

FHWA LTAP/TTAP
BUILD A BETTER MOUSETRAP
NATIONAL COMPETITION
National Entry Booklet 2012



Images from the 2012 Build a Better Mousetrap National Competition

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WHAT IS THE NATIONAL ENTRY BOOKLET 2012?

The National Entry Booklet is a compilation of all the entries from the FHWA LTAP/TTAP 2012 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 or contact Susan Monahan at the FHWA LTAP/TTAP Clearinghouse at smonahan@artba.org or (202) 289-4434.

1ST PLACE WINNER

REPURPOSING USED TRUCK TIRES FOR WING PLOW CUTTING EDGE: MICHIGAN

CONTACT:

Ottawa County Road Commission
Jeff Johnson
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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
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Town of Vernon Public Works Department
375 Hartford Turnpike
Vernon, CT 06066
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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
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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
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Cherry Hills Village, Colorado 80113
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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

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 returned 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:

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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.