

## Intake Backing Plate

### *Savings & Benefits*



- Less time & materials to repair damaged intake plates
- 3 hours vs. 3 days, for a savings of \$700
- Quicker replacement of damaged plates meets requirement of City's Engineering Dept to protect stormwater drain system



# **Innovations**Challenge

**April 2012**

Missouri Department of Transportation



# Innovations Challenge

**2011 -12 District Winner**

Innovations Challenge Showcase  
<http://www.intranet/cr/SolutionsATWork/Innovations.htm>

**April 2012**

Prepared by Customer Relations  
Missouri Department of Transportation

## Hydraulic Pressure Wrenches



### Description

Two styles of wrenches were designed to release pressure from both male and female hydraulic hose fittings.

### Benefit

Hydraulic hoses can be bled quickly and safely reducing the risk of being sprayed by hot hydraulic fluid. The wrenches also allow the fluid to be captured making the task more environmentally safe.

### Parts and Labor

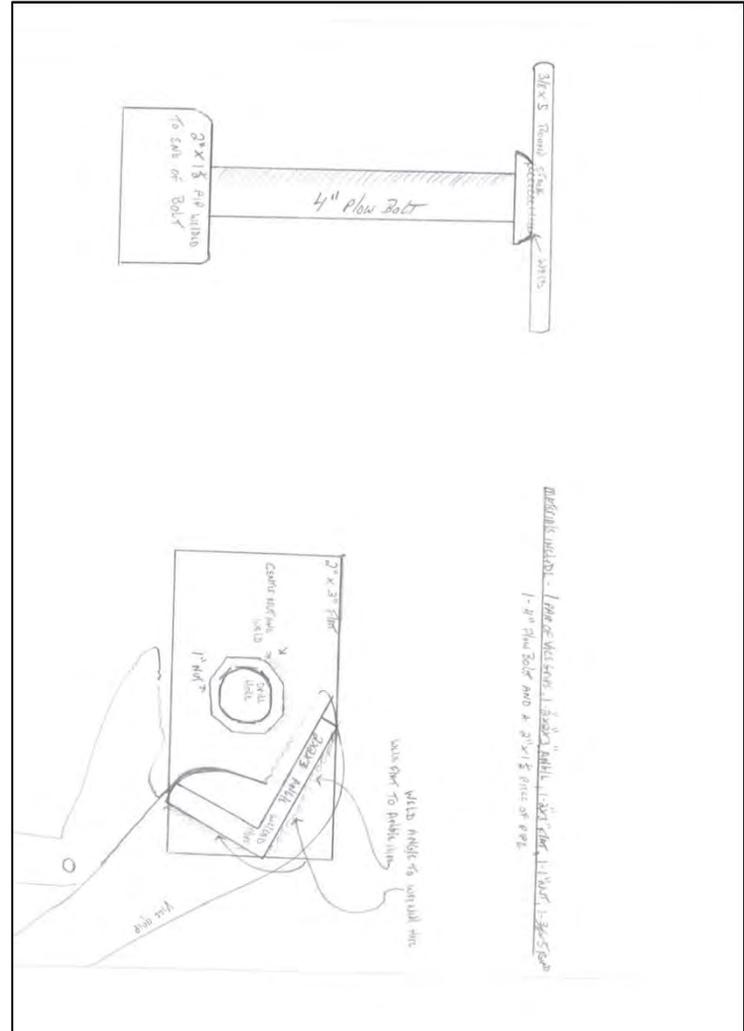
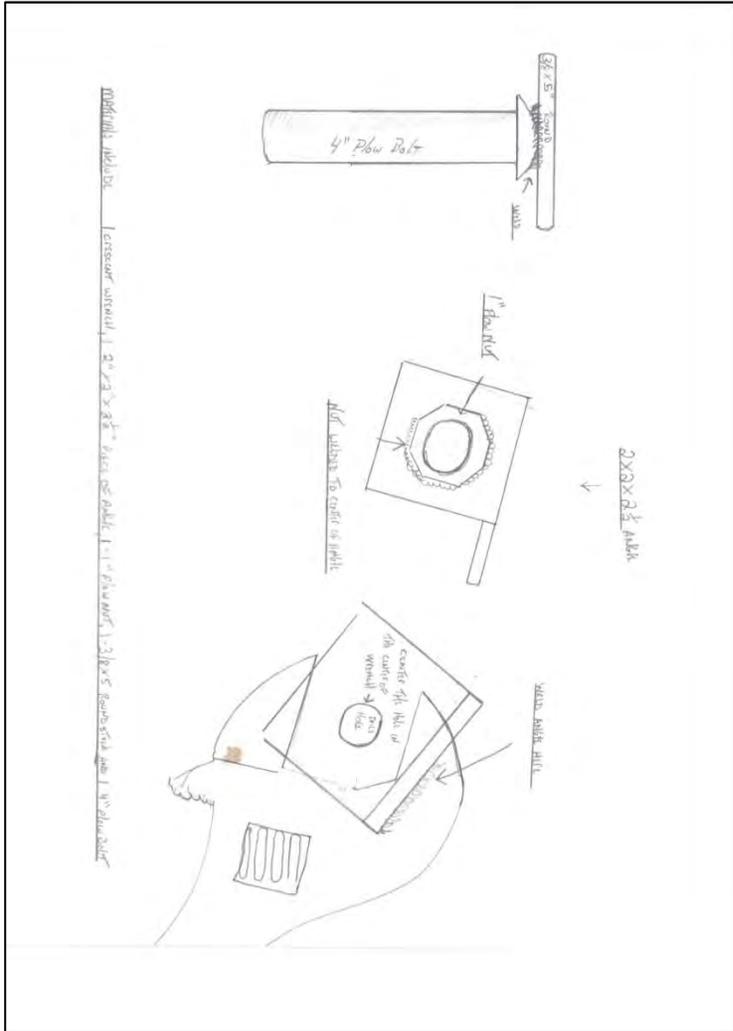
See shop drawings on page 2 for complete parts list.

**Total: \$20**

**Labor: 1 hour**

### For More Information

Contact Greg Buckner at (573) 325-4622. Additional photos can be seen by accessing the Innovations Challenge homepage at <http://www.intranet/cr/SolutionsATWork/Innovations.htm>.





# Innovations Challenge

**2011-12 District Winner**

Innovations Challenge Showcase  
<http://www.wi.intranet/cr/SolutionsATWork/Innovations.htm>

**April 2012**

Prepared by Customer Relations  
Missouri Department of Transportation

## Blade Raiser



### Description

A two-wheel dolly is modified with a top plate and threaded hand tighteners.

### Benefit

This innovation makes installing and removing plow and grader blades a one-person job. Securely attached to the dolly, the blade can be moved with less risk of back, foot or hand injuries. This also frees the floor jack for other jobs in the shop.

### Parts and Labor

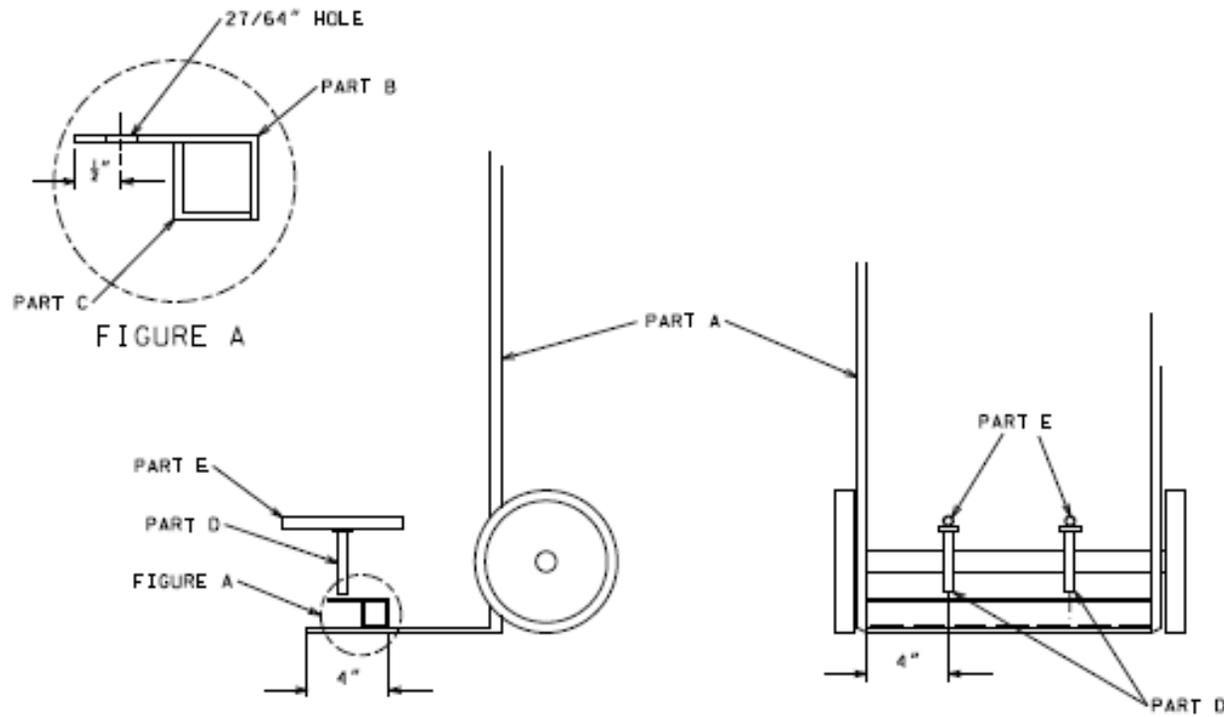
See shop drawings on page 2 for complete parts list.

**Total: \$65**

**Labor: 30 minutes**

### For More Information

Contact Steve Fisher at (573) 484-3541. Additional photos can be seen by accessing the Innovations Challenge homepage at <http://www.wi.intranet/cr/SolutionsATWork/Innovations.htm>.



**MATERIALS:**

- A - STEEL DOLLY
- B - 1-1/2" X 3" X 14° ANGLE
- C - 1-1/4" X 1-1/4" X 14° ANGLE
- D - 3" X 3" BOLT X 2
- E - 3/8" X 12" REBAR

**TO ASSEMBLE:**

1. BOX TOGETHER PARTS B AND C AS SHOWN IN FIGURE A. AND WELD TOGETHER
2. DRILL TWO 27/64" HOLES AS SHOWN IN FIGURE A 4" FROM THE END 1/2" FROM THE SIDE.
3. TAP THE HOLES WITH 1/2" TAP
4. GRIND THE LEFT SIDE OF THE DOLLY FROM 2" TO 4" TO PREPARE THE SURFACE FOR THE ATTACHMENT OF PARTS B AND C
5. WELD PARTS B AND C ONTO THE LEFT SIDE OF THE DOLLY 4" IN
6. CUT THE 12" REBAR INTO 2 - 6" PEICES
7. CENTER AND WELD PART E ONTO PART D AS SHOWN

THIS DRAWING SHALL NOT BE CONSIDERED A CONTRACT DOCUMENT.

DATE: 3/7/2012

BY: MD

DATE: 3/7/12

BY: MD

IF A SCALE IS PRESENT ON THIS SHEET, IT IS NOT NECESSARILY SCALE AND SHALL NOT BE USED TO DIMENSION ANY PART OF THE DRAWING.

REVISION

DATE

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION



CONCEPT BY: STEVE FISHER  
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**2011-12 District Winner**  
Innovations Challenge Showcase  
<http://www.intranet/cr/SolutionsATWork/Innovations.htm>

**April 2012**  
Prepared by Customer Relations  
Missouri Department of Transportation

## Waste Material for Edge Ruts



### Description

District staff screens cinder deliveries for large pieces (1-1/2"-2") to use for edge rut repairs.

### Benefit

Removing large pieces of cinders from material used during snow fights can reduce windshield claims from motorists. The cinder material can be used to repair edge ruts without any oil reducing the cost of repairs. The material also stays in place longer by resisting washouts.

### Parts and Labor

**Total:** \$0 - scrap material

**Labor:** Time to screen material

### For More Information

Contact Frank Tidd at (314) 223-1034. Additional photos can be seen by accessing the Innovations Challenge homepage at <http://www.intranet/cr/SolutionsATWork/Innovations.htm>.



# Innovations Challenge



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## Tooth Changer



### Description

District staff modified a hydraulic bit to fit the teeth on a pavement grinder.

### Benefit

This tool virtually eliminates the need for a hand-held hammer by using an air impact gun. The first tool pushes the old tooth out and the second tool fits over the new tooth and pushes it in. When removing teeth, some of them are bound up by dirt and it can take up to 10 minutes to remove them with a hammer and chisel. With this tool, the tooth comes loose after just a few impacts. With the tooth installer, you can install a tooth about as fast as you can pick the next one out of the bucket.

### Parts and Labor

**Total: \$0 - scrap material**

**Labor: 15 minutes**

### For More Information

Contact Matt Findley at (816) 809-5278. Additional photos can be seen by accessing the Innovations Challenge homepage at <http://www.intranet/cr/SolutionsATWork/Innovations.htm>.