



The Bridge



A quarterly newsletter from Michigan's Local Technical Assistance Program

Vol. 35, No. 3 – Winter 2023/2024

The Alaska Department of Transportation successfully installed a wicking fabric in the Beaver Slide pavement to help drain the embankment, thus reducing hazardous rutting and maintenance needs on the road segment.



Beaver Slide: How Geotextiles Made One Road Safer

Allison Szlachta, Technical Writing Intern
Center for Technology & Training

Photo: Courtesy of Solmax

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Michigan's
Local Technical
Assistance Program

Deep, hidden within Alaska's dense forest lies a lonely road: the Dalton Highway. This 414-mile stretch was originally built as a supply road to support the Trans-Alaska Pipeline system. With not much more than three gas stations along its route, this highway is known for being one of the most isolated roads in the entire United States.

That highway is primarily for heavy truck traffic, according to Daniel Adamczak, maintenance and operations engineer for Alaska Department of Transportation and Public Facilities (Alaska DOT&PF) Northern Region. "Oil fields are located at the end of the haul road," pointed out Adamczak. Commercial truck traffic outnumbers regular car and truck traffic along this important shipping route.

The Beaver Slide Dilemma

One steep gravel portion of the Dalton Highway, known as the Beaver Slide, is considered by truckers to be a treacherous stretch—two miles, either up or down, at an 11-percent grade. As the slope becomes steeper, erosion intensifies, primarily due to the effects of gravity. Because this increase in slope results in an accelerated water flow at an increased volume, more gravel is displaced and the structural integrity of the road is weakened.

To complicate conditions at the Beaver Slide, Alaska receives heavy amounts of precipitation that soaks into the highway. The rain does not have a place to properly drain out of the road, leaving water to infiltrate and remain in the pavement's subsurface layers where it eventually freezes and forms ice lenses. As water freezes, it expands and causes the ground to heave. During the spring, the ice melts, leaving depressions in the road where the ice lenses

had been previously located and frost boils, or pockets of weakened subgrade materials that, under excessive stress 'boil up' into the base layer, subsequently leading to soft spots on the road surface and failure of the surfacing.¹ Vehicles traveling on Beaver Slide often notice these depressions and soft spots and brake accordingly, rapidly degrading the road in these areas. As the vehicles travel over soft spots, tires pack down the soft spots and push dirt into the high spots, creating hazardous deep ruts.

On Beaver Slide, the poor condition of the road results in unsafe driving conditions. Plus, the remoteness of the highway makes it extremely difficult, if not impossible to maintain. "Even when we graded those ruts and smoothed that pumping ground, it would be rutted and difficult to pass sometimes within that same day or the next day," Adamczak said. Complicating matters, Beaver Slide is the sole road in that part of the state.

The Beaver Slide problem was well known to Alaskan engineers, who considered several options to fix the roadway.

At one point, Adamczak says Beaver Slide experienced "substantial embankment changes". So, Alaska DOT&PF considered removing all of the frost-susceptible soils to prevent frost heave. While this method can be effective, it is extremely expensive and time consuming, requiring heavy equipment, intense labor, and excavation of large amounts of soil. Alternatively, large amounts of rock could be used to remediate the drainage issue, but hauling quantities of rock to the remote Beaver Slide would be very costly. Alaskan engineers wanted to solve the drainage issues along Beaver Slide without

► continued on page 6



CONGRATULATIONS!

Jared Heinze - Hardesty & Hanover Contest & Bridge Category Winner

People Category Winner

Cindy Dingell - Road Commission for Oakland County

Summer Maintenance Category Winner

Cindy Dingell - Road Commission for Oakland County

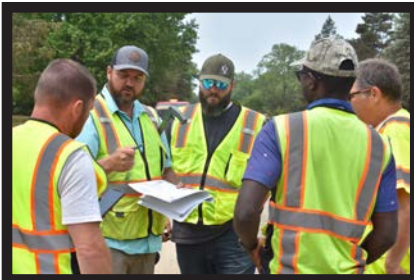


PHOTO CONTEST 2024

see page 6
for details

Letter from the Editor

Let me begin by congratulating Jared Hinze of Hardesty & Hanover, winner of the Michigan LTAP 2023 Photo Contest! And, let me thank all those agencies that submitted their photos to the contest. It was a tough decision as we received several great photos. We hope to feature some of these images of Michigan roads and road work in some of the upcoming issues of *The Bridge*. In the meantime, keep taking those picture! The Michigan LTAP 2024 Photo Contest is now open: michiganltap.org/2024photocontest.

This 35.4 issue of the *The Bridge* focuses on innovation. Albert Einstein reminds us that “innovation is everyone’s responsibility, not just R&Ds”. We see Alaska Department of Transportation and Public Facilities innovatively placing a geotextile in a pavement structure to improve drainage of the road’s embankment. We see biodiesel, made from diverse sources including plant and animal fats and cooking oils, replacing fossil fuels to power heavy-duty diesel vehicles and equipment. And, we’ve seen local agencies with great ideas continue to use and advance that innovations that make snow removal operations safer for plow operators and the motoring public.

In these pages, we also explore how local road-owning agencies in partnership with landowners can make use of standing corn rows and living snow fences to make roads safer. New studies in 2021 and 2022 have found these options to be a cost-effective means of reducing blowing, drifting snow on roadways.

These pages further share how local road-owning agencies how local agencies can access and benefit from MIRE data collection in the state of Michigan.

Finally, this issue introduces you to Matt MacDonnell, the new managing director for Washtenaw County Road Commission. He is living proof of how the life lessons we learn in sports can be applied to many of the other aspects of our lives, including the workplace.

As always, the success of our articles depends on your stories, your experience whether good or not so good, and your innovations. If you’ve never participated in an article for *The Bridge* but have a story about an experience or innovation at your agency, we invite you to reach out to us with your suggestion by emailing us at ctt@mtu.edu. We want to hear about your engineering projects, operations and management strategies, shop products and practices, and safety resources.

Till next time, we’ll be listening to you and working on articles that we hope are engaging and useful for Michigan’s road-owning agencies that we serve.

Victoria



Where the Wind Blows: How Standing Corn Rows Effectively Reduce Blowing, Drifting Snow

Emily Bergman, *Technical Writing Intern*
Center for Technology & Training

New research suggests that living snow fences (LSFs)—physical barriers, often composed of shrubs and trees and native grasses, constructed adjacent to roadways to trap blowing snow and prevent it from drifting onto the roadway—are effective, in terms of both function and cost, for managing blowing snow in the wintertime. Three new studies released between 2021 and 2023—a field test, a benefit-cost analysis, and an analysis of landowner perspectives—explore the benefits that living snow fences may provide in our region.^{1,2,3}

While all types of snow fences were found to be “cost-effective (benefit–cost ratio > 1)”, the 2022 studies found that standing corn rows (SCRs)—a specific type of living snow fencing—are the “most economical” because they share the same benefits as structural snow fences and living snow fences composed of trees and shrubs, while not requiring “installation and maintenance investments”.¹

Furthermore, landowners consider SCRs to be the least intrusive form of snow fencing.²

Standing Corn Row Program

SCRs are 8 to 16 rows, or 30- to 60-foot-wide swaths, of corn that are left standing along roadways where blowing snow is an issue in the wintertime. These SCRs trap snow behind

and within them before it has the chance to blow and drift on roads. SCRs function as a “windbreak” and are very effective at it.⁴ Jim Griesbach, county highway commissioner for Marathon County, Wisconsin, related, “We’ll get 50 mile-per-hour winds that’ll blow down our structural snow fencing, but the corn stays standing.” Thus, SCRs reduce snow blowing across roadways.

In turn, SCRs are intended to reduce the need for local agencies “to remove the snow from the roadway with plows and salt”, says Lucas Meddaugh, county engineer for Portage County Highway Department in central Wisconsin.

Griesbach emphasized, “Even a mile, a half-mile, or a quarter-mile of standing corn rows gets us one less area that has concerns with blowing snow, so we’ll take every mile that we can get.”

SCR Experience in Antrim County

The Antrim County Road Commission (ACRC), in the northwestern Lower Peninsula of Michigan has used SCRs twice. The first time was unintentional, according to Burt Thompson, engineer-manager at ACRC. “We had a farm field where the farmer left some corn rows standing in an area that was a bad drifting area, and we noticed that it really

worked well,” Thompson observed.

Then, in the winter of 2020/2021 a landowner came to ACRC with a complaint about drifting snow problems along their property. “So, I said ‘well if you have corn in that field, you might want to try just leaving some rows standing’, and the farmer did,” Thompson shared. He continued, “This area wasn’t as wide open as the other area and didn’t get the same degree of drifting, so it wasn’t as profound in effect but it still worked and the landowner was please with it.”

Although a SCR program has not been implemented in Antrim County, Thompson said that, despite not pursuing SCRs, the idea is “in the back of [his] mind”. “We might in the future,” he reflected.

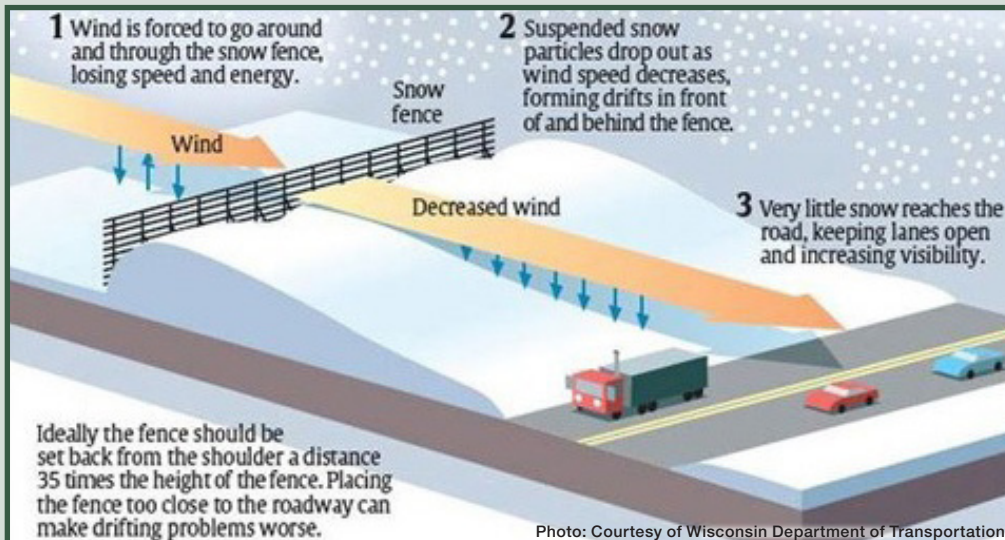
Standing Corn Rows Benefits and Drawbacks

What makes SCRs an easy-to-deploy snow fencing is the fact that they can be grown in one season. Other forms of LSFs take years or decades to mature and realize their full benefit.

Each segment of SCRs also equates to one less structural snow fence installation that road-owning agencies must do in the late fall. That’s when Marathon County Highway Department often “runs out of time” for

► continued on next page

Standing Corn Rows (continued from page 3)



NOTE: The distance of 35 times the height of the fence is circumstantial and based on 50-percent porosity with no melt off. WisDOT highway maintenance engineer, Peter Wisniewski, says he has not observed drift with 7 times the height. Thickening the vegetation in the snow fence increases snow caught on the upwind side of the fence or within the fence itself. Over the course of the winter season, frequent melt offs reset the capacity of the living snow fence. A second line of vegetation could serve to catch far snow (snow beyond 300 feet). WisDOT's LSF designs change based on available right of way.

preparing its network for winter, according to Griesbach, who considers the reduction in workload among the “main benefits” of SCRs.

“SCRs can have a good effect on minimizing drifting and they certainly do provide that wind and snow break” related Thompson. Managing blowing, drifting snow on roadways with the use of SCRs can translate to savings for agencies in terms of plowing and anti-icing/deicing measures. “It’s significantly cheaper to use the existing crops versus using snow plowing equipment,” said Meddaugh. He shares that Portage County Highway Department often gets late-afternoon calls about drifting snow. A round trip for a plow to a rural location in Portage County and performing one to two passes can require anywhere from 3 to 12 hours of staff time, he says. According to manager of the Roscommon County Road Commission (RCRC), Roger Saxton, plow operator labor, wage, and benefits is approximately \$45 an hour and equipment costs for plowing are around \$65 an hour. Plus, less snow drifting on the roadway means less need for chloride deicers, another cost saver that has environmental benefits as well.

“Extra snow removal equipment, like tractors with snow blowers or dozers to push back the snow, aren’t needed,” added Dan Gullickson, a supervisor with the Minnesota Department of Transportation’s (MnDOT) Blowing Snow Control Shared Services, about areas that employ SCRs. “We will still need to use snow plows but can avoid using the extra equipment to keep the highway free of drifts.”

Furthermore, SCRs can reduce soil erosion in windswept areas where ditches “accumulate a few inches of sediment” each year, and they can “sequester or secure carbon”, according to Meddaugh, Griesbach, and Gullickson. Moreover, research has shown the living snow fences go even further by “avoid[ing] carbon emissions” entirely by reducing the need for snow removal operations.

For landowners, SCRs offer “better access to their fields” and “less impact on seeded fields” in comparison to structural snow fencing that frequently blocks field entrances and requires equipment to install that leaves ruts, suggests Meddaugh. Landowners also enjoy knowing that they are helping their local road-owning agencies to maintain safer roads for the motoring public by participating in SCR programs. Meddaugh shared, “The landowners who are continuing to do this, they know that it helps us significantly.”

Road users experience clearer roads in places that employ living snow fences like SCRs as well as less potential for injury and damage in run-off-the-road events. “Living snow fences of standing corn rows or shrubs less than 4 inches are safer to drive into if a vehicle leaves the road,” commented Gullickson.

Although SCRs are a seemingly effective and easy solution to the problem of blowing snow on roadways, there are a few drawbacks to their use. One is the need for annual landowner-agency agreements. Another challenge is crop rotation.¹ Meddaugh relates that some areas with blowing, drifting snow issues may

see corn “once every 3 to 4 years”. That concurs with Thompson’s experience in Antrim County. “Landowners don’t want to grow corn in the same spot every year; they’re going to rotate through crops,” he said.

Finally, despite Meddaugh and Griesbach’s experience of landowners’ indifference towards springtime crop removal, the 2022 surveys found that landowners do find it problematic to time crop removal around rain and wet soils, fertilization, and other spring work, and to clean their combines for a second time.¹

Constructing Standing Corn Rows

How and where to construct SCRs looks different depending on the location. SCRs typically require 8 to 16 rows of corn. “How far the corn is from the edge of the pavement determines how much corn must be left standing,” noted Griesbach, adding that SCRs that are 50 to 100 feet from the edge of pavement typically require 12 to 16 rows while SCRs that are 200 feet away are effective with as few as 8 to 11 rows.

Snow fence installations address the nearest 2 miles of roadway to an area that’s experiencing blowing, drifting snow, says Gullickson. He detailed, “A snowflake doesn’t move much further than 2 miles without getting caught by something or sublimating and falling apart.” Gullickson continued, “Using the corridor method for implementing blowing snow control creates a more predictable driver experience during snow events.”

In terms its benefit-cost ratio, researchers of snow fence installations in Illinois found that the length of the installation negatively influences the benefit-cost ratio until the snow-fenced segment reaches 6 miles or longer, where the values stabilize.¹ They concluded moderate length installations less than 6 miles would “achieve a more cost-effective project”.¹

According to Gullickson, the benefit-cost of a snow fence installation is positively influenced by improved mobility of freight and emergency services—both outcomes of snow fences.

The effectiveness of SCRs also relates to crash data on the site and input from road maintenance personnel in identifying candidate locations.² “Location, location, location!” Gullickson emphasized, saying it’s important to consider locations with higher incidences of roadway departures and higher traffic volumes. “Along with that, you have to factor in the labor, materials, and equipment that are used during snow and ice removal operations to

determine the benefit-cost and rank where to deploy these treatments,” he added. Griesbach and Meddaugh say that candidate locations are commonly noticed by road-owning agency personnel in their daily commute.

From Gullickson’s perspective, outreach by plow operators is the most effective way to share the SCR program with landowners. “If landowners can hear firsthand from a plow operator who had to plow snow on Thanksgiving or Christmas Day and do emergency rescues, that might compel them to say ‘I’m interested in doing this for the greater good,’” shared Gullickson. He continued, “The landowners want to know they’re making a difference; nothing can replace that interaction with an individual landowner.”

Thompson shares that perspective. “You need to have a relationship with the landowner, a conversation with the farmer to see if they’re willing to do it, and then you have to work with them on it,” he explained.

However, landowners remain concerned about acres used, crop unit price, loss of revenue, and timely compensation.² As an incentive for landowners to participate in the SCR program, Minnesota DOT uses a rental formula that adjusts the yearly rental rate based on the national farm product price index, allowing landowners payment based on the economics of the industry. “If commodity prices go down,” Gullickson pointed out, “landowners are not going to get less than what the rate was when they signed up with us, but then this also allows us to give landowners a bonus or an incentive payment that is based on the economics of the industry.” That payout equates to approximately \$1000 per acre of SCRs per program year.⁵ Estimates in Minnesota suggest a quarter of a mile of SCRs composed of 12 rows of corn cover approximately one acre.⁶

Marathon County Highway Department pays 50 cents more a bushel than what the farmer can get at market at the time of the agreement. “They’re actually making more than that when they consider they don’t have the cost of hauling the corn to market or the cost of drying it,” said Griesbach. Plus, the farmers can also choose to pick the corn by hand and take it to market.

For the intentional SCRs in Antrim County, the road commission compensated the landowner for the estimated amount of bushels left standing at that year’s market price, which was \$41.20 per bushel for an approximate total of \$330 that year. “Compen-

sating them for the corn is a reasonable ask and justifiable if it saves you time and money battling snow drifts,” affirmed Thompson.

In contrast, installing and removing approximately 30 miles of structural snow fence costs Portage County Highway Department around \$143,000—\$80,000 to install and \$63,000 to remove—an effort that required 28 days of staff time to accomplish.

To combat landowner’s fears of losing money on their crops and springtime crop removal, Meddaugh opines that education is an important component of a SCR program. “Trying to convince them that this way of doing things benefits everybody is challenging at times,” he admitted “But, the best thing is education and examples, and having more real world examples, maybe even videos, would be beneficial for educating property owners on how these programs work and how different property owners remove the crops in the spring.” He says some counties have collaborated with non-profit groups to help landowners take down SCRs in the spring as a fundraiser.

Despite limited success in promoting the SCR program in Marathon County, Griesbach says he’s committed to spreading the word about the program and is eyeing advertisement opportunities in local newspapers. News outlets are “powerful” for communicating to the general public, suggests Gullickson. He added, “News and media avenues do help get the word out to landowners before a plow operator knocks on their door.”

Establishing SCR programs early in the season increases the chances of landowner participation. “A lot of farmers will have their corn off by November, so you need to approach the farmers early,” explained Griesbach. “August is the time you should be talking to them.”

Living Snow Fences

Snow fences made of trees, shrubs, and/or native grasses are low maintenance once the plants have matured, have environmental benefits like carbon sequestration and oxygen production, and provide “aesthetic beauty”.^{3,7} Gullickson adds that they can “support other living organisms around it like long-eared bats and migratory birds that nest in this vegeta-

tion and can benefit songbirds and pollinators”. However, he cautions that living snow fences develop root systems, which can plug drain tiles and affect agricultural production.

Nonetheless, Gullickson emphasized, “There’s a time and a place to do living snow fencing; it depends upon the location and the context.” He believes landowner partnerships in establishing living snow fences are important to tackling Minnesota’s “severe” blowing snow issues.

Plants must get adequate water, be kept free from weeds, and be protected from damage due to animals or insects and disease in order for a living snow fence to grow to the point of canopy closure, a process that takes three to five years. By 18 years after installation, researchers found the benefit-cost ratio tips in favor of living snow fences in comparison to structural snow fences.¹ But, from Gullickson’s experience, a favorable benefit-cost ratio can be experienced much sooner than that.

However, in Michigan, Roscommon County Road Commission (CRC) unsuccessfully attempted a living snow fence installation. Managing Director Roger Saxton said the agency carefully watered and fertilized its living snow fence. “I don’t know why it failed,” he shared. In fact, Roscommon CRC tried twice to install a living snow fence at the one location in the county, once with dogwood and once with Western red cedar. Each time, they used different techniques—the first time, augering out a hole before removing the plant from its basket and planting it, and the second time, ridding the area of brush and rototilling the soil before planting and mulching around each individual plant.

Yet, despite the agency’s two unsuccessful attempts at living snow fencing, Saxton said,



Setback area and standing corn rows in Portage County over 2023-2024 winter season (Photo: Courtesy of Portage County Highway Department)

Standing Corn Rows (continued from page 5)

► “I hope someday to get that living snow fence back in and growing.” He’s considering spruce trees since they grow quickly, are hardy, and are not eaten by deer, although he acknowledges that spruce trees can encroach upon the clear zone and become a hazard. “I would test plants first on a smaller scale... or try to pick something that’s native to the area,” he reflected.

A New Way of Thinking

“Snow fences have made a difference at individual locations—where they have been placed,” emphasized Gullickson. “They have reduced the need for heavy snow removal equipment and chloride use.”

The “biggest benefit” of SCR and other LSFs, according to Gullickson, is “helping road users get home safely”.

“SCRs are a benefit to everybody,” said Meddaugh, referring to road users and landowners as well as the road commission. Yet, he says an SCR program still involves “changing a way of thinking, which is the challenge”.

Listening to landowner concerns and providing education and resources can ease the challenges associated with promoting SCR programs and help road-owning agencies begin to realize the benefits of living snow

fencing like SCR.

To learn more about SCR, visit <https://www.transportationmatters.iowadot.gov/2022/01/standing-corn-lead-to-safety-legacy-for-solon-family.html>. ■

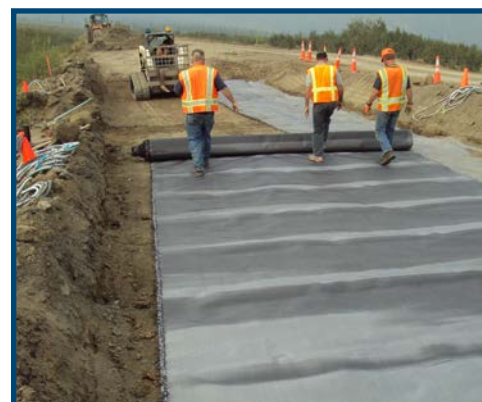
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2. Baral, Shambhu Saran; Fries, Ryan; and Qi, Yan. *Transportation Agency and Landowner Perspectives on Snow Fence Programs*. ASCE: Journal of Cold Region Engineering, v. 37, n. 1. 2023. Available: <https://ascelibrary.org/doi/10.1061/%28ASCE%29CR.1943-5495.0000291>.
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Beaver Slide (continued from



Beaver Slide before wicking fabric installed (Photo: Courtesy of Solmax)



Installation of MIRAFLI H₂Ri wicking fabric. Note: Dark patches illustrate moisture moving laterally, along the fibers (Photo: Courtesy of Alaska DOT&PF)

CATEGORIES

- Summer road maintenance**
(pavement repairs, mowing, grading, dust control, tree cutting, safety)
- Winter road maintenance**
(plowing, deicing, anti-icing, cutting banks, removing snow)
- Bridges & culverts**
(inspection, repairs, maintenance)
- People**
(work crews, community outreach, public events, school events, training)
- Equipment**
(new or historic equipment, innovations, equipment for a cause)

DEADLINE: December 31st

Photos judged on:
- fit for the category
- general composition
- aesthetic appeal (e.g., perspective, lighting)

Submitted photos should follow safety requirements for the depiction and should be clear and high resolution

PRIZES

Per Category: Free CTT webinar of your choice

Grand Prize: Free one-day conference registration of your choice

SUBMIT ENTRIES at
michiganltap.org/2024photocontest

PHOTO CONTEST 2024

► incurring large costs related to both the treatment and ongoing maintenance.

A third, less-costly method of addressing Beaver Slide drainage issues was to install French drains to reduce water from infiltrating the road. But, the drains would only remove surface water, meaning that water saturating the road embankment could not be drained. And, finally, capillary barriers could stop water from moving upward, but excess water could still collect underneath the barrier and produce frost heaves. Alaskan engineers quickly ruled out these last two methods as comprehensive solutions for correcting the drainage issues and reducing maintenance needs.

An Innovative Solution

Engineers at the Alaska DOT&PF Central Region office could not find any products that could be used to solve the problem available at a local construction equipment retailer, so they met with TenCate (now Solmax) representatives to see they could provide any innovative solutions. One engineer mused to the sales team that they should develop a geotextile that would suck the moisture out of an embankment. Jeff Currey, regional materials engineer for Alaska DOT&PF Northern Region, recalls that one engineer at the meeting did not laugh at the idea. “He was aware of wicking fibers that had been developed for personal hygiene and came up with the idea of weaving them into a geotextile that has those capillary properties,” related Currey.

The product they developed with Solmax is now known as the MIRAFLI® H₂Ri wicking fabric, a geotextile with a high specific surface area, suction, and wettability. The MIRAFLI H₂Ri wicking fabric’s weave allows it to “absorb water from both the top and the bottom sides and transport it along deep grooved channels”, according to a 2022 Missouri DOT report.²

“The magic of MIRAFLI H₂Ri wicking fabric is its capillary action that draws out the moisture,” explained Currey. In other words, water is pulled through the fabric simply due to the forces of cohesion between the water molecules and adhesion to the fabric’s fibers, and limited by the forces of surface tension and gravity.³ This capillary action resembles the movement of water as it climbs a paper towel that has had a small part dipped into a glass of water.

With the wicking fabric, its exposed ends, under the influence of relative air humidities of less than 90 percent that has an air suction

of around 100 megapascals (MPa; or 14.5 pounds per square inch), creates a hydraulic gradient that pulls infiltrated water out from the pavement structure.²

Moving Water With Success

In 2010, it was built into Beaver Slide to test its effectiveness at draining a saturated road embankment. Alaskan crews dug three feet into the existing road prism on Beaver Slide and placed the first layer of the geotextile. They then backfilled the road with the frost-susceptible material they had just dug out, followed by a second layer of the geotextile and the remaining material dug from the road.

Air temperature and humidity sensors were used to measure the wicking fabric’s effectiveness on Beaver Slide. Data concluded that the geotextile absorbs soil moisture and water from the soil embankment and “wicks” the liquid out, creating an effective drainage system.⁴

Five years after installation, researchers examined the Beaver Slide wicking fabric’s aging, which included the degree of clogging that had occurred.⁴ Samples of the fabric were removed from the embankment and examined under a scanning electron microscope.⁴ What they found was that all of the fabric’s surface fibers and deep grooves experienced clogging but only 6.67 percent of the underlying fibers were clogged.⁴ They concluded that “even though the surface was contaminated and the drainage paths were blocked, the wicking fibers beneath the surface were well protected and worked effectively as a drainage material to transport water laterally under unsaturated conditions” and not a major concern for long-term performance.⁴

Not only did the wicking fabric remove moisture from the embankment, but it also provided separation between the layers of aggregate and the naturally-occurring fine-grained soils. Additionally, the wicking fabric’s stiffness contributes to the overall strength of the embankment.

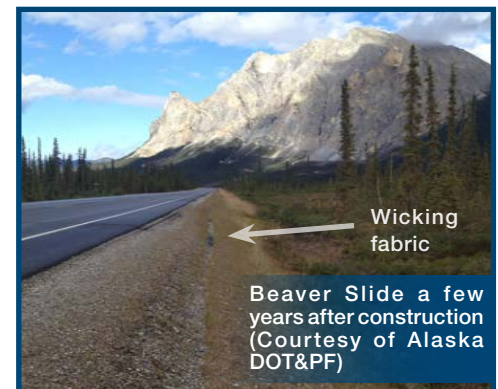
Since its installation in 2010, the wicking fabric within Beaver Slide continues to perform and has not needed any further maintenance. “This project was huge in us understanding MIRAFLI H₂Ri wicking fabric’s potential uses,” noted Adamczak.

Alaska DOT&PF has since installed the geotextile in other projects, including paved roads. “We consider wicking fabric to be a tool in our toolbox now,” explained Currey. “It’s not exotic anymore, it’s fundamental.”

While this fabric can be used as a tool for optimizing drainage without a significant investment in construction and ongoing maintenance, Currey cautioned, “It’s not a silver bullet for every application.” The moisture absorbed by the fabric must have a way to travel out of the roadway, which is why it is recommended that a portion of the fabric be daylighted. Currey continued, “It is preferred to daylight the fabric on a downhill side because gravity helps.” Thus, it can remove moisture from most materials only if the landscape will accommodate it.

In Michigan’s wet-freeze climate, effective drainage systems are crucial to ensure the integrity and safety of the state’s 120,256 miles of paved roads and approximately 37,000 miles of unpaved roads. In 2023, the MIRAFLI H₂Ri wicking fabric was installed in a paved parking lot in the state.


While this geotextile “was born of necessity”, as Adamczak says, MIRAFLI H₂Ri wicking fabric has been proving itself to be a durable, efficient, and versatile solution for removing moisture from saturated embankments. ■



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Shedding Light on MIRE Data

Victoria Kaplewski, *Technical Writer*
Center for Technology & Training

Many factors contribute to our roads being safe. Local road-owning agencies can make safety management decisions by analyzing various roadway elements. In 2012 and 2015, the federal government passed the Moving Ahead for Progress in the 21st Century (MAP-21) legislation and subsequently the FAST Act that required collection of data on these elements that contribute to or are critical for roadway safety.

This list of elements has since become widely known as “MIRE”, or the Model Inventory of Roadway Elements. These elements can be grouped into six categories: segment (109 elements), intersection (28 elements), intersection leg (40 elements), interchange or ramp (25 elements), horizontal curve (8 elements), and vertical grade (5 elements). Fundamental data elements, or “FDE”, are a subset of MIRE data that are considered most “useful” and are required for local and non-local paved roads as well as unpaved roads.¹ By September 30, 2026, all states are supposed to collect MIRE FDE on their roads and have the data accessible.

In Michigan, the department of transportation’s (DOT) System Monitoring and Reporting Unit is primarily responsible for collecting MIRE FDE. The unit’s supervisor, Mike Toth, shared, “We’re trying to collect MIRE data via vendors and put it in our roads and highways database,” shared Toth. That means the unit has been collaborating with organizations like the Roadsoft development team to gather data through Roadsoft software and through other online tools like map applications and artificial intelligence.

“This data collection effort is a partner-

ship,” said Heather Hoeve, MDOT transportation planner, about MDOT, its vendor organizations that are collecting the data items, and local road-owning agencies. “We’re just asking local agencies to view our data item guide, which goes over the data items, and requesting local agencies review and verify the accuracy of the data on their network.” She added, “It’s a partnership,” noting that the MDOT data is being freely shared with local agencies in exchange for their review.

In turn, local road-owning agencies can access this roadway and traffic inventory data for safety management. “The data could be used for systemic and systematic analysis on your system,” explained Toth. “This data is a good base—it’s fundamental data for that.” In fact, MIRE data is intended to be “improved and more robust safety data for better safety analysis”, which state and local road-owning agencies need in order to “implement strategic highway safety plans and make safety assessments of various roadway treatments”, according to the US Department of Transportation Federal Highway Administration (FHWA).^{1,2}

Additionally, the FHWA notes that MIRE FDE could be used for coordinating design, construction, maintenance, and asset management activities as well as for improving geospatial addressing methods and information modeling.¹

So, how can local agencies access this data for safety assessments and analyses? “We have MIRE FDE dashboards,” Hoeve said, noting that the dashboards illustrate how much data has been collected and what data is still needed.

She continued, “We’ve been working with a lot with the local agencies and have

a local agency viewer—a tool for those agencies to see what’s data has been collected in their area.” The dashboards and local agency viewer as well as links to MIRE resources and upcoming Roadsoft trainings can be accessed at <https://experience.arcgis.com/experience/ed4f1bacd03843e4a2cf6cae4a7842b6>.

Regarding the partnership between MDOT, its vendor organizations, and local agencies in collecting, sharing, reviewing, and using MIRE FDE, Toth reflected, “We’re hoping that by working together now we can set up agencies to maintain their data going forward.” ■



Screenshots of the MIRE Data Item Dashboard (top) and Local Agency Data Viewer (right)



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Fueling Your Fleet with Biodiesel

Allison Szlachta, *Technical Writing Intern*
Center for Technology & Training

Photo: Pixabay



With rising fuel prices and mounting environmental concerns, are there any effective, lower-cost fuel alternatives for heavy-duty diesel vehicles and equipment? Some local road-owning agencies say, ‘yes’. They’ve been using biodiesel. Biodiesel is a form of renewable diesel derived from diverse sources, ranging from plant and animal fats to cooking oils, including recycled restaurant grease. In comparison to conventional petroleum diesel, biodiesel’s performance and price are on a par, making it a viable domestic substitute for fossil fuel and foreign oil. Plus, biodiesel is a cleaner-burning, renewable fuel that has very low carbon dioxide (CO₂) emissions.

Biodiesel also offers versatility: it is considered a “drop-in” fuel, meaning that most existing equipment can operate on up to 20% biodiesel blended into petroleum diesel without any changes to the equipment. Commonly-available blends are made from pure biodiesel, known as B100, that is combined with petroleum diesel to create B5 (5% biodiesel) and B20 (20% biodiesel). According to the United States Department of Energy, B20’s price has stayed slightly under the cost of regular diesel since 2018 while B100’s average price per gallon has been

just over a dollar more than regular diesel, making biodiesel an affordable option that agencies are beginning to notice.¹

“When we buy B100 fuel from Chevron Renewable Energy Group,” said Rich Iverson, fleet manager for the City of Ames, Iowa, of the biodiesel supplier that’s synthesizing biodiesel from soybean feedstock grown in his region. “We pay the same amount, maybe just a little bit more, than the price of regular diesel,” he shared. “And, the fuel economy is pretty much identical, there’s very little difference, except we do pay to heat the biodiesel in the main supply tank.”

In the City of Ames, a substantial fleet of maintenance vehicles now exclusively relies on biodiesel, sourced from local soybean farmers. In doing so, they support local agriculture and receive tax credits, further lowering the price. Iverson said, “It’s significantly better for us to buy within the state of Iowa because we can support the local agriculture and get it for a better price.”

Biodiesel in Cold Climates

In January of 2020, the City of Ames became the first city in the nation to use B100 year-round in a cold climate, one that experience frequent periods of sub-zero degrees Fahrenheit

between November and March. Currently, the city transitioned its snow removal fleet to B100, targeting the larger snow plow dump trucks. According to Iverson, about 70 percent of the snow removal fleet burns 30 percent of the agency’s total annual diesel consumption, making the switch enough to have a significant impact. The remaining diesel vehicles in the fleet have been burning B20 in the summer and B5 in the winter since 1998.

While biodiesel has many similar properties to that of regular diesel, a notable difference is the cloud point: if biodiesel is left sitting in temperatures below 30 degrees, it will solidify to a lard-like consistency. This can prevent an engine or machine that’s holding the fuel from starting and running; this property of biodiesel has hampered its widespread use.

To address this issue, Ames has relied on a fuel management system that maintains biodiesel at an optimal temperature, thereby ensuring a smooth operation. Diesel engines have been able to operate on various blends of biodiesel for decades, but reliable systems for using B100 only recently debuted in 2018 when Optimus Technologies introduced the Vector System in a pilot project on five refuse trucks in Washington, DC.

This system can be integrated into most heavy-duty diesel vehicles and equipment so that they can operate on B100 even in the coldest climates. The conventional fuel tank is replaced with a 60/40 split tank to house both biodiesel and regular diesel respectively. “When the truck starts, the engine and coolant is warmed up on diesel, and the coolant then circulates through the biodiesel side of the tank to warm up the biodiesel,” explained Iverson. “As soon as the biodiesel gets to an operating temperature, the regular diesel is purged and B100 is sent to the engine, so the engine runs on 100-percent biodiesel going forward.”

Installation, setup, and testing required approximately a day and a half per vehicle, with the system’s cost totalling about \$20,000. This is an economical alternative compared to other sustainable fuel options. “Electric trucks cost over 1 million dollars each,” noted Iverson. “We don’t have to buy new vehicles because the fuel management system allows us to take the diesel trucks we currently have and run them with biodiesel.” This way, these maintenance fleets can be more environmentally sustainable for much less cost.

Ames is not the only city to take advantage of this technology; Madison, Wisconsin’s transportation sector also installed this fuel management system into vehicles in their fleet as part of a pilot project. “When you introduce biodiesel into the engine, it cleans out the tank, leaving behind gunk in the fuel lines,” explained Mahanth Joishy, Madison’s fleet superintendent who oversees 1,400 maintenance vehicles and equipment says the only mechanical change to vehicles that the City of Madison made when transitioning to B20 was replacement of filters. In fact, B20 contains solvent properties that are strong enough to “break down varnish deposits on the walls of

existing fuel storage tanks or fuel systems”, according to AutoCare Association. The subsequent particulate matter contaminates fuel and “causes fuel filters to plug rapidly”, which has been a complaint against biodiesel.² “The filters are very easy to replace and our department knows to watch for it so we avoid having problems,” said Joishy. Once the varnish deposits are removed, fuel filter service returns to normal.²

Since first using biodiesel in 2018, Joishy’s division has reduced their carbon dioxide output by 15 million pounds. Pure biodiesel, or B100, boasts an impressive 86% CO₂ emission reduction per gallon compared to regular diesel while B20 has a 17% CO₂ emission reduction. “We started with B5 in the spring of 2018, then went up to B10 and eventually B20 the next year,” he said. Now, they’re doing B5 and B20 year round. Joishy’s goal is to expand the program rapidly to all of the City of Madison’s 500 trucking units by 2030.

The modular fuel management software system can be updated and repaired remotely. “Operation wise, it’s seamless.” Iverson said. “If there is an issue with the truck even if it’s unrelated to the fuel system, the fuel management system will automatically default back to diesel so you’ll never have a truck sitting with biodiesel in the lines,” he continued. “Because of this we’ve never lost even a minute of work time using biodiesel.” These biodiesel vehicles are able to work just as efficiently as their regular diesel counterparts—a feat not achievable with all sustainable fuels. Joishy concurs. “We’ve gone through four seasons without any major problems,” he shared.

“For about the same cost, you’re getting a product that has a much lower carbon footprint that does not impact the operations

of a vehicle,” emphasized Joishy.

A Practical Solution Today

Reflecting on his biodiesel-run fleet, Iverson said, “I think you are going to see more and more use of it, whether it’s in blended form or pure biodiesel.” He continued, “The accessibility of biodiesel is really good in the Midwest.”

In Michigan, for example, two biodiesel plants are producing 15.75 million gallons of the 27 million gallons of biodiesel used in the state.^{3,4} At least three city or county fleets have been using or piloting biodiesel—Detroit Department of Transportation, City of Kalamazoo, and the City of Portage Public Works Department.^{4,5,6}

Biodiesel-run vehicles have the distinct advantage over electric vehicles of having near-uninterrupted operation—vehicles using biodiesel only require standard refueling as opposed to a time-consuming recharging process. “Electric vehicles for most heavy-duty truck types aren’t ready yet, the battery technology is not quite there,” explained Joishy. “Biodiesel is ready to deploy now, and can have an impact today.” Biodiesel allows local road-owning agencies to work efficiently while also saving money and being sustainable at the same time.

Iverson reflected, “Biodiesel is a great way for us to be sustainable today.” ■

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Photo: Shutterstock

Little League, Local Agencies, and Life Lessons:

Victoria Kaplewski, *Technical Writer*
Center for Technology & Training



Practice makes better; check your commitments and priorities; play well with others and share the credit; nothing ventured, nothing gained. These are all life lessons that, according to the University of Kansas School of Education & Human Services, are learned through sports (<https://onlinesportmanagement.ku.edu/community/5-life-lessons-learned-from-sports>). Those sports, for Matt MacDonell, are little league and middle school basketball, which he coaches.

“I’ve coached little league baseball for my sons’ teams,” MacDonell shared, proud of the fact that the team won in their district last summer. “In coaching, I see each individual player through the season and help each player grow in skill sets,” he said, reflecting on the value of mentorship. “But, little league also involves learning as a team to work together, to understand how everyone has their role, and to achieve our goals.” MacDonell sees more than just a passion in coaching sports like little league and basketball; much like those at the University of Kansas, he sees it as a training ground for “life lessons” that he uses in his day-to-day role of managing director of Washtenaw County Road Commission.

“When Sheryl Soderholm Siddall was retiring, I applied for her position of the managing director at Washtenaw CRC and that’s where I am now,” said MacDonell. But, he didn’t just drop into the role. “I got to work with...Sheryl and Roy Townsend, who was the director of engineering when I first started at Washtenaw.” He added, “They definitely mentored me and shaped my career.”

Before joining Washtenaw CRC in 2006, MacDonell grew up near Livonia and Westland, Michigan. He attended Michigan Technological University, at first as a general engineering major. But, various professors helped guide his decision to pursue civil engineering, he says. Summer internships with an asphalt paving company and a consulting firm “solidified” his decision of pursuing civil engineering.

After graduation, MacDonell joined OHM Advisors in their Livonia, Michigan, office. He began with road design for agencies like the Michigan Department of Transportation and the Road Commission for Oakland County. He had the opportunity to serve as lead road engineer on large projects like the reconstruction of seven-lane US-12 at Michigan Avenue in the cities of Dearborn and Detroit. “It was a huge project with lots of collaboration with MDOT, the local public works and engineering departments, landscape architects, water utilities, and local businesses,” he explained.

But, then, MacDonell shifted into municipal engineering, working directly with communities like the City of Northville, the City of Ypsilanti, and Huron Township on various projects. “I really enjoyed being connected to the municipal communities—helping with much-needed projects, working with department of public works directors, going to city or township meetings, just understanding the public side of engineering,” he shared. “I liked impacting my local community: doing meaningful projects like water main, drinking water, or road infrastructure that gets people to where they need to go safely and where they see the value of their taxes going to something they use every day for many years to come.”

Despite increasing in responsibility at OHM, MacDonell checked his priorities. He had a “desire to work with municipalities, not just on projects but by being involved in the day to day”. So, in 2006, he applied for a position at Washtenaw CRC and joined the agency—whose jurisdiction covers the areas around but not in the cities that include Ann Arbor, Ypsilanti, and Saline, for a total of 1,650 miles of public roads and 125 bridges, and serves 20 townships—as supervisor in the engineering department. “I initially started overseeing public road development and permits and, over time, gained responsibility, managing our construction projects in the engineering department,” said MacDonell, who later transitioned into the role of Washtenaw CRC’s assistant director of engineering.

MacDonell drew on the lessons in team work—or collaboration—that he had learned in his previous employment for his projects at Washtenaw CRC. One total reconstruct was a five-lane section of Carpenter Road, south of M-17 and near the US-23 interchange, that leads in and out of Ann Arbor. “We worked with the community and collaborated with MDOT for permits, the township’s water and sewer, utilities, and DTE Community Lighting,” he shared, adding that they opted to do a concrete pavement since the commercial corridor has high traffic volumes and to install sidewalks. “The concrete pavement was a bit more expensive in terms of initial construction costs, but the total life cycle costs if it’s maintained were lower.”



MacDonell answering questions at a public meeting (Photo: Courtesy of Matt MacDonell)

Meet Matt MacDonell

Similarly, he facilitated a collaboration between the road commission and the City of Ann Arbor, MDOT, and Pittsfield Township to redo a portion of Ann Arbor-Saline Road at the I-94 interchange. The existing asphalt pavement received a concrete overlay with portions being entirely reconstructed with concrete. The agencies worked together to reduce lane width and omit the median on the bridge in order to allow for barrier and sidewalk and to provide bike lanes over the interchange. “It was a big desire of the public to have pedestrian facilities connecting the City of Ann Arbor to the township,” he noted.

“As assistant director of engineering, I worked under Sheryl Solderholm Siddall, who was our county highway engineer at the time and, when she was promoted to managing director, I applied for and was promoted to director of engineering,” related MacDonell. “So, I got to learn a lot from her—she was my boss for almost my entire career at the road commission.”

While being mentored by Siddall, MacDonell also helped mentor others. “A few years ago, we had a new engineer come to the road commission who had been in the private sector as a consultant,” he shared. “We made sure that we were checking in and that the engineer felt supported, and we pointed that person in the right direction because oftentimes we are using our institutional knowledge on new projects.” MacDonell added, “You learn from those before you and, hopefully, you’re helping and supporting those behind you.”

In 2023, Siddall retired from her role of managing director of Washtenaw CRC. MacDonell, who had applied, succeeded her. “I had some big shoes to fill when I stepped into her previous role,” he said.

MacDonell credits Townsend and Siddall for their work in developing a county-wide millage and educating the public on it. “Historically, transportation infrastructure has been underfunded,” noted MacDonell. “In Michigan, if local roads have problems, we have to solve it ourselves and come up with different ways to fund those projects.” One way to fund local road projects has been partnerships with the townships in a matching fund program. But, another way has been

through a county-wide millage. Townsend, and then Siddall, worked with the county board of commissioners to implement a half mil roads and non-motorized millage that generates about \$4.5 million each year for Washtenaw CRC, something that MacDonell is carrying forward. “It’s a very unique millage in that 80% goes to the roads and 20% goes to county parks, which are very popular projects,” he shared. “We come up with a four-year plan and educate people about what will happen if this millage passes, and then, we execute the plan, report on what we do, and put up signs that say this is brought to you by the county millage.”

To produce the millage plan and secure grant funding on a number of projects, MacDonell has coalesced different parts of the Washtenaw CRC team. “They get developed by both the engineering and operations departments—we seek their input and get them involved,” he shared. He recognizes that these plans affect their entire organization, with the engineering department being responsible for designing and constructing and the operations department being responsible for constructing and maintaining. “When they’re working together, it fosters better relationships and trust as we work toward common goals.”

Right now, MacDonell is leading a new venture for the Washtenaw CRC team. In 2018, he had acted as project manager for two compact roundabouts for the City of Dexter that were “successful” and “very simple to operate”. The road commission has again partnered with the City of Dexter to install a new roundabout at the Dexter-Chelsea Road and Island Lake Road intersection. “It would help solve the safety of the intersection, improve traffic flow and mitigate congestion,” he de-

tailed. “I really like when we can collaborate to solve these problems in the community because we all serve the same public.”

“I do a lot of active listening—listening to really hear folks and what their perspectives or issues are,” said MacDonell about his new role of managing director of the road commission. “Sheryl, before me, managed both our external and internal relationships really well, and was an excellent communicator.” MacDonell is continuing Siddall’s weekly message to all Washtenaw CRC employees, helping them feel connected with the current projects and overall goals of their agency. But, he’s now started reaching out to their local elected officials and find out what’s worked well and how the road commission can improve. Fundamental to these external and internal relationships is good communication, according to MacDonell. “People have to be able to trust you when you say, hey, I know this didn’t go as planned, but we’ve got this, here’s our new plan,” he shared.

For MacDonell, growing in experience, sharing common priorities and goals, working as a team, acknowledging the contributions of others, and taking risks are life skills that stretch well beyond the ball diamond and basketball court. It encapsulates everything he does and values at Washtenaw CRC. He reflected, “We’ve got a great team here at the road commission.” ■



Compact roundabout in Washtenaw County designed by MacDonell (Photo: Courtesy of Washtenaw CRC)

Great Ideas—Where They Are Today

In Focus: Innovations that Increase Visibility During Snow Removal Operations

Emily Bergman, *Technical Writing Intern*
Center for Technology & Training

In this series, we continue to revisit Great Ideas Challenge submissions previously featured in The Bridge to see if and how the innovations are being used today.

Innovation often meets snow and ice at Michigan's local road-owning agencies. Local agencies are always looking for ways to clear roads more effectively and efficiently and make snow removal efforts safer for nearby motorists. Three agencies developed and continue to use their own innovations to make plow trucks and wing plows more visible during snow removal operations.

Tail Light Cleaner

After the switch to LED light systems on their plow and salt trucks, the City of Wyoming, Michigan, was having issues with snow and ice covering their lights during winter operations due to the lights not developing enough heat to melt off the snow. Their safety committee recognized this as a concern for the traffic around the trucks as they were unable to see the equipment in front of them, and removing the snow and ice by hand was time consuming and unsafe for operators. In 2014, the city submitted the Tail Light Cleaner to the Michigan LTAP Great Ideas Challenge as a solution to these problems.

The Tail Light Cleaner is a “simple invention”, said Don Roest, the current fleet supervisor for the City of Wyoming. The city worked with a local company to source the parts—an air valve, four nozzles, a timer, a box, a truck protection valve, tubing, a solvent container, a switch with an override button, and fittings. The city's master and senior technicians assembled a system that runs off of the truck's air brake system. The air is mixed with washer solvent from a reservoir and then sprays on the lights at timed intervals or when manually activated, clearing the snow.

“Keep the system's computer head out of the elements is important because salt is very corrosive,” shared Roest about what the agency learned with use. Over the years, they continued to tweak their design to protect the system as best they could.

Tail Light Cleaner
(Photos: Courtesy of City of Wyoming)



“We later added a cleaner for the laser guided system that we use when we operate the wing plows,” shared Roest. They have run a line to the top of the cabin where the laser guided system helps to operate the wing plow. “The lasers with our air blow system are much better, allowing us to use the laser during a blizzard”, emphasized Roest.

Their most recent tail light cleaner installation cost the City of Wyoming \$2750. Although expensive, Roest shared that he feels that the benefits outweigh the cost. “It's expensive,” he said. “But, it's hard to put a number on safety.”

He says they've been installing the tail light cleaner on new trucks coming through the shop when time permits the installation.

“The tail light cleaner helps to keep the operators safe, and it keeps the public safe,” continued Roest. “Our trucks don't get damaged, the public's cars don't crash into our plows.” He adds that their great idea saves operators' time in terms of keeping tail lights clean and helps the laser with navigation in whiteout conditions. He added, “I think it's just a good safety practice to have tail light cleaners on all vehicles,” he reflected.

Tail Light Snow Deflector

Another local agency innovated their own a solution to snow-obscured tail lights. Barry County Road Commission (BCRC) experienced similar issues with snow and ice build-up on truck tail lights. “We were trying to minimize the amount of snow and ice accumulating on the tail lights so that vehicles could see our trucks better,” shared Jake Welch, managing director of BCRC. So, they developed the Tail Light Snow Deflector, which they submitted to the 2014 Michigan LTAP Great Ideas Challenge.

The Tail Light Snow Deflector is a piece of sheet metal that extends past the back of the truck and around the edges of the lights, redirecting the wind and deflecting snow from direct contact with the truck lights.

“We put it on one truck, and we could tell quickly that this truck was coming back with a lot less material on the lights,” related Welch. “Within a week or two, we had it on all the trucks.”

Constructing the tool is “pretty simple”, requiring about a half hour of time for a mechanic or metal working professional. The drilled-on stainless steel deflector plate only requires two bolts.

“There really are no drawbacks to this tool,” Welch said, emphasizing that it “dramatically decreased the amount of snow build-up on truck tail lights and greatly improved visibility for drivers behind our plow trucks”.

At a cost of only a couple hundred dollars, “it was so inexpensive to create and install that we could put them on all our vehicles, and we're happy with the improvement,” he added.

Welch says that at this point he wouldn't change anything about the design of the Tail Light Snow Deflector. “We've been running them on our trucks for 15 years now, and we're not switching back,” he added.



Tail Light Snow Deflector
(Photo: Courtesy of Barry County Road Commission)

Wing Plow Light Box

In 2017, the Kent County Road Commission (KCRC) entered their Wing Plow Light Box into the Michigan LTAP Great Ideas Challenge, winning an honorable mention. While KCRC had used wing plows on their plow trucks to clear snow from the right lane of traffic and the shoulder simultaneously, they never plowed two travel lanes at once due to safety concerns. That changed with the development of their Wing Plow Light Box.

“Once we came up with the idea, we had to show the prototype to the state, and it was approved the first time they reviewed it,”

Learn more about these past entries!

Great Ideas Challenge entry details:
<https://michiganltap.org/great-ideas/past-entries>

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Michigan's Local Technical Assistance Program

Center for Technology & Training
Michigan Technological University
309 Dillman Hall
1400 Townsend Dr.
Houghton, MI 49931-1295

Telephone 906-487-2102
Fax 906-487-3409
E-mail CTT@mtu.edu
Website MichiganLTAP.org

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Michigan LTAP Staff

Administration

Tim Colling, PhD, PE Director
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Federal Highway Administration
Kurt E. Zachary, PE 517-702-1832
Local Program Engineer, FHWA

Michigan Department of Transportation
Bruce Kadzban, PE 517-335-2229
Local Agency Programs, MDOT

County Road Association of Michigan
Larry W. Brown, PE 616-813-5538 lbrown@alleganroads.org
Allegan County Road Commission

said Brian Weber, equipment supervisor for KCRC's South Complex. He says their "most robust" variant of the Wing Plow Light Box is a horseshoe-shaped design with two horizontal boxes, each holding a 6-inch oval flasher, placed at 42 inches from the ground. "It holds up against any obstructions it may hit," he explained. This version is used on trucks with routes through rural areas with many items along the side of the road that could be hit, like mailboxes.



Wing Plow Light Box (Photo: Courtesy of Kent County Road Commission)

They've also developed two other versions: one being two stainless steel boxes that hold 6-inch ovals in a vertical position and the other being an LED flashing whip. The latter, in particular, is the most fragile option, breaking off if the wing hits an obstruction. KCRC has been using these two versions mostly for the "ease of installment" but only on routes where breakage is less likely, according to Weber. "We're looking at new technologies all the time specific to what each truck does" Weber explained.

The original Wing Plow Light Box design requires ¼"-thick 4" flat stock and two boxes (made in-house or purchased premade) to house two 6" oval flashers. To build the light box requires mechanical, welding, and electrical expertise as well as basic hand tools. Costs run about \$300 for parts and labor, but the LED light whip variation is as low as \$90.

"They are high maintenance because they need to withstand the elements and vibrations," warned Steve Roose, director of Equipment and Facilities at KCRC. "Sometimes the housings crack and the lights loosen, so it's another check point every time the truck comes in for servicing."

But, Roose continued, "It gives the motoring public a visual of where our wing is, even when there's a lot of snow flying around as the wing plow is going down the road."

The Wing Plow Light Box means less passes, so KCRC can clear roads quicker for the motoring public. Weber opined, "Plus, if one motorist doesn't hit a plow, it pays for itself right there in a potential loss of life or damage to the truck."

Weber reflected, "Our Wing Plow Light Box is an evolving project as technology changes and lights get better." He says that with new technology that's currently available, their great idea is "as good as they can make it at this point" in terms of durability.

Importance of Innovation

"There's a lot of great ideas that the road commissions are doing," reflected Roose. He says that, in developing their own great idea, KCRC borrowed an ideas from other agencies in their innovation process. "Always look and see what's out there, and make choices to develop something that works best for your agency." ■



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