Vol. 35, No. 4 – Spring 2024

The Bridge

A quarterly newsletter from Michigan's Local Technical Assistance Program

A Joint Effort:
Protecting Pavements and Ensuring Safety on Roadways with Horse and Buggy Traffic

Victoria Kaplewski, Technical Writer
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A research project on repairing roads damaged by horseshoes has led to a collaborative effort between the local Amish community and Ohio local agencies to maintain and improve roads.

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Inside

Michigan's Local Technical Assistance Program

Every day, our pavements make it possible for road users to move between their points of origin and destination. Each car or truck passing over the pavement exerts wear and tear that can be considered expected or anticipated and factored into the design of pavements. The very design of roadways is based on the safe movement of motorized vehicular traffic over time. But, in some parts of the country, pavements are facing an unexpected yet not new source of wear and tear and safety complications, and local road-owning agencies have found surprising sources of support in the face of these challenges.

Pavement damage related to horseshoes is a growing problem for local road-owning agency engineers in the Great Lakes region, which is home to the greatest concentration of Amish communities in the country. As of 2023, the states with the highest Amish populations were Pennsylvania (89,765), Ohio (84,065), Indiana (63,645), Wisconsin (24,920), New York (23,285), and Michigan (18,445), and those states were experiencing annual Amish population growths between 7.3 and 12.1 percent.[1,2]

In Michigan, Amish communities are spread across 33 counties. Michigan's Branch (2,560), Clare (1,250), and Gladwin (1,580) counties are among the counties with the highest Amish populations nationwide. These three counties saw population increases over a 10-year period (2010-2020) of 39.5 to 90.4 percent.[2,3]

Amish reject use of motorized vehicles, instead choosing to rely on horses, buggies, and bicycles. However, horses with standard horseshoes don't get great traction on chipseal pavement. And, it can be especially slippery if MC-3000 is used as a binder.

To enhance traction, farriers "dress" the horseshoes by adding cleat-like welds known as 'calks' to the bottom of metal horseshoes, as the Amish also reject synthetic rubber and plastics. Calks on metal horseshoes have been found to cause scarring of the pavement and fracturing of aggregate within the top 2.5 inches of surfacing which, in turn, leads to rutting in areas with buggy traffic.

How to Mitigate Damage and Make Repairs

In 2017, an Ohio Department of Transportation (ODOT) study by Munir Nazzal and Evan Holcombe surveyed ODOT county garages and found that "the service life of repairs on non-Amish routes ranged between 5 to 7 years, but repairs on Amish routes lasted 2 years only".[4] Nazzal, in a news release on the study, pointed out, "The loads aren't huge, but they're being transferred to the pavement through this small area (calks), so this is resulting in huge stresses being applied on the pavement."[5]

In Holmes County, Ohio—home to one of the largest populations of Amish in the country—County Engineer Christopher Young observed, "Most of the damage we get to our asphalt roads is during summer when the pavements are more pliable." He related, "The calks are like chipping hammers to the pavement so, after 10 buggies go down the road, the pavement looks like it's speckled."

Young became involved as a technical liaison in Nazzal et al.'s 2020 follow-up study, which did a more in-depth investigation into horse-shoe-related damage and mix designs for paving.

"We studied the horseshoes, and how the horses were being dressed for traction, and if they could be

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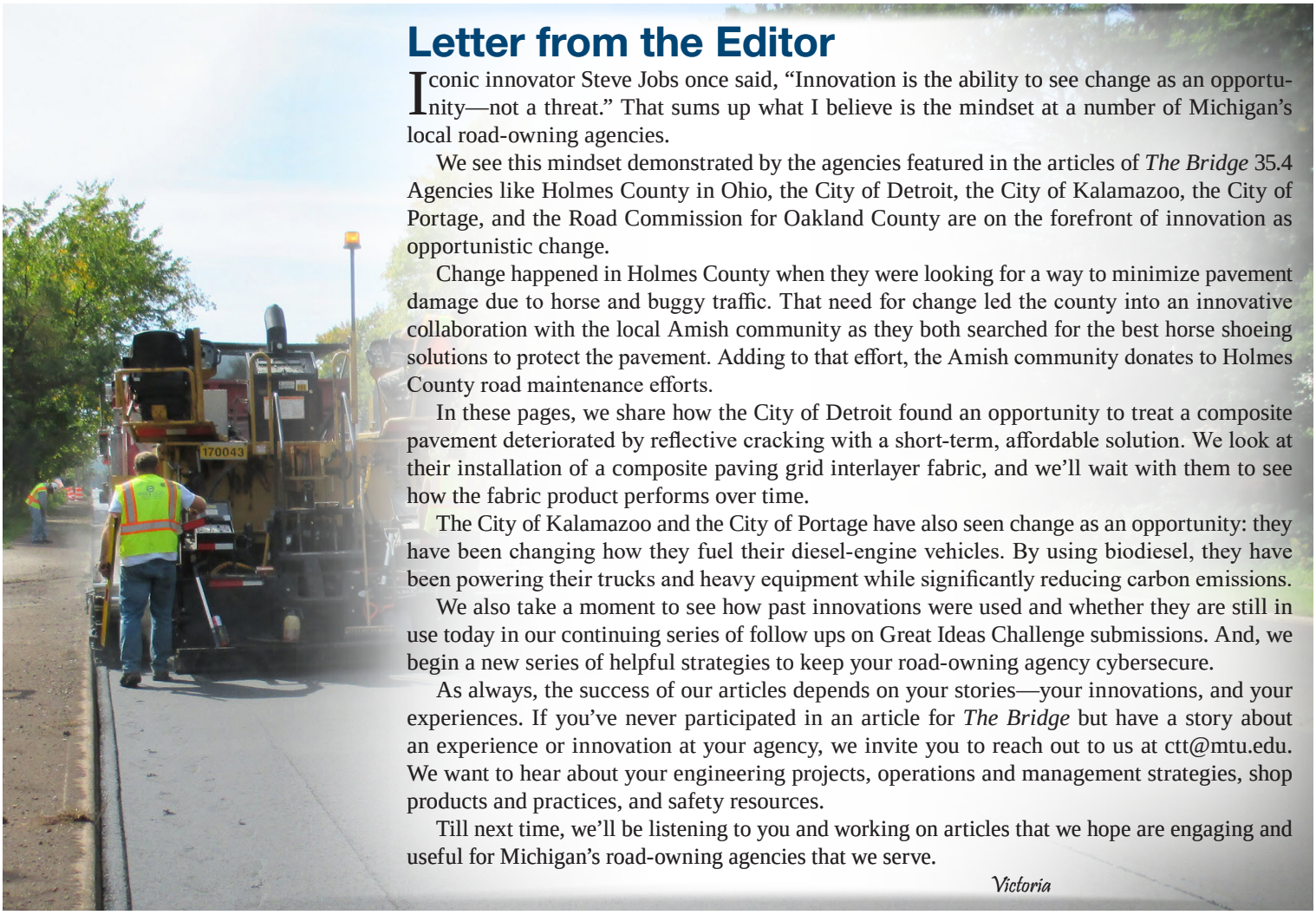

Letter from the Editor

Iconic innovator Steve Jobs once said, "Innovation is the ability to see change as an opportunity—not a threat." That sums up what I believe is the mindset at a number of Michigan's local road-owning agencies.

We see this mindset demonstrated by the agencies featured in the articles of *The Bridge* 35.4 Agencies like Holmes County in Ohio, the City of Detroit, the City of Kalamazoo, the City of Portage, and the Road Commission for Oakland County are on the forefront of innovation as opportunistic change.

Change happened in Holmes County when they were looking for a way to minimize pavement damage due to horse and buggy traffic. That need for change led the county into an innovative collaboration with the local Amish community as they both searched for the best horse shoeing solutions to protect the pavement. Adding to that effort, the Amish community donates to Holmes County road maintenance efforts.

In these pages, we share how the City of Detroit found an opportunity to treat a composite pavement deteriorated by reflective cracking with a short-term, affordable solution. We look at their installation of a composite paving grid interlayer fabric, and we'll wait with them to see how the fabric product performs over time.

The City of Kalamazoo and the City of Portage have also seen change as an opportunity: they have been changing how they fuel their diesel-engine vehicles. By using biodiesel, they have been powering their trucks and heavy equipment while significantly reducing carbon emissions.

We also take a moment to see how past innovations were used and whether they are still in use today in our continuing series of follow ups on Great Ideas Challenge submissions. And, we begin a new series of helpful strategies to keep your road-owning agency cybersecure.

As always, the success of our articles depends on your stories—your innovations, and your experiences. 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 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

Photo: Courtesy of City of Detroit

What Lies Between: Detroit's Composite Paving Grid Interlayer

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

In the heart of Detroit, a fast-moving city driven by the automotive industry, lies a segment of Monroe Street nestled between Woodward Street and Randolph Street. At less than a mile long, Monroe serves as a vital connector to the city's central hub, Campus Martius Park, and other major roadways that allow travelers to reach other parts of the city and major highways with ease. Along Monroe's south side, a 1.5 million-square-foot private development is planned and will include retail, offices, residences, and parking. And, an adjacent segment of Monroe that passes through the Greektown District is in the design phase for a $20-million grant-funded reconstruction.

But, Monroe Street—a six-lane (two travel lanes and a parking lane in each direction), divided composite pavement road consisting of 9 inches of concrete base and 3 to 4 inches of asphalt surface course—has developed significant longitudinal and transverse reflective cracks at the underlying concrete pavement joints in the segment between Woodward and Randolph. "If we were to just mill and resurface as is our standard procedure for rehabilitating composite pavements, it's likely that we'd still have this reflective cracking coming back up through the new surfacing," said Steven Bannasch, City of Detroit Department of Public Works (DPW) engineering services coordinator for design and construction, who notes that "a vast majority of the pavements in the City of Detroit are composite".

Bannasch and his team sought to find a short-term, affordable, innovative solution to Monroe Street's reflective cracking problem without having to completely replace the road. With a network of utilities underneath the road and the pending construction of new buildings and facilities that requires heavy machinery, Bannasch knows that "now is not time to reconstruct the road".

Detroit's city engineers, including Bannasch, collaborated within their own department, other municipalities, and outside contractors to discuss possible solutions and conduct research over the course of several years. Through their contractor Ajax Paving, they discovered a potential solution:

It is a composite paving grid interlayer fabric composed of lightweight polypropylene reinforced with continuous filament fiberglass. The fiberglass filaments are bonded to the non-woven fabric in two directions, providing tensile strength, increasing resistance to reflective crack, and protecting the pavement from moisture infiltration. At the end of the pavement's service life, the composite paving grid interlayer can be milled and recycled into hot-mix asphalt.

To learn more about the paving fabric, Bannasch collaborated with one of the Center for Technology & Training's research engineers, Pete Torola. Torola guided Bannasch through existing research on the fabric and addressed his inquiries. "His knowledge base has been very helpful for us," shared Bannasch.

Bannasch concluded, "We think this fabric product is something we should get good value out of, and our hope is that we can get a good extension of the regular service life from a normal resurfacing while limiting

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Detroit Composite Pavement (continued from page 3)

▶ reflective cracking."

For the paving of Monroe Street, the City of Detroit planned to use their paving contractor. However, for the MPG 4 fabric installation, their paving contractor subcontracted with textile supplier Road Fabrics, Inc. from Carol Stream, Illinois, because of the supplier's experience with the specialized machines necessary for the install. "We wanted experts out there to make this textile installation," Bannasch explained.

On October 6, 2023, the crews milled the roadway to remove 3 to 3½ inches of asphalt surface and expose the concrete. The following day, they removed the debris, vacuumed the surfaces, cut butt joints, and applied a tack coat followed by a leveling course of 2-inch hot-mix asphalt (HMA) 4EML. Over the next two and a half weeks, curbs were repaired and structures were adjusted to final elevations.

On October 24th, crews swept and vacuumed the pavement, applied a tack coat, and placed the MPG 4 fabric, starting in the westbound segment. Bannasch detailed the process: "We placed the 12½-foot-wide fabric along the [south] curb and then along the [north] curb, and that left us a strip in the middle." They cut a portion of the roll to fit the remaining strip in the middle of the roadway and made cutouts for irregular structures along the roadway. Next, they used a pneumatic roller to flatten the material and eliminate any wrinkle, and then the paving crew placed a 1½-inch HMA surfacing course over the fabric while the fabric installation crew moved on to the eastbound segment. Crews completed the fabric installation and wearing surface paving of the entire boulevard in one day. Bannasch says that the process was "very smooth".

The City of Detroit reviews their projects' pavement conditions after the initial winter season and in subsequent seasons thereafter. But, with Detroit hosting the NFL draft in April 2024, their review of the Monroe Street project was delayed. "Since late March, the NFL occupied several areas of downtown Detroit, and Monroe Street was one of those areas" said Bannasch. So, Bannasch is hoping to look at Monroe Street's condition within the next month or so. For now, he can confidently say that "to completely reconstruct the road would have been a significantly greater cost". Bannasch reflected, "We anticipate that it will be worth the added cost." He says they are hoping to get at least fifteen years out of this installation and some degree of crack control.

In July 2024, the City of Detroit DPW inspected the roadway and found no surface cracking of note. Inspectors took photographs at measured intervals for comparison. They will continue to review Monroe Street on an annual basis and will compare it to similar conventionally-rehabilitated streets in order to evaluate the benefits of the composite paving grid interlayer. ■

Repaving Monroe Street, Detroit, with composite paving grid. Top left: Rolls of 12.5-feet-wide Mirafi MPG4 fabric. Top right: Cutting the composite paving grid fabric to size. Bottom left: Placing the fabric. Bottom right: Paving over the fabric with asphalt. (Photo: Courtesy of City of Detroit)

Cybersecurity for Local Agencies

Emily Bergman, *Technical Writing Intern*
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Photo: Shutterstock

In this five-part series, we will explore strategies that local road-owning agencies can use to be more cybersecure.

STRATEGY 1: Rely on Trusted Resources

Phishing is a tactic to trick individuals into providing personal information to criminals or clicking on bad links that will download malware onto the recipient's device. These scams often involve fake emails, text messages, or even phone calls that appear legitimate—as though they are coming from an acquaintance, a law enforcement agency, a financial institution, or even the IRS—but are designed to steal information or install malware.

Being cautious with emails, text messages, and phone calls that ask for personal information, provide unsolicited links or attachments for download, or that come from an unverified sender is one way to avoid becoming a victim of a phishing scam. "Be wary of any email that comes into your inbox," Advised Christoforo Delreal, systems administrator for the Center for Technology & Training (CTT). "If something seems fishy, it probably is; if something doesn't seem fishy, it just might be—just use caution." Keeping software on computers up to date and keeping yourself educated on the topic can also help.

Communications that are phishing scams have several red flags. First, the correspondence tries to rush the recipient into urgent action by fees if money isn't paid right away or some other type of consequence. Delreal points out that oftentimes these correspondences "try to rush you into some sort of action while you're flustered or don't feel like you have the time to be able to review the email completely".

When an email or phone call is a suspected phishing attempt, a recipient should cross-check the communication with information from the supposed sender's official website, keeping in mind that phishing scams try to imitate people or legitimate organizations. Compare the information, such as listed phone numbers and emails, with the reputable website. The best way to do this, according to Delreal, is to "manually open your browser and type in the URL without clicking on links in emails, if you can avoid it". Phishing attempts can contain malicious links and attachments, like .exe files and even PDFs, that can contain malicious payloads.

If the information in the communication matches that found on the reputable website, it is likely that the correspondence is legitimate. When doing this kind of cross-check, it is important that the website the information is coming from is reputable.

Suspected phishing-attempt communications should be reported on the delivery platform (like Google or Yahoo! for emails) and to the IT specialist within your local road agency. "It takes maybe two or three minutes to check over an email and see whether it is suspicious with someone who's trained to recognize it, but it might take half a day or longer to fix up a network that's been compromised by malware or stolen credentials," Delreal emphasized. "The best thing you can do is ask your IT specialist."

For more information visit: https://staysafeonline.org/theft-fraud-cybercrime/phishing/. ■

A Joint Effort (continued from page 1)

▶ dressed a little different to reduce the damage to the roads," Young detailed. The study found that a new calk design "consisting of low profile Drilltec (tungsten carbide) calks" reduced abrasion damage by 45 percent while horseshoes coated with the selected tungsten carbide coating design reduced vertical stresses by 89 percent and almost eliminated damage.[6] "That's a big number when you add up all the road miles we have!" said Young.

"ODOT also designed an asphalt to help with the horseshoe-related rutting issue," Young shared. The researchers concluded that "airport mixtures designed with polymer-modified binders, PG 76-22M and PG 88-22M or ground tire rubber modified (GTR) binder, and with an aggregate structure modified based on Bailey's method" had better rutting resistance and performance.[6]So, Young adds that, instead of MC3000, some townships have started using high-flotation, rapid-set chipseal for paving. "That helps reduce the slipperiness," he noted.

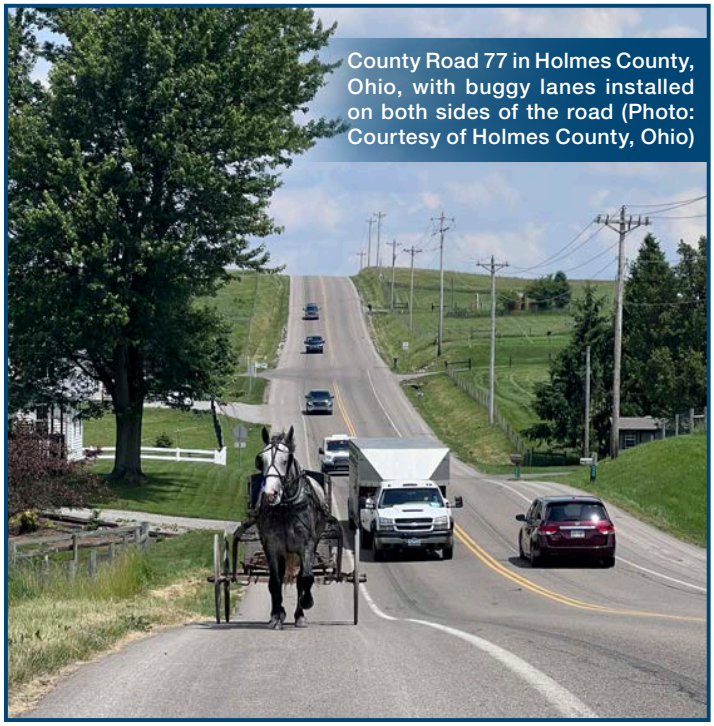
Working Together on Road Repairs and Safety Improvements

The two-phase study got the involvement of the Ohio Amish community's farriers, who helped develop the new calk design, as well as their Roadway Safety Council—a council of representatives of the local Amish church who oversee the community's effort to do their part in offsetting the cost of repairs and improvements of the roads they use.

"The Amish donate in Ohio," shared Young. "They don't pay a license fee or gas tax, so they voluntarily collect $75 per buggy, and they donate it to the counties and townships in the state." It's not only in Holmes County, either. Various news sources report that Amish communities in Coshocton County, Ohio, donated $130,000 toward local agency road work; in Monroe County, Wisconsin, $6,275; and, in Vernon County, Wisconsin, an undisclosed amount.[7,8] Annually, an unidentified community featured in *The Amish* (2012, Buller Films, LLC) donates to the road-owning agencies maintaining roads in their district; in the year prior to filming, their donation was $250,000, divided amongst the state, the county, and the township.

Young says that last year alone the Amish in Holmes County donated approximately $300,000 for county roads plus additional funds for state and township roads. "I apply that to paving our roads that have a lot of horse traffic on it," shared Young. But, he can use those funds for more than just repairs.

In the areas where Amish reside, crashes involving motorized vehicles and buggies on roadways are a significant concern. According to the Associated Press and the National Highway Traffic Safety Administration, these crashes range from "accidents where people are hurt to more serious collisions resulting in deaths of the buggy riders and the horses" with 101 fatal crashes between 2011 and 2016 alone.[9]



County Road 77 in Holmes County, Ohio, with buggy lanes installed on both sides of the road (Photo: Courtesy of Holmes County, Ohio)

Young says that Holmes County finds places like over the top of hills where car and truck drivers travelling at 55 miles per hour have limited sight distances as locations to install dedicated lanes for 10-mile-per-hour buggy traffic in an effort to improve safe stopping sight distances. Or, he says they'll make intersection improvements to provide better sight distance for buggy drivers, who sit farther back from the intersection than drivers of cars and trucks. These projects make motor vehicles, horses, and buggies sharing a roadway "a lot safer", according to Young.

A highlight for Young has been the County Road 77 project. "It took a few years, but we did about seven miles of roadway, building buggy lanes on each side of our busiest road—about 5000 vehicles a day—in the county," he detailed. The Holmes County Amish Roadway Safety Council demonstrated their investment in collaborating with Holmes County on road improvements. "Not only did they fund that project, they donated the land, they helped whenever they could, and they brought our guys baked goods while we were constructing the road," shared Young.

The collaboration between the local road-owning agency and the local Amish community in Holmes County is possible elsewhere. To start such a collaboration, Young advised, "Reach out to the Amish bishops at the local level." He continued, "Just start asking around, and they'll introduce you to who you need to talk to." ■

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Fueling Your Fleet with Biodiesel: A Michigan Perspective

Photo: Shutterstock

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Biodiesel is a renewable fuel source that has recently been implemented in the City of Kalamazoo, Michigan, as part of an effort to reduce carbon emissions. "We didn't want to do something that was going to decrease our reliability or become a problem," emphasized James Baker, Kalamazoo's Public Services director and city engineer. His department began researching biodiesel in fall of 2020. They developed a pilot program that started in June of the following year. "Our Department of Public Services now runs all vehicles and equipment that normally take diesel on biodiesel," Baker explained. At present, the City of Kalamazoo uses biodiesel to fuel 108 vehicles, which is 72 percent of its 151 diesel-equipped engine vehicles or 21 percent of its entire fleet of 501 vehicles.

Kalamazoo first started using B11, a blended fuel containing 11 percent biodiesel, and has since upped the percentage to B14 as of April 2024. Their goal is to be using B20 by April 2026 in an effort to reduce vehicle emission through the use of alternative fuels.

They source their biodiesel from Exxonmobil in Illinois because fuel terminals in West Michigan don't carry biodiesel. A full truck load from Illinois can transport up to 7,500 gallons at a time, which the City of Kalamazoo stores in a converted unleaded fuel storage tank.

"Increasing our demand for biodiesel locally has enabled us to transport the biodiesel economically into Kalamazoo from East Chicago," shared Baker. "The City of Portage is a big part of our success story." The two cities partnered in piloting the use of biodiesel, with Portage purchasing their biodiesel from Kalamazoo and filling up their vehicles at Kalamazoo's storage site.

"We have a fob...for each one of [our] vehicles to gain access to their facility and ...[use] their [fuel] pumps," explained Jereme Rowland, deputy director of fleet and facilities for the City of Portage. "It records which vehicle it is, you enter the mileage, [and it records] the number of gallons...dispensed, [and then] they bill us on what we use and we pay the bill every month." He continued, "We also [use] that [data] in our fleet maintenance software,...so [it helps us to] check and monitor [the vehicles, too]."

Learn more about biodiesel in "Fueling Your Fleet with Biodiesel"!
https://michiganltap.org/the-bridge/353

Reflecting on the City of Portage's use of biodiesel, Rowland emphasized, "We're getting away from the fossil fuels,...we've seen no negative effects or negative impacts,... [and] we haven't had to modify our vehicles in any way."

But, the benefits from the City of Portage's biodiesel program extend well beyond the fuel and the fleet. "We formed a relationship with a local municipality—a sister city—that has paid dividends in other ways," shared Rowland, noting that the City of Kalamazoo even sent employees to help the City of Portage in its recovery efforts after a tornado swept through the municipality in May of 2024.

For Baker, using biodiesel in the City of Kalamazoo would not have been possible without the City of Portage. "Because of Portage's use of biodiesel, we can justify bringing that full tanker load," he said.

Currently, a gallon of biodiesel costs the City of Kalamazoo $2.80. In comparison, their cost for ultra-low sulfur diesel is $3.09 per gallon.

For the City of Kalamazoo, the benefits of biodiesel go beyond cost-competitive renewable fuel sources and 8-percent carbon emission reductions with B11. "Biodiesel has a much lower wear scar, which means the fuel is a better lubricant," noted Baker. In fact, researchers have found that all biodiesel blends have lower wear scar diameters—that is, abrasion caused by steel components rubbing on each other—than regular diesel and an optimum reduction of wear scar diameter with the use of B10 through B20.[1,2]

"When the City of Kalamazoo's biodiesel program started, there was an anticipation of failure, bordering on negativity," noted Baker. The city had had a previous failed attempt in 2005-2007 at using biodiesel that was due to several factors including using an unapproved fuel product, self-blending the fuel, and the sulfur content in fuel at the time.

"This time, we were very intentional with the planning, design, engineering, testing, and evaluation of our biodiesel program, and we created our own specifications meeting BQ9000, ASTM D6751 and the EMA Premium Diesel Standard," he explained. "The biodiesel blend meeting our engineering specifications performed better in independent lab tests in every performance metric, including cloud point, when compared to regular petroleum diesel."

"Seeing is believing," he reflected. "We're really seeing that this is a premium fuel that is impacting our fleet in a positive way." ■

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Basics of a Good Road:

Patching Potholes

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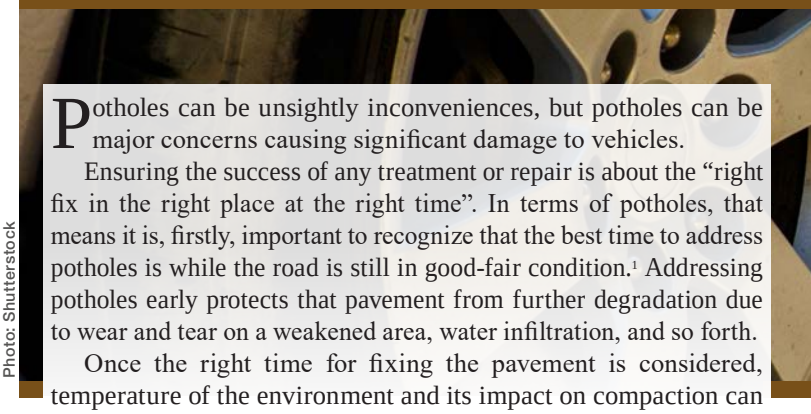

Photo: Shutterstock

Potholes can be unsightly inconveniences, but potholes can be major concerns causing significant damage to vehicles.

Ensuring the success of any treatment or repair is about the "right fix in the right place at the right time". In terms of potholes, that means it is, firstly, important to recognize that the best time to address potholes is while the road is still in good-fair condition.[1] Addressing potholes early protects that pavement from further degradation due to wear and tear on a weakened area, water infiltration, and so forth.

Once the right time for fixing the pavement is considered, temperature of the environment and its impact on compaction can determine whether permanent or temporary patching is the best choice.[2] Some pothole fixes are better suited for ambient temperatures above freezing for several consecutive days while others fixes can be done even when temperatures are below freezing.

Other factors that influence the treatment selection are[3]:

- the existing road structure, geography, and alignment
- the traffic type and volume
- the weather and season
- the position of the defect on the road
- other defects present
- implementable traffic management solutions
- risk level and safety concerns.

The right fix is one that is suitable to the placement of the pothole, appropriate to the time of year that the fix is being made, and offers the greatest benefits and fewest limitations for the life expectancy and cost of the treatment (see table, right).

Once the right fix has been selected, that fix can be optimized with these best practices:

1. Choose the right material – Choose a finer top mix material for better compaction and minimal water penetration. Use a high-quality cold patch mix—one that has all stones coated with binder and one in which the binder doesn't wash off with water—to keep the material in place. If appropriate, the material should be kept at the proper temperature (e.g., using a hot box reclaimer) and applied as close to mixing temperature as possible.[6]
2. Maximize adhesion – For optimal adhesion, begin by cleaning the hole thoroughly. Use a tack coat. Compact well, using a vibratory plate compactor without water for compacting the soil and a tamper for compacting the asphalt (good), a walk-behind single-drum roller (better; used only for final lift unless patch is large), or a double-drum ride-on roller (best; used only for final lift unless patch is large). Begin the compaction process by using a plate compactor to compact 3 inches of asphalt around the edge; this edge pinch seals the patch at its greatest failure point while the material is hottest. Keeping the water reservoir full on a plate or drum roller helps to ensure that enough water passes over the plate preventing the plate from picking up bits of asphalt. Check stiffness readings for adequate compaction.[6] ■

Pothole Fix Options					
	Hot-mix Asphalt Patching	**Thermal Recycling** (a.k.a. Infrared Heater Patching)	**Thermal Repairs**	**Spray Injection Patching**	**Cold Patch**
Suitable road types...[4]	All	Most	Hot-rolled asphalt surfaces	Rural roads with low traffic	High traffic roads
Best for...[5]	High-traffic areas and major roads	Seamless repairs, larger areas, levelling surfaces		Quick fixes, utilities cuts, widespread road defects	Small potholes, emergency repairs
Time of Year	Year round (note *Limitations*)[4] But best in warm conditions[4]	Year round[4]	Year round[4]	Wet or cold weather[1]	Any temperature but affected by weather conditions[4]
Setting Time[5]	Requires time to set & harden	Immediate after cooling		Immediate after application	Immediate after application
Permanency[4]	Permanent	Permanent	Permanent	Variable	Temporary to somewhat permanent
Longevity[5]	2-5 years	5+ years		1-3 years	6 months – 1 year
Process	Excavate hole to allow for a thickness that matches existing pavement, making sure edges are vertical; heat hot-mix asphalt; apply[4]	Excavate pothole until rounded; place material in hot-box reclaimer; combine extracted bitumen with additional material[4]	Heat patch area asphalt to depth of 2-3 inches; scarify; work rejuvenators into in-place asphalt or heat new material and work into existing material, then place material over pothole and seal, leaving no seams; compact[1]	Clean patch area with compressed air; apply tack coat of hot-asphalt emulsion; use forced air to blow combined one-size aggregate and hot emulsion into patch; place dry coat of aggregate on top; compact using forced air[1]	Apply ambient-temperature cold patch asphalt mix[5]
Limitations	HMA plants may not be open in winter (this is the case in Michigan)	Requires high-volume use to be cost effective Requires truck-mounted heaters but fewer workers[4]		Requires a truck or trailer-mounted unit with emulsion and aggregate tanks, heaters, and spray injection equipment Potential lose chips Unconfirmed longevity[1]	Generally functions as a stopgap temporary measure[4]
Required Equipment	Delivery truck, roller/compactor, hand tools (shovel, rake, pick)[4]	Infrared heater, compactor, roller, rake[4]	Infrared heater, gas burner, compactor, hand tools (shovel, rake)[1]	Emulsion tank, aggregate tank, heating units, high-volume blower telescoping boom with injection head[4]	Shovel, rake (for larger patches), tamper[4]
Cost per Square Foot[5] (average)	$2.00-$4.00	$3.00-$5.00		$1.75-$3.25	$1.50-$2.50
Total Cost over 5 Years[5] (estimated)	$2.00-$4.00	$3.00-$5.00		$3.50-$6.50	$3.00-$5.00

RESOURCES

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Meet the CTT's Newest Employees: Amy and Noah

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

"People working together in a strong community with a shared goal and a common purpose can make the impossible possible."

– Tom Vilsack, former United States Secretary of Agriculture

Amy Spahn: CTT Coordinator

Amy Spahn works full time as the center coordinator for the Center for Technology & Training (CTT). She joined the CTT in June 2023.

Amy spent the first part of her childhood in Dearborn, Michigan, before her family relocated to Chassell when she was in first grade. Amy went on to earn an undergraduate degree in finance from Northern Michigan University.

Afterwards, she worked for a financial firm where she monitored financial advisors' transactions for investment compliance. She recalled, "I liked the idea of helping people invest in preparing for retirement, but I ended up on the compliance and regulations side of the transaction." Along the way, Amy attained necessary securities licenses to sell, supervise, and manage activities related to stocks, mutual funds, and annuities at a broker-dealer. Amy later went to work for the Western Upper Peninsula Planning and Development Region (WUPPDR) as a program specialist where she assisted with financial and accounting responsibilities and provided grant administration and compliance on state and federal grants.

In 2014, Amy joined Michigan Technological University's Department of Social Sciences. As part of her role, she worked on sponsored projects, handling the financial administration of funded research projects. This work inspired her to pursue simultaneously a graduate degree in research administration from Central Michigan University.

When Amy saw the job posting for her current position, she was excited at the opportunity to "come to the CTT and be able to work on sponsored projects".

As center coordinator, Amy manages the financial aspects of the CTT's grant-funded projects, making sure invoices are paid and spending is on budget and handling other human resources responsibilities like payroll. "It ties together my background in research administration and finance," she enthused.

Still, local road-owning agency staff may recognize Amy, who helps collect event registration payments over the phone and has assisted at CTT trainings. "I was at the Winter Operations Conference this past year—I was the front table person assisting our attendees with sign in and other logistics," she explained.

When Amy isn't working at the CTT, she enjoys caring for her four cows, her dog, and cats. Amy also likes to read and spend time with her family. "I have a granddaughter now, so I try to see her as much as I can", she shared. She especially enjoys exploring places with her cousin; she further reflected, "There are so many nice places in Michigan; I like doing mostly the outdoor and scenic activities."

Amy is more than willing to help local road-owning agencies in any way that she can. "If anyone has any questions, they can call me," she invited.

Noah Rule: Marketing Specialist

Noah Rule is the Center for Technology and Training's (CTT) newest marketing specialist who began working full-time for the CTT in December of 2022.

Before joining the CTT, Noah grew up in Ontonagon, Michigan, and went on to earn an associate's degree from Gogebic Community College and a bachelor's degree in marketing from the University of Wisconsin-Eau Claire. Learning about the consumer behavior aspects of marketing intrigued him. "I thought it was really interesting to see how different pools of people reacted to different types or styles of marketing efforts," he shared. After graduation, Noah worked as a digital marketing specialist for Farrell Equipment and Supply in Eau Claire, Wisconsin.

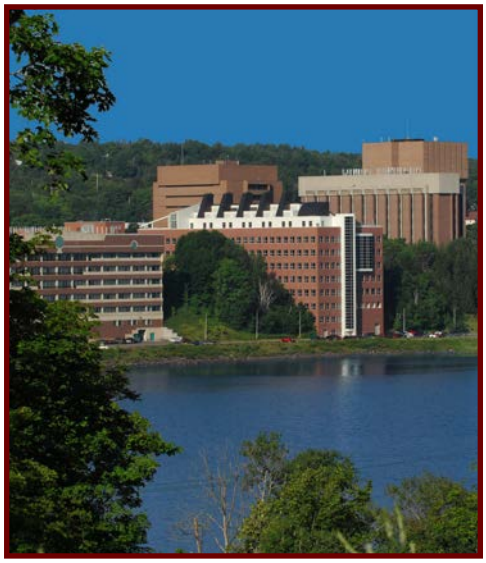
While working in Wisconsin, Noah decided that he was ready to be back home near family and friends in Michigan's Upper Peninsula. "I was just ready to be back in my place," he reflected. With this in mind, Noah came across the job posting for his current position and, after learning about the CTT, he decided to apply. "I thought it'd be

an interesting place to apply my new skills I picked up from college and my previous job," he shared.

As marketing specialist, Noah describes his role at the CTT as "involving all things marketing". He creates the materials for CTT events including flyers, printed and virtual workbooks, posters, and more. Noah leads the planning and organizing of the CTT's Michigan Highway Maintenance Conference and the Exhibitor Show that is held during the Winter Operations Conference.

In addition, Noah leads the Great Ideas Challenge (michiganltap.org/great-ideas). He gathers the innovative ideas that Michigan local road-owning agencies submit, coordinates judging with the Michigan Local Technical Assistance Program engineers, and awards prizes to the winning entrants.

So, the next time agencies receive a flyer marketing a Michigan Local Technical Assistance Program, Bridge Load Rating Program, or other program event, they'll know that Noah was behind its creation. ■



"We're all working together; that's the secret."

– Sam Walton, founder of Walmart

WHAT NOT TO SAY: Guidance for Liability Neutral Language

PART 1

Ron W. Eck, *WVU Professor Emeritus & West Virginia LTAP Director*

Reprinted from Country Roads & City Streets *with permission*

Background & Introduction

State and local road agencies generate a variety of documents, including manuals, policies, studies, memoranda and emails.

Such documents can be used by litigants and courts as evidence regarding the standard of care or duties for road agencies who are sued for alleged negligence in the operation of transportation facilities. These documents may use language and phrases such as "hazardous" and "high-risk " that have derogatory meaning in the legal system as opposed to more neutral and objective language. Language that is not neutral can increase the potential for roadway agencies to be found liable for damages in lawsuits.

Almost all written communications prepared within a public agency are accessible through public records requests and during the litigation process, so it is always important to use accurate and precise language and avoid language that contains opinions, inaccuracies, or conclusions.

In July 2020, the National Cooperative Highway Research Program (NCHRP) published Legal Research Digest 83—Guidelines for Drafting Liability Neutral Transportation Engineering Documents and Communications Strategies. The Digest includes information on how to write documents clearly and promotes the use of direct, objective and fact-based writing to avoid language that can have legal implications. The pdf of this publication is available at: http://nap.nationalacademies.org/25894.

Given the importance of language in minimizing liability risk exposure, we will be presenting key elements from the NCHRP Digest in a two-part series. This newsletter issue focuses on words and what not to say. In the next issue of the newsletter, we will look at policy and operational considerations such as making sure the language in agency guidance documents matches field conditions.

Recommendations for Liability Neutral Documents & Communication Strategies

Choosing Each Word Carefully

Words such as "hazardous", "dangerous" and "unsafe" tend to create the potential for liability, due to what is implied. For instance, the words "dangerous" or "unsafe" when used to describe a condition of the road imply that if the specified feature of the roadway is improperly maintained or in need of imminent repair, the road, rather than driver error, is at least partially at fault for an accident. Those words can imply that an agency is careless or negligent if it has not remedied the condition before an accident that may relate to the condition occurs.

While the following list of words from the

▶ continued on next page

Liability Neutral Language (continued from page 11)

▶ Digest is comprehensive, it does not include all the words that can create unintended liability or responsibility for an agency.

The Digest notes that even some "liability neutral" words may create liability for the agency, given the context in which they are used. Therefore, neutral words must be considered in context to determine the risk of liability with their use. The following lists illustrative words that provide flexibility.

Common Words & Phrases to Avoid	
Better	Clearly
Concern	Danger/Dangerous
Deficient	Edge/Shoulder drop off
Ensure	Essential
Excessive	Hazard
Hot spot trap	Imperative
Inadequate	Insufficient
Is needed	Mandatory
Obstacle	Poor
Problem	Require
Risk/Risky	Shall
Should	Trap
Unsafe	Worse

Example: A guide (published by a government agency) for local municipalities

In describing things that can be done to improve safety on local roads, the guide states "Reduce crash severity by designing appropriate slope/ditches and removing "hazardous" roadside obstacles."

The guide is considered authoritative with respect to local roads. The word "hazardous" suggests that if a roadside feature is not properly maintained, the road may be at fault for a crash. Such words can further imply that an agency is careless or negligent if it has not reduced the condition before a crash that is potentially related to the condition occurs. When a respected organization acknowledges that roadside obstacles create a dangerous condition of the roadway, it creates a liability risk for local road agencies. The sentence could be made liability neutral by simply removing the word "hazardous."

Avoid Using Vague Phrases

Phrases such as "consideration should be given" and "wherever possible" may appear to provide flexibility to an agency. Even though they seem to simply emphasize the importance of the instruction, they also in essence require action to be taken.

Factual information and descriptions that allow the practitioner to use engineering judgment to make a decision are more useful and allow the use of discretion in performing the work.

Example: Two state highway agency maintenance manuals

State A Maintenance Manual

The Department, when fencing, regardless of specific ownership, is damaged by an errant vehicle that has left the pavement of a State Highway and livestock is present, is authorized to give notice to the property owner; notify HP; complete a temporary repair while the owner is responding; and repair the fence if the situation seems too dangerous. The property owner or damaging party will be billed for the repairs. Repairs made to non-Department fence will meet the minimum Department standards.

State A's policy contains language that is not clear: "[t]he Department, when fencing, regardless of specific ownership, is damaged by an errant vehicle that has left the pavement of a state Highway and livestock is present, is authorized to give notice to the property owner; notify HP; complete a temporary repair while the owner is responding …" This sentence is critically important to the process and should be changed to identify the parameters of the agency's responsibility.

Photo: Shutterstock

Context Sensitive Liability Neutral Words and Phrases	
Application of engineering judgement	As soon as practicable
Can	Candidates for shielding
Consider	Could
Criteria/factors that may be considered	Difference in elevation rather than edge drop off or shoulder drop off
Factors that contribute to the probability	Guideline
May	Normal
Potentially contributing factors	Roadside feature, condition object, or device rather than hazard or risk
Strategy	Toolbox
When	Where feasible

State B Maintenance Manual

Inspection and Repair of Fences and Gates

1. Activity Description. This activity includes maintaining or replacing fence posts, top rails, and gates of department-owned fences. Interstate fencing is the responsibility of DOT. All other fences are the landowner's responsibility unless a right-of-way agreement states otherwise. Cleaning dirt and materials from state-owned fences is included in this activity.
2. Purpose. The purpose of this activity is to protect the safety of the public by keeping livestock off the highway and ensuring that controlled access is maintained.
3. Timing of Maintenance. Fences should be inspected twice a year and needed repairs and maintenance scheduled. Fence and gate damage should be scheduled for repair as soon as practical.

State B's maintenance policy on fencing is consistent with the principles described herein. Note that State B sets a specific schedule for fence inspection (twice a year) but provides flexibility within the policy to allow repairs to be done "as soon as practical." On the other hand, State A instructs its staff to repair a fence "if the situation seems too dangerous." When the word "dangerous" or "hazardous" is used, maintenance staff is left to determine how dangerous is "too dangerous." And who has to decide when it's "too dangerous?" How and when is that

decision made?

Surplus Language

Surplus language can be words that are redundant or duplicative or words that seek to explain a concept that does not require explanation. Surplus language can impact the clarity of an idea or provide a plaintiff's lawyer with a theory of negligence that would not have been apparent from a clearly written sentence.

For example, let's look at another sentence from the previously mentioned guide for local municipalities. The guide suggests that one of the ways for giving road users appropriate information so they can navigate roadways is "Remove visual obstructions as much as you can." "As much as you can" is vague and it is not clear how much work should be done to remove obstructions. But with regard to the subject of this section, the phrase "As much as you can" is surplus language.

The advice to maintenance crews should be to remove visual obstructions. The "as much as you can" phrase is not needed and could, in fact, provide a plaintiff's attorney with a theory of liability against the road agency.

Example: Vision Zero

Vision Zero is a concept that has been accepted by hundreds of cities in the United States. The agencies work towards the goal, based on data-driven strategies, of achieving zero serious injuries and deaths on their roadway systems. City C makes this statement on its website:

"The primary responsibility of the City government is to ensure the safety and well-being of all of the city's residents. One death on our streets is one too many."

This language suggests that the government itself is "ensuring" the safety of all its residents. This is not an appropriate legal standard of care. A roadway agency's legal duty is to provide reasonably safe roads, not to ensure the safety of all road users. The sentence could be eliminated entirely or replaced with a sentence that simply sets out the facts, such as "In the last ten years, there have been 74 deaths and 542 serious injuries on our roads. Our goal is to reduce the number of deaths and serious injuries every year." ■

Reprinted from Eck, Ron W. What Not to Say: Guidance for Liability Neutral Language (Part 1). Country Roads & City Streets, Vol. 38. N. 1. Spring 2023. Available: https://www.wvltap.org/_files/ugd/c1d927_484a45b0e60e4806b62f64337278d2f6.pdf

Liability-neutral Language Guidance for Michigan's Local Road-owning Agencies

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

Precision and accuracy in language are essential for local road-owning agencies as they draft policies and everyday communications. Yet, the choice of words can mean the difference between an effective document and a lawsuit. While this might seem overwhelming, Michigan's local agencies are not alone.

Avoid Aspirational Language—A Reasonably Safe Example

Liability-neutral language is language that does not purport to create obligations beyond the law. For example, Michigan law does not require its road agencies to keep roadways under their jurisdiction "reasonably safe," says Tountas. This protects Michigan's road agencies from forces entirely outside their control that influence the safety of the road since, in reality, making a completely safe road is unattainable. But, Tountas explains that "all [road agencies] are obligated to is perform reasonable maintenance". If a road commission were to have a policy that claims "it is our job to keep roads reasonably safe" or "we pledge to have every pothole patched in thirty-two hours" they would be using dangerously risky language. This language may elevate an agency's standard of care beyond what the law requires, and could confuse things if a dispute proceeds to litigation. So, aspirational language should be avoided.

Assistance for County Road Commissions

Adam Tountas is a shareholder and head of the litigation department at Smith Haughey Rice & Roegge in Grand Rapids, Michigan. He recommends that Michigan road commissions ask for help when dealing with liability neutral language by turning to the Michigan County Road Commission Self-Insurance Pool (MCRCSIP). "MCRCSIP offers a broad spectrum of services to all its members," explained Tountas. "MCRCSIP will often take a direct hand in helping its members draft policies." These resources give Michigan road commissions access to several different kinds of attorneys and technical experts. These individuals can provide agencies with the best possible service and prevent them from elevating their standard of care higher than what is required by law. Tountas noted, "If you reach out to the pool, you don't just get a lawyer helping you—you get a lawyer, a roster of experts, and people with all kinds of technically-appropriate advice." MCRCSIP serves as a guide for local agencies in drafting policies and in creating and maintaining liability-free communications. ■

Photo: Shutterstock

Great Ideas—Where They Are Today
In Focus: An Innovative Tool for Collecting and Analyzing Data

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.

Data collection is a necessary and important task for local road-owning agencies. One agency innovated a method for collecting, storing, and analyzing their data.

Arc GIS Collector for Transportation Asset Collection

The Road Commission for Oakland County (RCOC) took first place in the 2015 Michigan LTAP Great Ideas Challenge with their ArcGIS Collector for Transportation Asset Collection (TAC). Since then, the great idea has been adapted to become even easier and more user friendly.

In the early 2010s, the Michigan Department of Environmental Quality (MDEQ), now the Michigan Department of Environment, Great Lakes, and Energy (EGLE), requested that RCOC provide them with the county's outfall layer. At the time, RCOC did not have a map of road stream crossings and dry-weather-flow screening within its right of way for storm water permit compliance. "We got a quote from a consultant, and it was going to be about 2 million dollars to collect those data points," shared Aaron Verhelle, the GIS supervisor for the RCOC. "To have an intern collect that data with a tablet would be a fraction of that price—around $200,000 over four and a half years."

So, RCOC's great idea was to use a GPS-enabled tablet and a form in the Esri ArcGIS Collector software—now known as ArcGIS Field Maps—with redefined form fields for outfall data collection. Back in the office, their ArcGIS Collector form could be downloaded into RCOC's local database.

Although cost effective, using a tablet with ArcGIS Collector had drawbacks. "Accuracy wasn't the best," explained Verhelle, who says the tablet GPS had three to five feet of variance with the actual location of outfalls. "But, if you're within 3 to 5 feet, you are going to be able to find it, so we decided the accuracy we were sacrificing wasn't detrimental to the project in light of the cost savings."

Publishing the layer for use in the field was another issue. "We didn't want the interns who were in the field collecting points to have to retype all of the different values—we wanted a list of predefined values that they could choose from, like a set of measurement values or just 'yes's' or 'no's'," said Verhelle. He says it took about two weeks to get the form running smoothly. "It was one of our bigger challenges," Verhelle remarked.

A third challenge is knowledge transfer. Verhelle pointed out, "We have interns doing the transportation asset inventory, but they're only here for a few months." He suggests that others on staff should be familiar with these data collection tools.

While Verhelle says the ArcGIS Collector "was very user friendly", its replacement, ArcGIS Field Maps, more efficiently integrates different apps—like Survey 1,2,3 and Workforce—with better compatibility and communication between functions while retaining general capabilities like data collection and storage.

ArcGIS Field Map can also be used on a phone. Verhelle shared, "If I am out in the field and I see something I need to collect, I'll just use my phone now—I don't worry about not having the tablet on me." The Field Maps app integrates with an external GPS receiver of choice. "That allows us to get our accuracy down to about 5 to 10 centimeters," said Verhelle. Additionally, ArcGIS Field Maps is compatible with Roadsoft.

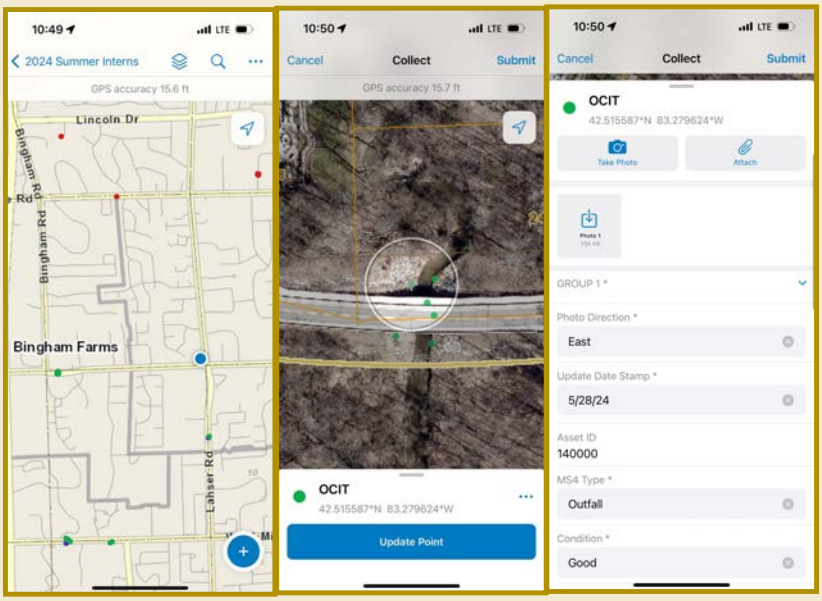
The app also allows for maps of specific areas to be downloaded for offline use. "When you are going to be in an area with no service, you can download the maps beforehand, collect data points in that area, and store the data locally on the tablet," shared Verhelle.

Using Field Maps for transportation asset data collection is relatively inexpensive. The most expensive resource is the Esri licensing which, for RCOC, is nested under the county's license. For RCOC, the tablet to run the app is a couple hundred dollars and an external GPS unit is another $700 plus the approximately $1300 a year for a subscription to run the GPS unit with an accuracy of within one foot.

Verhelle says experienced road agencies are usually willing to help with using ArcGIS Field Maps. "Bigger road agencies are likely to have dealt with it already,"he said. "I would assume they would be willing to help out another road agency."

Esri also has a lot of learning resources available. "There's a lot of free courses that can show how to set up the databases and get them published to ArcGIS online and then use them in Field Maps in the app," Verhelle noted.

For more information about ArcGIS Field Maps visit: https://www.esri.com/en-us/arcgis/products/arcgis-field-maps/resources. ■



Screenshots of ArcGIS Field Maps used by the Road Commission for Oakland County data collection (Photos: Courtesy of Road Commission for Oakland County)

Learn more about these past entries!
Great Ideas Challenge entry details:
https://michiganltap.org/great-ideas/past-entries

MDOT Local Agency Program Announcements

Effective June 23, 2024, Dale Spencley assumed the role of LAP Rural and Bridge Unit Obligation Specialist, backfilling the position formerly held by Monica Uribe, who left State service. Dale served LAP Rural customers for over 14 years as an LAP Staff Engineer. MDOT is currently accepting applications for that position.

John Welch accepted the position of LAP Statewide Engineer, delivering projects to advertisement and bidding that were assigned to LAP's consultants for assistance in reviews. John's previous position was in construction oversight in MDOT's Davison TSC.

https://www.michigan.gov/mdot/business/local-government/local-agency-program

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Center for Technology & Training

Michigan's Local Technical Assistance Program

The Center for Technology & Training (CTT) is a part of the Department of Civil, Environmental, and Geospatial Engineering at Michigan Technological University in Houghton, Michigan. The mission of the CTT is to develop technology and software, coordinate training and conduct research to support the agencies that manage public infrastructure. In support of this mission, the CTT houses Michigan's Local Technical Assistance Program, which is part of a national effort sponsored by the Federal Highway Administration to help local road agencies manage their roads and bridges. For more information, visit ctt.mtu.edu.

The Bridge

The Bridge is published quarterly by the Center for Technology & Training (CTT) through Michigan's Local Technical Assistance Program at Michigan Technological University. Subscriptions are free of charge. To request a subscription, contact the CTT.

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The Bridge is printed with soy-based ink on recycled, acid-free paper (50% recycled, 10% post-consumer waste). 4,000 copies mailed this edition.

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About LTAP

The Local Technical Assistance Program (LTAP) is a nationwide effort funded by the Federal Highway Administration and individual state departments of transportation. The goal of the LTAP effort 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.

Steering Committee

The LTAP Steering Committee makes recommendations on, and evaluations of, the activities of Michigan's LTAP.

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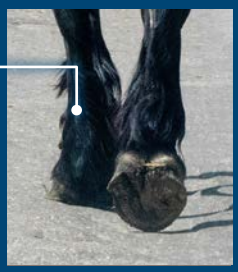
Vol. 35, No. 4 – Spring 2024



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