



Michigan LTAP
Great Ideas

CHALLENGE

Identifying, sharing, and rewarding innovative ideas from local road agencies



2013 Entries



Important

This document describes equipment and practices developed by employees of local road agencies for use within their agencies. The equipment and practices described herein have not necessarily been tested and/or approved to meet engineering design or safety standards. Agencies considering adopting the practices described in this document should first verify the practice is appropriate and safe for their agency's use. The Center for Technology & Training (CTT) is not responsible for damage to equipment or facilities, or for bodily injury as a result of reproducing and/or using the equipment or practices described herein.

What is the Great Ideas Challenge?

Working through Michigan's Local Technical Assistance Program (LTAP), members of the Center for Technology & Training staff get to visit dozens of local road agency facilities every year. Every time we stop at a county road commission or a city department of public works, we are impressed with what goes on behind the scenes. The men and women who manage and maintain local agency roads, facilities, and equipment are intelligent, ambitious, passionate, innovative, and productive. No matter the obstacle, they figure out how to get stuff done. And they do it well.

The *Great Ideas Challenge* is meant to help identify, share, and reward the great work that gets done at local road agencies in Michigan. The Challenge is open to all employees of road agencies that serve counties, townships, cities, and villages in Michigan. All entries are considered for the state-wide competition, and the entry that wins first place in Michigan is automatically entered in the Federal Highway Administration's LTAP Build a Better Mousetrap national competition.

The 2014 *Great Ideas Challenge* will open in March 2014.

Special Thanks to the Judges

Judges for the *Great Ideas Challenge* took time out of their busy schedules to evaluate, discuss, and score each entry based on five criteria: Cost, Ingenuity, Effectiveness, Ease of Adoption, and Return on Investment. Judges include:

Mark Jahnke – President, Specialty Claims Services, Inc.
John Ryyanen – Training Coordinator, Center for Technology & Training
Jeff Silagy – Transportation Specialist, Michigan DEQ
Ron Young, P.E. – Engineer-Manager (retired), Alcona County Road Commission
Kurt Zachary, P.E. – Construction Program Manager, FHWA Michigan Division

Contents



Dyed Hydraulic Fluid

City of Wyoming 1



Trailer Air System Remote Control

Lenawee County Road Commission 2



Trailer Light & Tarp Remote Control

Lenawee County Road Commission 3

Tail Light Clearer

City of Wyoming, MI 4

Tail Light Snow Deflector

Barry County Road Commission 5

Ford Super Duty Engine Lifting Tool

Lenawee County Road Commission 6

Blade Jack

Huron County Road Commission 7

Snow Plow Training Manual

City of Livonia Department of Public Service 8

Hub Plug Retainer

Ottawa County Road Commission 9

Fork Hitch

Jackson County Department of Transportation 10

Using Truck Mounted Hook-lift Systems to Reduce Fleet Costs

City of Wixom 11

In-house Carbide Underbody Scraper Blades

Bloomfield Township 12

Blade Change Ramp

Roscommon County Road Commission 13

Pre-wet Chute to Optimize De-icing Material Application

City of Novi Department of Public Services Field Operations Division 14

Dyed Hydraulic Fluid



City of Wyoming

Contact Information

Daniel Gard
gardd@wyomingmi.gov
616-745-2084

Address:

City Of Wyoming - Motorpool
2660 Burlingame SW
Wyoming Michigan 49509

Problem Statement

Finding hydraulic leaks on snow-covered vehicles was difficult.

Summary of Solution

Dan Gard worked with a local oil distributor to find a blue, mineral-based dye to color the hydraulic fluid on City of Wyoming trucks. He chose blue because it stands out; most other colors can be confused with other truck fluids. To experiment with the dye, Dan added 1/2 to 1 cup to the 40-60 gallon hydraulic fluid tank on a few trucks. After experiencing no adverse effects, he added it to the rest of the trucks and also added about 3/4 gallon of dye to his agency's 300 gallon bulk hydraulic fluid tank. He has used the dye for three years. Dying the hydraulic fluid for their entire fleet requires about 4 gallons of dye per year.

Labor, Equipment, Materials

1/2 to 1 cup of dye added to each of the trucks to dye existing fluid
3/4 gallon of dye added to the 300 gallon bulk hydraulic fluid tank

Summary of Expenses

\$35 per gallon

Benefits

With the dye, hydraulic leaks are much easier to spot, which speeds up problem diagnosis and also simplifies the pre- and post-trip checks for drivers.



Trailer Air System Remote Control



Lenawee County Road Commission

Contact Information

David Foster
Courtesy of Rob Crowell
rob@lenaweeroads.com

517-673-0071

Address:

2461 Treat Hwy
Adrian, MI 49221

Problem Statement

Operation of the trailer air system is limited to the truck's cab.

Summary of Solution

David Foster created a remote control that connects to the trailer air system, allowing for operation outside of the truck's cab.

Labor, Equipment, Materials

- Electrical box
- Air regulators
- Fuse panel
- Electrical relays
- Air hose
- Cart
- Battery charger couplers
- Gladhands
- Switches
- Indicator lights

Summary of Expenses

Total cost: \$250

Benefits

Air system operation isn't limited to the cab of the truck.



Trailer Light & Tarp Remote Control

Lenawee County Road Commission

Contact Information

David Foster
Courtesy of Rob Crowell
robcc@lenaweeroads.com
(517) 673-0071
Address:
2461 Treat Hwy
Adrian, MI 49221



Problem Statement

Operating the light and tarp is only possible from the truck's cab.

Summary of Solution

David Foster created a remote control that operates the trailer lights and tarp, allowing for operation outside the truck's cab.

Labor, Equipment, Materials

- Relays
- Wire and fuses from old automobiles
- Cart and box from garage sales
- Battery switches
- Lights and charger

Summary of Expenses

Total cost: approximately \$250 - \$300

Benefits

It is now possible to operate the trailer lights and tarp without going to the cab.



Tail Light Clearer

City of Wyoming, MI

Contact Information

Daniel Gard

gardd@wyomingmi.gov

616-745-2084

Address:

City Of Wyoming - Motorpool

2660 Burlingame SW

Wyoming Michigan 49509

Problem Statement

The LED truck lighting does not get warm enough to prevent the accumulation of snow on truck tail lights and rear flashers. A way to keep drivers from having to exit their trucks to clean the lights off during their routes was needed.

Summary of Solution

Daniel Gard created the Tail Light Clearer using the truck's air system to clear the lights at adjustable and timed intervals.

They were installed on seven trucks and were tested throughout last winter. He then redesigned them by adding a washer solvent dispenser to aid in keeping tail lights clear.

Labor, Equipment, Materials

A local supplier helped to find an air valve and timer, and also supplied the nozzles.

Summary of Expenses

Air valve: \$80

4 nozzles: \$15 each

Box: \$25

Timer: \$70

Truck protection valve: \$70

Tubing: \$10

Solvent container: \$75

Switch with override button: \$45

Numerous fittings: \$60

Total Cost: \$495

Benefits

The tail light clearers provide safety to the public and drivers by eliminating the need to exit the truck to clean the tail lights in adverse weather.



Before



After



Tail Light Snow Deflector

Barry County Road Commission

Contact Information

Rob Richardson
administration@barrycrc.org
269-945-3449
Address:
P.O. Box 158
Hastings, MI 49058

Problem Statement

Drivers were required to exit the truck to remove the snow build-up on tail lights throughout the day.

Summary of Solution

The air deflector keeps lights clean while the truck is on route.

Labor, Equipment, Materials

The Tail Light Snow Deflector was originally designed by Blade Man - Bob Miller, from a pie tin and duct tape! A mechanic perfected the design by using a drill, stainless steel and two bolts.

Summary of Expenses

\$25 for the deflector plate, bolts and washers
1/2 hour mechanic rate

Benefits

The tail light snow deflector helps keep drivers inside the truck and helps motorists to consistently see tail lights throughout a snow event, resulting in increased safety for everyone.



Ford Super Duty Engine Lifting Tool

Lenawee County Road Commission

Contact Information

Rob Crowell

robc@lenaweeroads.com

517-673-0071

Address:

2461 Treat Hwy.

Adrian, MI 49221



Problem Statement

The manufactured tool is very expensive to purchase.

Summary of Solution

The Ford Super Duty engine lifting tool was developed in-house to assist in removing a truck engine. The lifting tool mounts between the chain lift brackets on the engine, allowing the engine to be lifted from the center.

Labor, Equipment, Materials

Bolts

D-ring

Steel tubing

Labor for welding it together

Summary of Expenses

Total cost: \$20

Benefits

Removing an engine is easier and safer.

Blade Jack

Huron County Road Commission

Contact Information

Tom Donnellon

tdonnellon@yahoo.com

(989) 269-6404

Address:

417 S. Hanselman Street

Bad Axe, MI 48413

Problem Statement

Changing under-body blades is a challenge; they are heavy and difficult to get in the right position for attachment.

Summary of Solution

The Blade Jack makes it easier to position the blade under the truck for attachment. It also lowers the risk of injury caused by the weight of the blade. Many attempts have been made to use floor jacks as a solution; it took many alterations to this model including larger rubber wheels and a swivel mount for the blade. This can be done at many road commissions throughout the state.

Labor, Equipment, Materials

Labor and Shop hours

Basic jack

Customized wheels

Front counterweight

Summary of Expenses

Basic jack: \$80 from TSC, Harbor Freight

Wheels, add-ons: \$40

Labor & Shop, 4 - 6 hours: \$200

Benefits

Changing blades can be done by one person, more quickly with a lower risk of injury.



Snow Plow Training Manual

City of Livonia Department of Public Service

Contact Information

Jim Williams

jwilliams@ci.livonia.mi.us

(734) 466-2648

Address:

12973 Farmington Road

Livonia, MI 48150

Problem Statement

Training new employees to operate front V-plow trucks safely and efficiently.

Summary of Solution

Jim Williams developed a training program that includes a 2 hour classroom session, a 25 page manual and 1-2 hours of field training.

Labor, Equipment, Materials

Instructor and students

Summary of Expenses

Employees are paid an hourly wage for training.

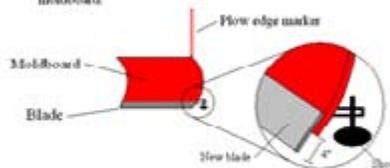
Benefits

Training new employees to plow snow properly, safely, and efficiently saves the city and the citizens both time and money.

Fundamentals of snow plowing with front V-Plow trucks.

Pre-shift safety check-out.

1. Check engine oil and other fluid levels of the truck, ie, coolant overflow tank, windshield washer fluid, etc.
2. Check all the lights, 4 way flashers, brake lights and strobe.
3. Check all the tires for proper inflation.
4. Check the 2-way radio, set it to channel 3 (S-R-F).
5. Check fluid level, top it off before leaving the yard.
6. Visually inspect the plow blade for wear, broken or missing bolts, and worn shoes. Blade should be no less than 1" below the moldboard.



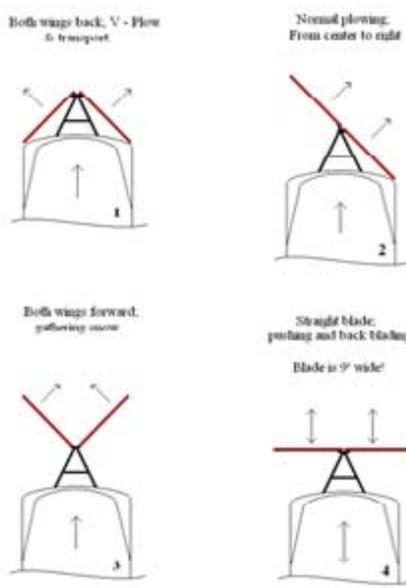
New plow blades are 4" below the moldboard so if it looks to be 1" or less, it may need to be replaced. When in doubt, ASK a mechanic. Many plows have a "curb feeler" that extends beyond the moldboard. This can make the inspection more difficult, but it must be checked!

7. Start the truck and check the plows operation. Lift and extend both wings forward and back. If it seems to strain in any operation, it may need hydraulic fluid. Look for any signs of leaks underneath. To add fluid to the system, ask a mechanic for help.
8. Check the plow blade for wear, every 2-3 hours!

DO NOT transport in 4 wheel drive on bare pavement!
DO NOT plow in 4 wheel drive or 4 wheel LOW gear!

V - Plow configurations

TOP VIEWS



1. Both wings back, V - Plow for transport.
2. Normal plowing, from center to right.
3. Both wings forward, gathering snow.
4. Straight blade, pushing and back tending. Blade is 9' wide!

Hub Plug Retainer

Ottawa County Road Commission

Contact Information

Randy Nagelkirk
rnagelkirk@ottawacorc.com
(616) 638-0384

Address:

14110 Lakeshore
Grand Haven, MI 49417

Problem Statement

The fill plugs on the passenger side of plow trucks were getting pulled off as a result of being rubbed against hard packed snow. This caused lube to drain out, and dirt and water to fill the wheel, which removed trucks from their routes for repairs.

Summary of Solution

The problem was fixed with a very simple solution: bolting a piece of flat stock over the plug. This allows the fill plugs to cut through the snow when they rub against snow banks.

Labor, Equipment, Materials

1 hour of labor

Drill and screwdriver

2 - 10/32" x 3/4" panhead machine screws

2 - 1/4" nuts

1 - 1x4x1/8" flat stock steel

Key part: wheel hub with screws on the front. The Ottawa County Road Commission uses Stemco hub caps.

Summary of Expenses

Labor time to cut steel, drill two holes and install the new cap

Benefits

The Hub Plug Retainer is an inexpensive and simple solution to what can be an expensive problem. The installation of the plug will result in time savings, as one lost plug means one truck is out of commission for repairs. In addition, once installed, the proper oil level can still be checked and refilled by simply removing one screw.



Fork Hitch

Jackson County Department of Transportation

Contact Information

Al Roden

allenr@jcrc-roads.org

(517) 740-0312

Address:

2400 N. Elm Rd.

Jackson, MI 49201

Problem Statement

Maneuvering trailer-mounted equipment was being done by securing a long bolt through the end of a fork lift to rest a ball or pintle on. One day, the trailer jumped the bolt and got away. There wasn't a lot of damage but it was a wake up call to the agency.

Summary of Solution

Using some scrap steel and a hitch, their fabrication shop made an attachment for the forks, utilizing the existing hole.

Labor, Equipment, Materials

3 labor hours

New hitch

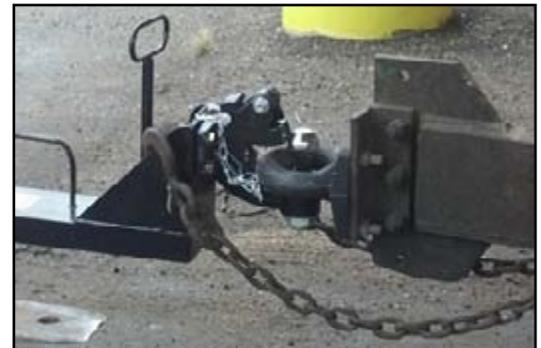
Scrap metal

Summary of Expenses

Approximately \$300

Benefits

The Fork Hitch makes maneuvering equipment a much safer task for employees, and reduces the risk of damage to equipment.



Using Truck Mounted Hook-lift Systems to Reduce Fleet

City of Wixom

Contact Information

Mike Howell
(248) 624-0141

Address:

49045 Pontiac trail
Wixom, MI 48393

Problem Statement

Maintaining services with reduced capital improvements funds has been a challenge for the City of Wixom.

Summary of Solution

The City of Wixom purchased a 2008 Ford F550 equipped with a new 'hook-lift' system. Hook-lifts allow one truck to complete the tasks of several. The F550 was equipped with a 3 yard salt box, a dump box and four utility boxes. In 2012, Wixom refurbished a 2001 Sterling L line to a hook-lift. This truck is outfitted with a 5 yard salt box, a 1,000 gallon anti-ice brine tank and a dump body.

Labor, Equipment, Materials

Not applicable

Summary of Expenses

2008 F550 with salt box (with pre-wetting capabilities)

Dump and utility boxes: \$80,000

Refurbished 2001 Sterling

New hook-lift system

Retrofitted 5 yard salt box (with pre-wetting capabilities)

1,000 gallon anti-ice tank and a utility dump box: \$90,000

Benefits

The hook-lift allows one truck to perform the seasonal tasks of several trucks, saving shrinking capital and reducing single task trucks from the fleet.

**2008 Ford F550
with new Hook-lift System**



**Refurbished 2001
L line with Hook-lift System**



In-house Carbide Underbody Scraper Blades

Bloomfield Township

Contact Information

Duane Poole

dpool@bloomfieldtwp.org

(248) 594-2800

Address:

4200 Telegraph Rd

PO Box 489

Bloomfield Hills, MI 48303-0489

Problem Statement

Eight inch by ten foot underbody blades with carbide inserts are not being manufactured. Underbody blades without the carbide reinforcements have a lifespan of only 8-10 hours of use. The time it takes to plow the township's roads takes 12-14 hours per route. This results in excess of 12 hours of repair time per event and costs a total of \$3,655.08 in labor material.

Summary of Solution

The Bloomfield Township mechanics add carbide blocks to the face of the underbody blades. This increases the lifespan from approximately 8-10 hours to approximately 3/4 or more of a winter season.

Labor, Equipment, Materials

1 mechanic, approximately 15 minutes per set

1 welder

2 steel 8 inch x 5 feet underbody blades

1 - 6 1/4 inch x 2 inch x 1 inch carbide block

4 - 12 1/2 inch x 2 inch x 1 inch carbide blocks

Summary of Expenses

15 minutes of mechanic wage: \$7.36

Underbody blades: \$52.08 per section, x 2 = \$104.16

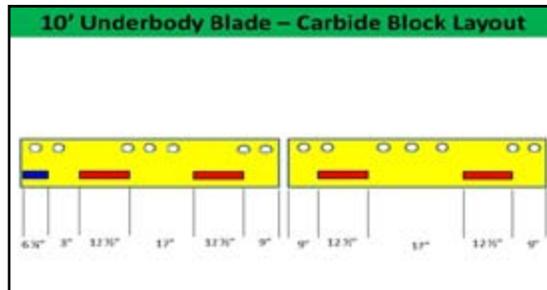
1 - 6 1/4 inch x 2 inch x 1 inch carbide block: \$89.78

4 - 12 1/2 inch x 2 inch x 1 inch carbide blocks: \$646.00

Total cost to build one set of blades: \$847.30

Benefits

Trucks do not need to stop plowing for blade changes, which saves time, money and allows for better customer service. The reduction in blade changes also decreases the potential for personal injuries including back injuries, broken bones, and lacerations.



Blade Change Ramp

Roscommon County Road Commission

Contact Information

Scott Eckstorm

eckstorms@roscommoncrc.com

989-366-0333 ext #20

Address:

Roscommon County Road Commission

820 E. West Branch Road

Prudenville, MI 48651

Problem Statement

Changing the blades on underbody scrapers is challenging for the Roscommon County Road Commission, who does their blade changes on the floor of their garage.

Summary of Solution

Elevating the truck allows the blade to hang straight down, making blade changes an easier task.

Labor, Equipment, Materials

Approximately 40 labor hours

Wire welder

Angle grinder

Approximately 40 feet of 2 inch square tubing

20' of 3"x 4" angle iron

4 foot piece of grating

1 gallon of paint

Summary of Expenses

Total cost: approximately \$500 in materials

Benefits

Changing the blades on an underbody scraper is easier.



Pre-wet Chute to Optimize De-icing Material Application

City of Novi Department of Public Services Field Operations Division

Contact Information

Rob Hayes, Director of Public Services/City Engineer

rhayes@cityofnovi.org

(248) 735-5640

Address:

City of Novi Field Services Complex

26300 Lee BeGole Drive

Novi, MI 48375

Problem Statement

The “bounce and scatter” problem occurs when rock salt doesn’t receive maximum pre-wet coverage. This creates the problem of keeping de-icing materials on the roadway, which wastes materials and negatively impacts the environment, roadway infrastructure and motorist safety. In addition, de-icing material is wasted and spray tips used to coat the salt with liquids get damaged from the physical impacts of the salt.

Summary of Solution

Novi’s Winter Maintenance Advancement Team (WMAT) developed a removable, self-contained, stainless steel pre-wet chute for trucks outfitted with liquid application capabilities. The chute can be used on any type of standard auger box and ensures that dry rock salt gets covered with the maximum amount of dispensed liquid while protecting liquid application components. The chute also ensures that the pre-wetted salt is placed in the center of the spinner so that it can then be uniformly applied to roadways.

Labor, Equipment, Materials

WMAT partnered with a Novi-based metal fabricating shop to manufacture the chute’s stainless steel box and mounting bracket. The shop equipment used included a press brake to bend the steel and a drill press to create the holes needed to mount the chute. Equipment used to complete installation of the units at the garage included a knife to cut the hose to the proper length, and wrenches to secure the spray tips and mounting brackets. The bill of materials for each chute included:

- 1 stainless steel chute body
- 2’ of low pressure 1/2” rubber hose
- 2 brass spray tips (size 11020 BR)
- 1 brass tee fitting

(continued on next page)

Before



After



Pre-wet Chute to Optimize De-icing Material Application *(continued)*

- 2 brass elbows
- 2 stainless steel mounting plates
- 4 small bolts
- 4 lock nuts
- 2 presto pins

Summary of Expenses

Labor for installation: (1 hour @ fully-loaded rate): \$50

Fabrication of body and mounting bracket: \$100

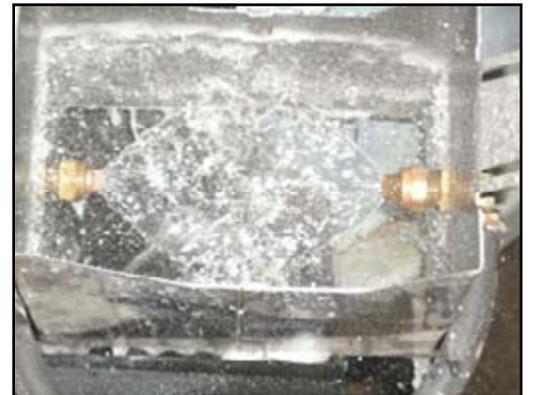
Materials (tips, hose, fittings, couplers, pins, bolts, etc.): \$25

Total cost: \$175

Benefits

Enhanced liquid coverage yields quicker hydration and activation of salt, resulting in safer roads sooner rather than later. Reduced bounce and scatter associated with thoroughly pre-wetted salt means that less salt is wasted, resulting in lower operational costs and decreased detrimental impacts to infrastructure and the environment. Material is 30% more likely to stay on the pavement not only when the liquid thoroughly coats the salt, but also when pre-wetted material is placed in the center of the spinner. Redirecting pre-wetted material to the center of the spinner also provides more uniform distribution over the pavement. Material usage has decreased from 194 tons per event in 2011-2012 down to 131 tons per event in 2012-2013. In addition, the use of the pre-wet chute has reduced labor costs associated with fewer repairs on spray tips.

Operating





The Center for Technology & Training is located on the campus of Michigan Technological University. The CTT's mission is to develop technology and software, coordinate training, and conduct research to support the agencies that manage public infrastructure. For more information, visit www.ctt.mtu.edu.