



Agencies maximize their brine by custom blending additives to get the most out of their winter maintenance dollar.

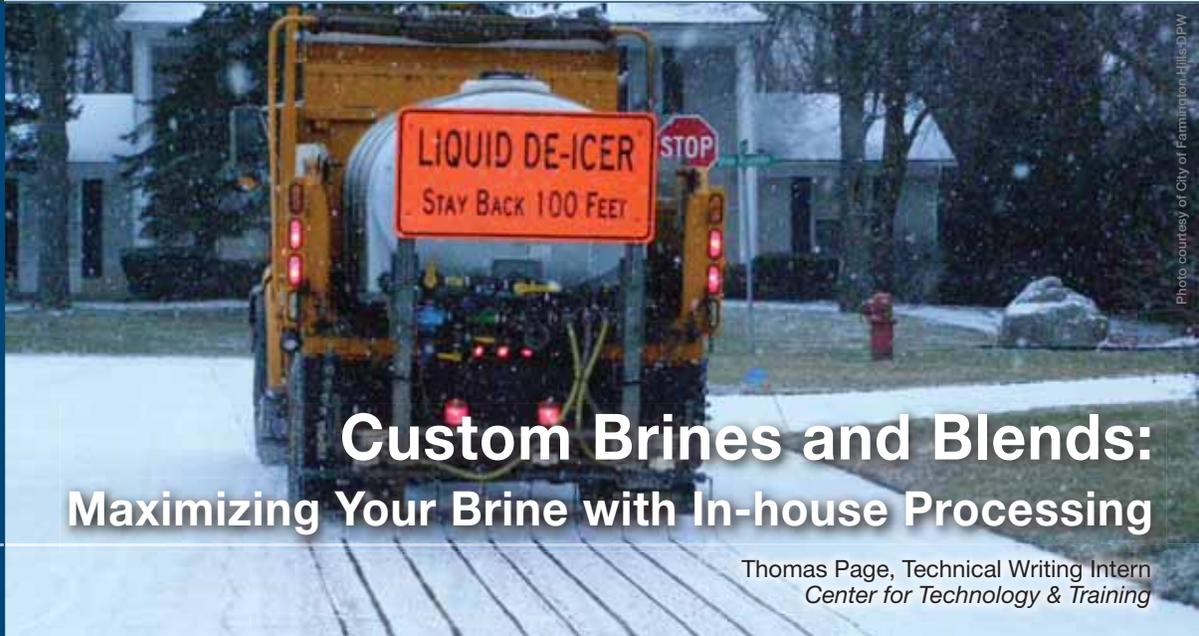


Photo courtesy of City of Farmington Hills DPW

## Custom Brines and Blends: Maximizing Your Brine with In-house Processing

Thomas Page, Technical Writing Intern  
Center for Technology & Training

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Salt water is found in the ocean, underground, and on your roads. During Michigan winters, most local road agencies use some form of salt water, or brine, in their snow-fighting endeavors. But, not all brine is made the same. The effectiveness of brine used to melt snow and ice depends on what's in it and how it is used, factors that can vary greatly depending upon the type of brine an agency acquires.

To exert more control over the brine, some local agencies have begun making in-house brine or blending their brine with additives like beet juice and other organic materials. Manufactured sodium chloride brine is made by dissolving rock salt in water in mixing tanks to reach a certain salinity. Aside from manufactured sodium chloride brine, some agencies have re-purposed pickle brine for treating roadways while jurisdictions in Wisconsin have experimented with cheese brine, a salt brine waste product from the cheese industry consisting of sodium chloride brine with natural organics. Often, organic additives are added to brine to make it more sticky, which helps the brine or, in the case of pre-wetted salt (see *The Bridge* 30.3), both the brine and rock salt stay on the road better. In Michigan, a common additive is beet juice, a feedstock for Michigan's sugar beet industry based in the mid-Michigan region. Another, less-common additive is molasses.

#### Making Brine from Scratch

"Well brines vary depending on the amount of calcium chloride, magnesium chloride, all kinds of stuff included in the liquid coming out of the ground. It's very hard to control," Bryan Pick-

worth, road maintenance supervisor for the City of Farmington Hills Department of Public Works (DPW), explained. "The big thing when you're manufacturing your salt brine you can control your salinity."

The City of Farmington Hills DPW has been making salt brine since 2006, and makes every gallon of the 200,000 gallons they use every year. Their current machine is a Henderson Infinity brine maker, which is fully automated and can produce 8000 gallons of brine per hour. It also has three truck-fill points that can blend two additional liquids into the brine on demand when loading trucks. But, the City of Farmington Hills DPW didn't always have this capacity. The first 'machine' they used was a simple tank, mixed by hand, that produced 800 gallons per hour. Kevin McCarthy, superintendent for the City of Farmington Hills DPW, said, "We had a cook back there making brine all the time when we were using it." Eventually, the cost savings of making brine themselves paid off, and they were able to save for better and more automated machines. "In the last two years, we got a more automated system [and now] we don't even have to be there [with it], just load it with salt and leave it," continued McCarthy.

The Genesee County Road Commission (CRC) put in a salt brine making machine about three years ago. Anthony Branch, maintenance director at the Genesee CRC, says they use about 120,000 gallons of brine each year, and have reduced their salt usage by "15% to 25%, depending on the winter and the amount of snow occurrences," by using the brine with organic additives, according

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## Letter from the Editor

There is an anonymous quote that says, “Don’t let your struggle become your identity.” This saying underscores the Michigan Transportation Asset Management Council’s fall conference theme of *adapt and overcome* (learn more at [ctt.nonprofitsoapbox.com/2020tamconference-fall](http://ctt.nonprofitsoapbox.com/2020tamconference-fall) or at [michigan.gov/tamc](http://michigan.gov/tamc)). Sure, 2020 has dealt us a challeng-

ing hand: a redefinition of the *locus* we know as the “workplace”, the change in funding at many local road-owning agencies with the unforeseen drop in traffic in the spring, the sudden alteration of life for residents in Midland County as the Tittabawassee River engulfed homes and roads, and the unusual flooding of coastal roads along the Great Lakes’ shorelines. And, then there was orange skies as fires defied firefighters in California, the sightings of murder hornets in the northwestern US, and the questions about space debris orbiting the earth. But, in all of this, it’s not the struggles that define us but how we move forward and overcome those struggles.

Facing and overcoming struggles is something that Michigan’s local road-owning agencies have been doing for years. In this issue’s article about asset management plans, we see how some Michigan road-owning agencies were facing bleak road network conditions combined with tight budgets and how they have been overcoming those challenges.

We also see how some agencies have innovatively been making and mixing their own brines to combat snow and ice on roadways, making driving safer for the motoring public. Plus, we’ve got two tips on how to use less rock salt by increasing brine usage from Minnesota Local Technical Assistance Program’s Paul McDivitt.

In these pages, we see how Delta County Road Commission is not allowing themselves to be defined by gravel roads that fail quickly with the spring thaw and heavy vehicle usage. We give you a sneak peek into an experiment they’re conducting on stabilization of gravel roads in Delta County.

This issue also contains strategies for increasing public involvement through the use of virtual tools. Iowa is leveraging virtual tools to enable the public to access meeting minutes, find projects, and provide feedback on projects. After examining what Iowa has been doing, we then check out similar initiatives that have been occurring at Michigan’s state and local levels.

Finally, to help keep track of our projects and meetings, we return to our look at digital note-taking tools and share ways that Microsoft OneNote can enhance note-taking. In the last issue, we saw how Microsoft OneNote allows for quick and easy reorganization of folders and files, collaboration, and sharing of notes; in this issue we show how digital notes can be enhanced with inserted files and pictures and through markups using the drawing tools.

When faced with current struggles or those yet to come, we can choose who we are and who we will become as an agency responsible for stewardship of Michigan’s road and bridge network. Let’s not allow those struggles to define us as a road- or bridge-owning agency.

In the meantime, if there are training topics or newsletter article topics that would benefit you and your agency, please let us know. In our webinars or virtual events, please share your suggestions with us in our exit polls or event evaluations. Or, share your suggestions with us by e-mail at [ctt@mtu.edu](mailto:ctt@mtu.edu), by visiting our conference pages and completing the Present tab form, or by visiting <http://michiganltap.org/TheBridge> and completing the Topic Suggestions form.

Victoria

### What’s Going to Happen...

...to County Engineers’ Workshop?

...to Michigan Bridge Week?

...to Highway Maintenance Conference?

...to the workshop I was planning to attend?

The Center for Technology & Training (CTT)—home of the Michigan Local Technical Assistance Program—is committed to providing attendees with a healthy, safe learning environment.

As necessary, the CTT is offering a selection of our current events online. So, you won’t miss CEW, Bridge Week, or other events. When these events are not possible in person, we will bring them to you virtually or in a hybrid format. In addition, the CTT is offering new trainings online. Follow our events on [ctt.mtu.edu/training](http://ctt.mtu.edu/training).

Some of our virtual conferences will have new contests. We ran an ugly snow plow competition during the virtual Winter Operations Conference, and the Michigan Transportation Asset Management Council held an extreme transportation makeover competition during their fall conference. Look for announcements about the contests at our virtual events when you receive your acknowledgement-of-registration receipt.

For on-site events, the CTT will adjust event capacities and food and beverage services. Based on current on-site event guidelines due to COVID-19, the CTT reserves the right to replace the on-site session with an equivalent online event on or around the same date(s). The CTT will make every effort to provide sufficient notice of event changes to attendees. All attendees at on-site events must adhere to the social-distancing and face-mask guidelines of the venue as well as any additional guidelines put forth by the CTT prior to the event. ■

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# A Story-telling, Strategy-setting, Millage-winning Tool: The Asset Management Plan

Victoria Sage, Technical Writer  
Center for Technology & Training

**F**orty-one Michigan local road-owning agencies checked a box on their 2020 to-do list on October 1st: *submit PA 325 compliance plan and asset management plan appendixes*. Another 81 agencies will need to do the same in 2021 or 2022. While checking the box on the to-do-list is satisfying, agencies who check that box may find that they can get a greater value out of their asset management plans.

An asset management plan is more than just a bound document that ultimately becomes an oversized paperweight. It's more than just a document that fills or accents a bookshelf. It's a document that identifies the assets an agency owns, the condition of those assets, and a plan for managing and maintaining those assets. It's also a document that both details how and ensures that public funds are spent most effectively to maximize the condition of a road and/or bridge network.

When such a document is outward-facing, it becomes a source of transparency for an agency's decision-making process. Such a document also allows local and elected officials as well as the public to understand the technical and financial challenges and goals a road-owning agency is tackling in order to manage their transportation infrastructure on a limited budget.

In recent months, local road-owning agencies with 100 or more centerline miles of roads on their federal-aid network have already developed or will need to develop a "compliance plan", an asset management plan that summarizes the inventory, condition, historic and projected trends based on available financial resources, and goals of their road and bridge assets as well as their culvert and traffic

signal assets in order to comply with Public Act (PA) 328 of 2018 (see *The Bridge 32.1*). However, a number of agencies have been leveraging road and bridge asset management plans for years, using these plans to make significant improvements to their road and bridge networks despite their limited budgets. Others have been realizing the advantage of asset management plans while preparing their submittals, thus crafting their plans in a way that their agency will be aided by the sheer fact of having an asset management plan.

Marquette County Road Commission (CRC) began developing formal asset management plans two-and-a-half years ago, according to Alex Elsenheimer, a civil engineer in the engineering department. "It's always been kind of in the background," he shared, "but we just started developing the actual asset management plan, [which has] more of the details and breaks it down for our constituents and board members."

Even though compliance plan submission isn't required for Marquette CRC until October 2021, Elsenheimer says they're "in the process of compiling the asset management plans" for submission to comply with PA 325. "We're doing a three-year cycle for [the pavement plan] and a two-year cycle for bridge [plan] updates."

While Marquette CRC only recently started developing and using asset management plans, Emmet CRC has been producing asset management plans for 16 years and not just for the county as a whole. "I developed an asset management plan—a five-year road plan—for each township," explained Brian Gutowski, engineer-manager for Emmet

CRC. Emmet CRC's asset management plans have consisted of a prioritized list of projects over a five-year period for each jurisdiction.

But, what exactly is motivating Marquette CRC and Emmet CRC to put all this effort into developing and updating asset management plans for their road and bridge assets?

## Telling Your Story...

An asset management plan explains the "story" of your road and bridge network for your board members and constituents, according to Elsenheimer. "This document can change sporadically based on unknown events," he added, "But, [through your plan], you're passing on what you're seeing, what you're trying to head towards, what you're trying to build, and you're letting your constituents and board members know where you stand as a system with the budget you have, what can be done, and what decisions need to be made."

More than just a simple story, an asset management plan helps agencies focus their maintenance and construction efforts for efficiently maintaining and improving their networks. Gutowski thinks that having and implementing an asset management plan is the "most efficient way to spend public funds". Elsenheimer agrees. "The asset management plans help put focus on where you should direct money because there's a limited budget and plenty [of work] that needs to be done," he added.

Marquette CRC posts its asset management plans on its website, a move that Elsenheimer says helps foster transparency. In a similar fashion, Berrien County Road Department

► continued on page 8



Test sections: top left – gravel section stabilized with Perma-zyme; top right – gravel section stabilized with chloride; left – reclaimer on gravel section being stabilized with Perma-zyme (Photos: CTT Archive)

Control sections: bottom left – paved section without chipseal (left) and with chipseal (right); bottom right – gravel section without stabilizing agent (Photos: CTT Archive)





# Delta CRC Tests Gravel Road Stabilization Techniques

Sarah Lindbeck, *Technical Writing Intern*  
Center for Technology & Training

Many gravel roads are barraged with logging and farming trucks when they are at their most vulnerable during freeze and thaw cycles, causing them to deteriorate rapidly. Even day-to-day traffic throughout the year has an impact on gravel roads over time, making frequent maintenance a necessity. But could there be a way to treat gravel roads so they are stronger and last longer? That is the question Delta County Road Commission (CRC) set out to answer when designing a one-mile test strip this summer within their county in an attempt to find a cost-effective way to build a strong, long-lasting chip-sealed gravel road.

“We should always be improving,” Delta CRC Manager Jody Norman said. “Every year I sit down with all the workers and brainstorm ways to improve. That’s how this idea came about.” The idea is to construct a one-mile test strip using different variables to determine a more efficient way to maintain a road surface over time. The test juxtaposes a mixture of conventional and lesser-known methods to strengthen road bases. Each stabilization variable is tested in conjunction with a chip seal that Delta CRC has already used successfully on a number of their gravel roads. The CRC will analyze the road over time to see which method works best.

When searching for a suitable test site, Delta CRC chose County Road 434 not only for its gravel, width, and straightness characteristics but also because local potato farmers haul fertilizer and potatoes over the road in the spring and fall. The trucks’ weight will test each section’s ability to withstand heavy loads during freeze-thaw cycles. Before the test could be performed, a uniform base for all the test sections had to be established. The 24-foot-wide road consisted of geotextile fabric, six to eight inches of three-inch stone base, and three inches of gravel. An additional four inches of gravel was added to each section and subsequently was shaped and compacted.

Once a uniform base was added, four

consecutive quarter-mile test sections were marked off to allow for easy comparison when performing observations. The first quarter-mile test section was overlaid with two-and-a-half inches of hot-mix asphalt (HMA). One lane of this section received a chip seal immediately to compare the effects of chip sealing a new pavement and leaving it uncovered.

The three remaining test sections were not paved with HMA but were used to test three different gravel stabilization methods. Those test sections were surfaced with a double chip seal using Delta CRC’s usual chip seal recipe: anionic high float rapid setting chip seal (HFRS2) emulsion with a bottom course of 25A stone and an oil application rate of 0.38 topped with a course of 31AA stone and an oil application rate of 0.39.

The second section is putting enzymes to the test. Enzymes are a relatively new concept in road design that remain largely untested, particularly in climates similar to Michigan’s. Norman’s willingness to include them in his real-world application test shows an open-mindedness that could increase the knowledge surrounding this innovation to the benefit of the entire state. Perma-Zyme, the manufacturer of the enzyme product used in the Delta CRC test, explains that their product works through a “process that increases the strength of the soil when Perma-Zyme interacts with the clay particles in the soil, creating a reaction between the soil and Perma-Zyme”. The result of the reaction is a concrete-like surface. For this reaction to occur successfully, clay needs to be present in the soil. Delta CRC added clay to their soil to give the enzyme product the best chance for success. To apply the enzyme, the gravel was fluffed and sprayed with Perma-Zyme. A pulverizer was used to mix the enzyme fluid into the top five inches of gravel. Finally, the road was shaped, compacted, and left to harden. (To learn more about the use of enzymes in gravel

road stabilization, refer to *The Bridge 32.4*.)

Mineral brine, that had 21 to 24.5 percent calcium-magnesium chloride, was the variable in the third section. This test section’s gravel was sprayed with 1,000 gallons of mineral brine. Then, the top five inches were fluffed and mixed with a pulverizer and sprayed with another 1,000 gallons of mineral brine before being shaped and compacted again.

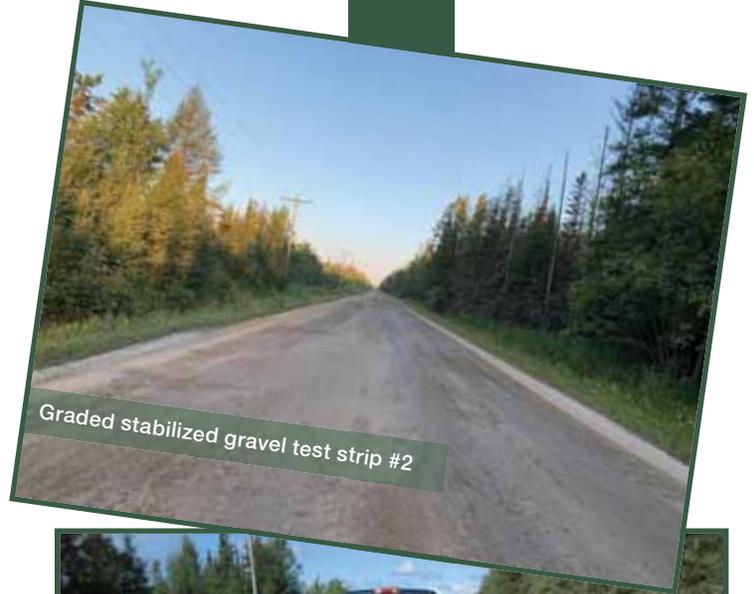
The final test section was built “in the usual way” for Delta County, according to Norman. The fourth test section’s gravel was topped with calcium chloride at a rate of 500 gallons per quarter mile.

The test site was completed this August and will be monitored frequently over the years, particularly during the spring and fall, to analyze how each stabilization method performs during freeze-thaw cycles. Most of the results will be qualitative, attained through visual inspection of cracks, potholes, rutting, and other physical characteristics the road may develop. Density tests were performed the day the test sections were made. Periodic traffic counts will tell how many vehicles are driving on the road.

Norman hopes conducting this real-world test will provide Delta CRC with definitive answers regarding a cost-effective way to build roads with stronger base structures. He anticipates a winner among the chip-sealed gravel sections to emerge within a few years based on the overall cost associated with the method. Delta CRC is hoping the test sections will stand for many years, but only time will tell if the chip-sealed gravel roads end up being significantly more cost effective with a stronger base structure and an extended service life.

Norman says “We have an obligation to the motoring public to find better and cheaper ways to build and maintain their roads.” Testing innovative products and strategies in the environment they would actually be used is one great way to ensure optimum use of public funds in the future. ■

# A Sneak Peek at the Delta CRC Test Setup





Applying emulsion on gravel test strip #3



Applying chips on gravel test strip #3



Applying chips on gravel test strip #3, continued



Sealcoat on test strip #3



Rolling (and sweeping) on test strip #3



Rolling (and sweeping) on test strip #3

(Photos: CTT Archive)



Agency plans available on their websites, from left: Marquette CRC, Berrien CRD, Grand Traverse CRC

►(CRD) also posts its plan to their website. Jason Latham, director of Berrien CRD, reflected, “I think it’s important to be able to tell our story so the public knows what we’re doing and why we’re doing it.”

Grand Traverse CRC also experiences a value in posting its asset management plan to its website. “It’s to get the information out there on how we do things,” explained Joe Slonecki, the assistant county highway engineer for Grand Traverse CRC. “So many people always ask why are you doing that? We always spend the time to talk to them and tell them why and how we do things, and we always tell them hey, it’s on the website if you want to read it.”

According to Slonecki, Grand Traverse CRC has been preparing asset management plans since 2013. The agency uses their asset management plan to present to their board “what’s going to give us the biggest ‘bang for the buck’”. Slonecki explains that, while the board’s priorities might differ from the priorities mapped out in their asset management plan, having the plan enables Grand Traverse CRC to show with ease the impact that adjusting the priorities can have. “We don’t create the policy, we follow the policy,” he said. “But, we can give recommendations and we can explain to our board and the public where our constraints are—the state law, the recommendations from the state, where we can and can’t spend funds.”

However, many agencies don’t have their asset management plans on their websites. While Emmet CRC does not post their asset management plans to their website, Gutowski e-mails the plan to townships or citizens who have questions. “They can look at the plan themselves and see where their roads sit as far as a priority,” he commented.

Both Marquette CRC and Emmet CRC felt strongly enough about telling their story through an asset management plan that, even though they were not required by PA 325 to

submit asset management plans in 2020, they already have plans in place. They are both planning to start refining their plans early for their 2021 submission requirements.

## ...and Specifying Your Strategy

Going one step further than story alone, both Slonecki and Gutowski say their maintenance and improvement program—including the budgeting for that program—is spelled out in their asset management plans, which guide their work and budget throughout the year. “It’s the primary driver of how we spend our funds aside from our routine maintenance funds...all the funds that we have work through the asset management plan,” Slonecki stated.

Gutowski says that Emmet CRC’s entire road maintenance and improvement program is based on their asset management plan. “Prior to [having an asset management plan], we were basically just fixing any road we thought needed it,” he shared. “With the asset management plan, that came to a screeching halt, and then we are able to extend our money further by using an asset management plan and, I think, spending our money more wisely.”

That’s because asset management plans typically have a strategic component in their narrative. Latham explains that Berrien CRD’s asset management plan not only details their road and bridge assets but also outlines how they make decisions and select the roads that will be fixed. Four years ago, Berrien CRD did not have an asset management plan. In developing the Berrien CRD plan, Latham included a narrative regarding Berrien CRD’s optimization strategy, which uses a proprietary formula to help identify the right fix on the right road at the right time.

Having both an optimization strategy and an asset management plan has led to a dramatic transformation on Berrien CRD’s road network. They enable Berrien CRD to be “efficient”, notes Latham. He reflected, “Knowing you have so many miles of roads and very limited funding...I have to know that the money is going exactly where it needs to go to provide the greatest benefit.” With their asset management plan in hand, Latham says he’s able to explain Berrien CRD’s story of what they are doing and why to his board and the public.

Nonetheless, Slonecki acknowledges that an asset management plan “doesn’t say pick this road or pick that road”. He shared, “You have a big picture of what your target should be.” He says their plan doesn’t list each road

they are planning to address over the time period covered by the plan, but it does list the large projects that they are planning to do. “Every now and then, something pops up like we’ve got an opportunity to crush-and-shape this road because we got a little bit of extra money, and we’ll throw it in there.” Elsenheimer, Gutowski, Latham, and Slonecki all shared that having a written asset management plan helps solidify an agency’s priorities for managing and maintaining their assets.

All four also shared that the essential elements of their asset management plans are the inventory of assets that identifies assets owned by the agency and the condition of those assets. Having that data ready at hand enables what Latham calls “data-driven decision making”. He’ll use that data to determine “how [to] use [their] money most efficiently”. Being able to make data-driven decisions means “politics don’t come into play”, notes Latham.

## Setting a Goal

One area of writing asset management plans and compliance plans that has generated a lot of discussion is the identification of a goal. Reflecting on it, Latham suggested, “I think the goal should always be aspirational; it should be tough to reach because it makes you sharpen your pencil that much more.” He does note that, to reach an aspirational goal, it is important to allow for plenty of time.

In a similar vein, Gutowski’s network goals were seemingly aspirational when he began developing and implementing asset management plans for Emmet CRC. He acknowledges that, when they first started working toward the goals they set out in their asset management plans, it was “overwhelming”. But, slowly fixing roads over sixteen years paid off, and more parts of his network now maintain average their pavement conditions in the good condition rating category.

But, what if they don’t reach their aspirational goal? There again, having an asset management plan serves an important purpose. Since Berrien CRD’s plan is updated regularly, Latham points out that the plan can readily illustrate why a particular goal couldn’t be attained and where the money did end up going. In that case, he says they’ll update their asset management plan and discuss a revised budget with the board. “We’re an open book,” he shared. “Nobody likes surprises...We always want to know if we are on track to meet our goals and, with our asset management projec-

tions, we will know a few years ahead if we won't be able to obtain the goal."

Latham explains that many variables can change an agency's ability to meet their goals, such as changes in transportation funding or changes in the costs of labor and materials. However, he says that "having the data gives you credibility and [explains] why you're doing well or not as well as you expected".

### Collaborating with Townships for a Greater Good

A unique way that asset management plans have been leveraged is in fostering a relationship with the townships in an agency's jurisdiction. "Because of the way things are written in our funding, [the local road network] is kind of a secondary group of roads that doesn't always surface to the top of our list despite some of our local roads having more traffic than our primary roads," said Slonecki.

He says an asset management plan can be a tool to discuss "partnership projects" for improving local roads, a model that has helped several special assessment districts in subdivisions to fix their streets. Since much of the funding comes from the residents of these districts, Grand Traverse CRC also develops a mini-asset management plan for roads fixed under a partnership project in order to maintain the investment that the residents made in their roads. Overage funds can be returned to the residents or held in escrow for maintenance purposes, he explains.

Further, asset management plans can support townships in their decision to enact millages to improve their road networks. By a simple majority vote of the township board, general law townships can enact road millages of up to 1 mill; townships chartered after 1978 must convince their electorate to approve millages of up to 5 mills. The township's ability to vote in or propose a millage is "a huge tool in the township's toolbox", Latham says. With many county road commissions facing limited budgets and legislative requirements on where and how their funding can be spent, the county local roads often get bypassed in favor of the county primary roads when it comes to road projects. Latham finds that being able to present an asset management plan to townships can help them see and address the needs on local roads in the township. He believes collaboration between the county road department and the townships generates the best road condition results across the county primary and county local networks.

Recognizing this and taking his county's asset management plans one step further, Gutowski develops a plan for every township in his county. When his road network was facing an average at the low end of the fair condition rating category, Gutowski quickly realized that his network's needs were outpacing the county road commission's budget. He gathered condition data for each segment of road, not only on the county primary system, but also for the township's networks. From the data, he identified planned projects for the county and each of the townships over a five-year span and gave each township a copy of the plan for managing their road assets.

"After a lot of conversation, we went to the county board with the township officials and decided to allow the townships to raise an extra mill for roads in each individual township," explained Gutowski. "It goes on the ballot as an operating millage for the township, [...and] it passed for the first time in 2004, and it's passed every four years since, so a lot of the townships have their local roads done." Gutowski says the townships are able to raise the additional mill to fund their own road projects.

Gutowski points out that it is critical, then, for Emmet CRC not only to develop the asset management plan but to follow it as well. "If we don't follow it, then we have egg on our face trying to explain to our townships why they should follow it," he said.

But, to him, it's worth it. "Without the plan, we would never have gotten the millage," shared Gutowski. "When I first went for the millage, a lot of our township officials were closed to it until I provided the plan to them. [Then], officials who were opposed to it before actually helped us to go to the county board and convince the county board to let them assess one extra mil. Without their support and without the asset management plan, we would never have gotten it done."

### Why They Do AMPs

To Elsenheimer, being able to tell the

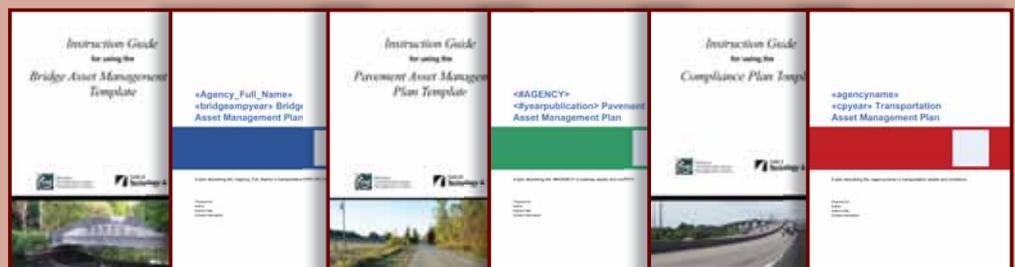
agency story is one of the significant values Marquette CRC experiences from investing time and resources into producing an asset management plan. "Overall, it's a good picture for the public to see what happens in the background and why certain decisions are made," he shared. "But, it's still a living document and can change year to year based on unknown events or other circumstances."

Beyond the story itself, the asset management plan is one of the best tools for data-driven decision making, in Latham's estimation. "Embrace data-driven decisions... embrace the data," he encouraged. "The asset management plan and an optimization strategy in roadssoft, they're a tool. Use the tools, that's what they're there for. ...[They help] explain why you are doing what you are doing and how you do what you do."

Slonecki, however, offers a couple cautions. Having the Grand Traverse CRC plan on their website, he said, "If you don't follow it to a 'T', savvy people will catch on to that very quickly,...so it can be one of those things where you have to explain and justify what was done."

Further, he says that "buy-in" with the engineering department, other agency staff, and the road commission board is critical to the success of the asset management plan. Without "buy-in", he says the plan can become "just a document that sits there and doesn't get used". To create buy-in with the road commission board, Slonecki says Grand Traverse CRC recently conducted a workshop for their board to explain how they develop their rationale and their project list. "But," continued Slonecki, "if you truly use your asset management plan and your board has buy-in, it protects your decision making."

"Just realize it's a tool," added Gutowski. "If later on somebody questions why you spent money on something, you can always fall back to the asset management plan and say according to the dollar amount that you got, where you put this money was the most efficient way to spend your public resource." ■



TAMC tools, developed and distributed by the Center for Technology & Training, for creating bridge and pavement asset management plans and a compliance plan

► to Branch. The machine at the Genesee CRC is as easy to use as pressing a button. “We put the material and the salt in the brine maker, and the concentration level is already set,” explained Branch. “We press the button for it to start making the brine [... and] the computerized system adds water and continues to circulate that water and salt until it gets to a certain percentage consistency, and then it will pump it into the storage tank.” He says that, once the brine is in the storage tank, a truck can drive up, connect a hose to the storage tank, and input into the truck’s computerized system exactly how many gallons to load on the truck.

The biggest benefit is being able to make as much as they need when they need it. “It’s convenient and it’s pretty much on demand. We can mix up four or five thousand gallons and have it in a storage tank and as trucks come in to get it, we can determine when we need to make more, how much more we need to make, so it’s a big convenience for us. Versus having to order from a vendor and wait on delivery and that is a timing game. And, when you’re playing with time with Mother Nature, you’re going to lose,” Branch said.

## Blends: Customizing Purchased Brines

Agencies that like the ease of purchasing brine can still reap the benefits of on-demand blending by investing in a system that takes the purchased brine and blends it with organic additives. In Northern Michigan, Emmet CRC recently put in a mixing system that blends calcium chloride well brine with beet juice. Brian Gutowski, engineer-manager of the Emmet CRC, says that they start their brine formulations with Michigan well brine. He shared, “We looked into producing our own salt brine and decided not to get into that because we’re kind of rural out here and have a six-inch water well, and we decided that the cost of us putting in a separate well [would be too much].” Emmet CRC uses the AccuBrine mixing system, which has a computerized mixing apparatus that allows them to “mix

different blends depending on what the weather’s going to be like”. Gutowski states their minimum usage is 90% of the brine and 10% of the organics. He says Emmet CRC is unique in that it is a mixing-only facility. Emmet

CRC’s AccuBrine mixing system is a less expensive route in comparison to a brine maker with an integrated mixing system. Depending on the setup, system costs can be expected to range from approximately \$60,000 to \$180,000 or so. Mixing systems can also be integrated into existing brine distribution systems.

Before setting up their mixing facility, the Emmet CRC used no additives in their brine. Gutowski says their typical salt usage before purchasing their brine mixer was 20,000 tons of salt per year. In the first year after purchasing the mixer, the Emmet CRC only had to order 16,000 tons of salt. “We figured it would pay for itself in three years,” Gutowski said.

## How is brine used?

Once on hand, brine can be used in three ways during winter months to remove and prevent ice and snow buildup on roads. The most common method used by many Michigan snow-fighting agencies is pre-wetting the rock salt with brine before or as it is distributed on the road surface. Some agencies simply apply liquid salt brine or other organic products on the salt stock piles before loading onto trucks; others have trucks with tanks that allow the salt to be pre-wet as it is placed on the road surface. In either case, salt pre-wet by brine is ‘stickier,’ which helps the salt stay on the road path and not bounce onto the shoulder of the road. This is where the organic additives come into play; organics in the brine improve the stickiness factor, and further improve the ability of the brine to keep the salt where it is spread.

The second brine application method is de-icing, or direct liquid application, where the liquid is sprayed directly on the roads to melt the

ice without solid salt involved.

The third method is anti-icing, which is a proactive measure to lay down a layer of liquid before a winter storm event. Pickworth explained, “Say we’ve got an event coming Monday. We can go out and pretreat today [on Friday], and it’s still really effective come Sunday night or Monday morning.” Anti-icing also reduces the time taken to plow the roads. McCarthy, shared, “It used to take us 30 hours to plow our city. Now, it isn’t just salt brine that helped that, but we added some new wing plows, pretreating the salt, and just being more accurate with the salt. We tell everyone 24 [hours], but last year we were getting it done in 12.”

Using a combination of pre-wetting salt, de-icing with direct liquid application, and pretreating roads before storm events reduces salt use—and reduces costs. Pickworth reflected, “Where we’re really seeing a cost savings is by using the brine the way we’re using it, with the three different methods. We’re saving anywhere from a fourth to a half of our salt costs. We’ve cut our salt usage down by 30 to 50 percent.”

## A Better Brine

“I truly believe that anti-icing or pretreating the roads most of the time makes the roads safer because there’s no [ice] bond there and also increases your level of service,” said Pickworth. Beyond simply using brine, being able to use custom-made brine in a local agency’s own facility can provide an agency with better service and better savings. Plus, making brine doesn’t require expensive equipment to get started. McCarthy added, “You start out small, you start out with a tank and you hand make the brine like we did. You start recouping those savings, and that’s how you buy bigger and better equipment. If you can save on your operation costs..., it’s definitely worth it.” ■



Brine-making facility at City of Farmington Hills (Photos courtesy of City of Farmington Hills DPW)



Mixing facility at Emmet CRC (Photos courtesy of Emmet CRC)

# Two Simple Changes to Increase Brine Usage

Paul McDivitt, LTAP Feelancer

Minnesota LTAP, Reprinted from Minnesota LTAP Technology Exchange, Vol. 27, No. 3 September 2019

Roseville Street maintenance worker Josh Dix was slated to present in-person at the Road Salt Symposium last February, but Mother Nature had other ideas.

On the morning of the conference, a heavy, wet snow started falling, and it didn't stop. Dix was kind enough to stop at home in the middle of his plow route so that he could still give his presentation remotely before heading back out into the flurry.

Roseville is still trying to use more brine to reduce the impact of road salt on water quality. At the time of the symposium, the city had already used 35,000 gallons of brine during the 2018–2019 winter. Dix credits the increased usage to two easy, inexpensive changes they made to their plow trucks.

## No Nozzle

Dix says he took a “smart salting” course when he first started working for the City of Roseville and learned that 10 gallons per ton was a good brine rate. He measured Roseville's rates and found they were low. The fan nozzles on the gravity output were allowing only 0.35 gallon per minute.

“It's barely a trickle, so we took the nozzles out,” Dix said. “It's really as simple as that.”

Removing the nozzle increased brine output up to four times, up to 1.3 gallons per minute. Driving 20 miles per hour with a granular rate set to 400 pounds per mile, the rate was 5.25 gallons per ton with the nozzle. Without it, the rate increased to 19.5 ga/ton. At 30 miles per hour, the rate was 3.5 ga/ton with the nozzle. Without it, 13 ga/ton.

There was some variation with different tank levels, but the increase overall remained significantly higher than with a nozzle. “If you're thinking you're going to lose that coverage, it really wasn't there to begin with. You're not losing much,” Dix explained.

## Hydraulic pre-wet pumps

December 2013 was very cold, with no sun and a lot of icy hard pack. “We really wanted to get more liquid, especially treated liquid, on our salt to keep breaking down that hard pack,” Dix said. “So that's when we made the decision to start buying trucks with hydraulic control pumps rather than gravity.”

Dix likes the hydraulic pre-wet pumps because you can easily calibrate them, just like road salt. They also have speed control to keep

your rate even as you drive faster, they allow higher rates so you're able to get more brine out, and you're able to keep accurate records of your brine usage with the pumps. “With gravity, it was a rough estimate at best,” Dix said.

He was hesitant at first after hearing bad things—such as seizing pumps—from some people. Roseville has had a few issues, but Dix said they've mainly been due to their own negligence. Pumps need to be cleaned out and prepped for summer properly and kept filled with liquid instead of air at all times. “The one that we took care of has not had any issues,” he said.

With the controller, the pump can be set to a max of 72 gallons per ton, and the VariTech Industries pre-wet pump is capable of a maximum of 10 gallons per minute. The flow seemed restricted at higher rates, Dix said, with not much liquid coming out. “Once again, I ended up pulling the nozzles out,” he said, in order to get the full flow that the pump is capable of.

## Pre-wet Vs. DLA

Brine pre-wet is measured using gallons per ton while liquid deicing uses gallons per mile. Because the liquid pre-wet rate is tied to the granular rate, at low granular rates the liquid rates are exceptionally low.

Dix guessed the common direct liquid application (DLA) rates are 50 to 100 gallons per mile. DLA rates are generally higher than anti-icing rates.

If salt is set to 100 pounds and pre-wet to 15 gallons per ton, that converts to .75 gallons per mile. If you increase your salt to 200 pounds at the same pre-wet rate, that equals 1.5 gallons per mile. “That's pretty much nothing,” Dix explained. “Think about taking a gallon jug of brine and spreading it out over a mile. I can't imagine why that would do very well.”

Dix wanted to get to 25 gallons per mile—at the low end for anti-icing, but a good starting point—and to get the pump to max capacity. However, the controller limited the pump to 72 gallons per ton. This didn't require an equipment change, just a programming change.

For about \$100, Force America (of which VariTech is a subsidiary) will email you a file. You put it on a thumb drive and load it into the controller. “It's as simple as that,” he said. “You load it and it resets, and now it thinks your pre-

wet pump is a direct application pump.”

You have to adjust a few calibration settings: disable “pre-wet,” enable “direct,” and remember your previous calibration rate. Dix ran out of brine quickly at 25 gallons per mile so he backed it down to 10 gallons, which has been the best balance on a single axle for Roseville. At a granular rate of 200 pounds per mile, this compares to a pre-wet rate of 100 gallons per ton of salt. With cold pavement temperatures, the city has been experimenting with 15 to 20 gallons per mile.

## Salt use down

During the 2017–2018 winter, Dix's modified truck averaged 34 percent less salt than an average of other comparable routes over eight events. For three of those events, the modified truck averaged 42 to 68 percent less. During one event, it was over the average by 20 percent.

“That's pretty huge, I think, to be using two-thirds less salt than the average of my coworkers,” Dix said. “I'm really excited about the possibility that gives us in still maintaining a really high service level but using quite a bit less salt to do it.”

This past winter they modified a second truck. This driver had previously been one of the higher salt users, but with the modified truck during this past winter's New Year's Eve storm, his salt use was 33 percent less than the average of the other seven trucks, and similar to Dix's modified truck.

There are some challenges. For starters, you run out of brine quickly. Dix wants more liquid capacity, and to be able to drive faster than 20 miles per hour without maxing out the pump.

But with two simple, low-cost changes, Dix and the City of Roseville achieved significant salt reductions. Removing the nozzle increased brine output on their gravity systems nearly 400 percent. In hydraulic systems, he concluded, if you've gone to pumps, reprogram the controller to maximize pump output. “Without any big purchases or an increase in cost, it's possible to use a lot more brine.” ■

*Reprinted from Minnesota LTAP: Two Simple Changes to Increase Brine Usage. In: Technology Exchange, September 2019. Minnesota LTAP. Available: <http://www.mnltap.umn.edu/publications/exchange/2019/September/two/index.html>. For more information, contact Minnesota LTAP.*

# Iowa Creates Virtual Public Involvement Tool

U.S. Department of Transportation *Federal Highway Administration*  
In: Innovator September/October 2020



The Iowa Department of Transportation (DOT) developed a virtual public involvement platform to manage its stakeholder outreach and improve project decision making and is now making the tool available to other highway agencies.

As mobile phone, internet, and social media use grows, agencies are turning to virtual public involvement—the use of digital technology to engage people or visualize projects—to supplement in-person public involvement strategies during planning and project development.

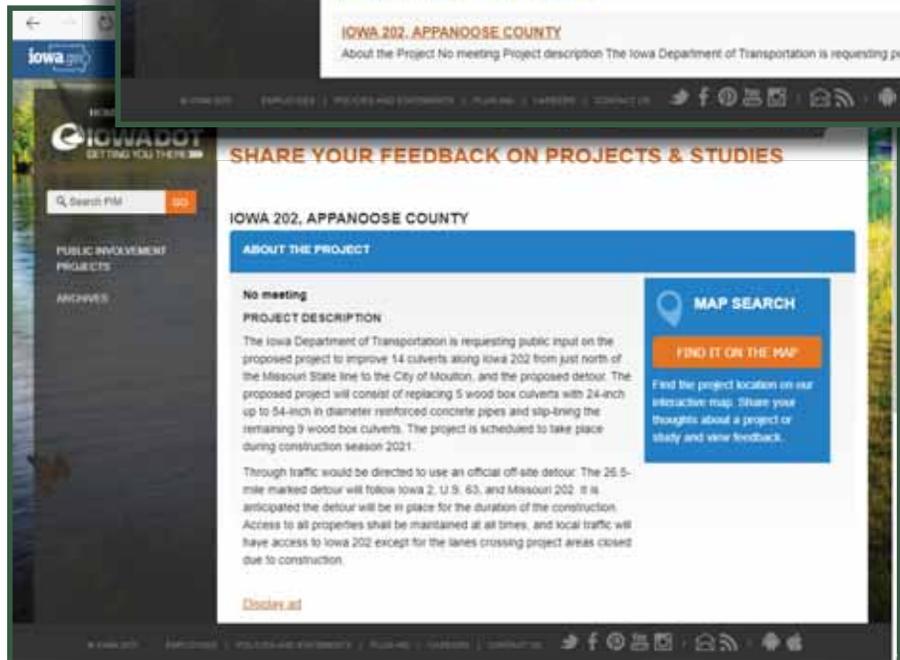
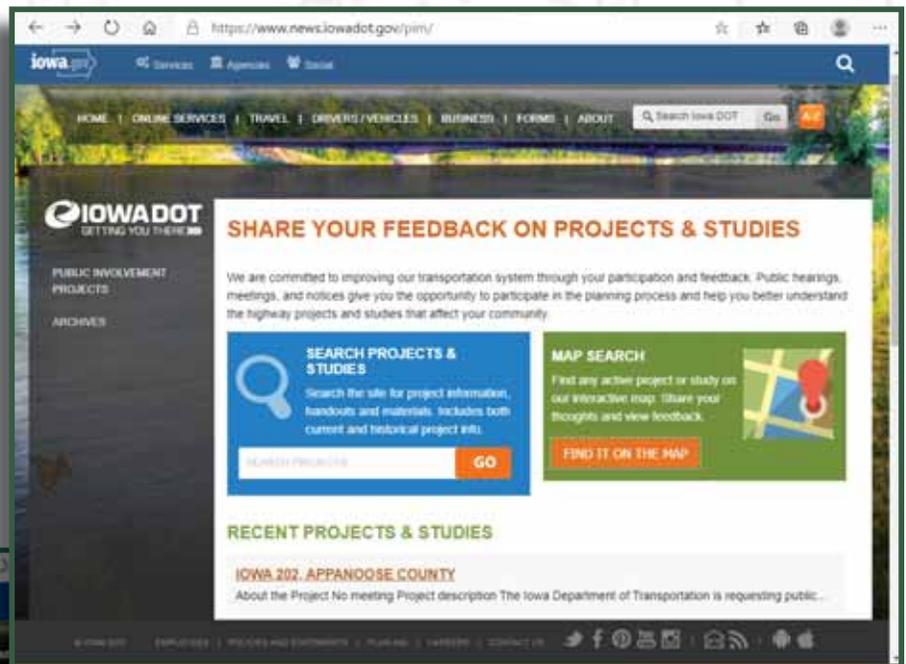
The Iowa DOT created its Public Involvement Management Application (PIMA) to expand citizen input on transportation projects, reduce manual processes, and improve consistency of data collection for public meetings. “PIMA allows us to manage and coordinate our public involvement effort across our organization,” said Brad Hofer, director of the Iowa DOT Right-of-Way Bureau.

## PIMA Goals

The agency had several goals in developing PIMA, which features both an internal management tool and a public portal. “We wanted to better analyze and adjust our public involvement effort based on real data,” said Hofer. “We also wanted to improve the ease with which the public can provide feedback on all our projects.”

Traditionally, the Iowa DOT held public meetings primarily for larger, more complex projects. “We wanted a public space that gives everybody an opportunity to comment on every project,” said Hofer.

The searchable public portal gives users information on all Iowa DOT projects and details from any past public meetings. It also displays the level of support a project has received, which is based on comments that



PIMA homescreen (top) and a project description example on PIMA (bottom). (Photo: Screenshots of public.iowadotpi.com)

have been submitted. In addition to providing a way for people to learn about and comment on projects, PIMA allows Iowa DOT staff to respond to and manage citizen comments electronically.

In recent months, the Iowa DOT has used PIMA for online public information meetings, offering participants the opportunity to view a prerecorded presentation at their convenience and make comments as they watch. Meeting materials can include visuals such as videos, story maps, and slide presentations.

“With PIMA, Iowa has been able to continue business as usual,” said Valerie Brewer, public involvement manager. The agency is working on the capability to livestream public information meetings in the future.

### Spreading the Word

The Iowa DOT has demonstrated the PIMA platform to other State DOTs interested in using it for their public involvement efforts. The Georgia and Massachusetts Departments of Transportation have incorporated PIMA into their processes and others are considering implementation.

The Iowa DOT offers PIMA free by agreement with the stipulations that other agencies give Iowa credit for PIMA when appropriate, not share proprietary information with others, and share any improvements they make with Iowa. “We’re excited that this will continue to stimulate innovation around virtual public involvement,” Hofer said. ■

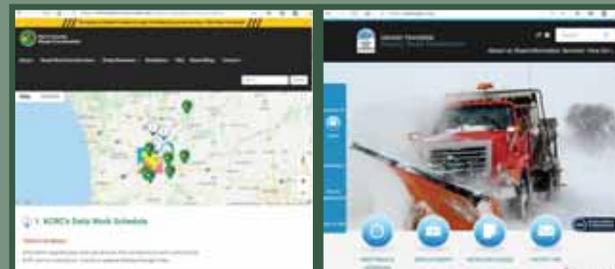
*Reprinted from Federal Highway Administration: Iowa Creates Virtual Public Involvement Tool. In: Innovator, September/October 2020. U.S. Department of Transportation Federal Highway Administration. Available: <https://www.fhwa.dot.gov/innovation/innovator/issue80/>. For more information, contact Carolyn Nelson of the Federal Highway Administration Office of Planning, Environment, and Realty for information on virtual public involvement. Contact Brad Hofer, Valerie Brewer, or John Rees of the Iowa DOT for details on the PIMA tool’s applications and benefits.*

The PIMA map can be used to see comments, meetings, and overall support for projects (top). Members of Iowa DOT can create meetings that the public can attend virtually through PIMA or in person (bottom). (Photo: Screenshots of public.iowadotpi.com)

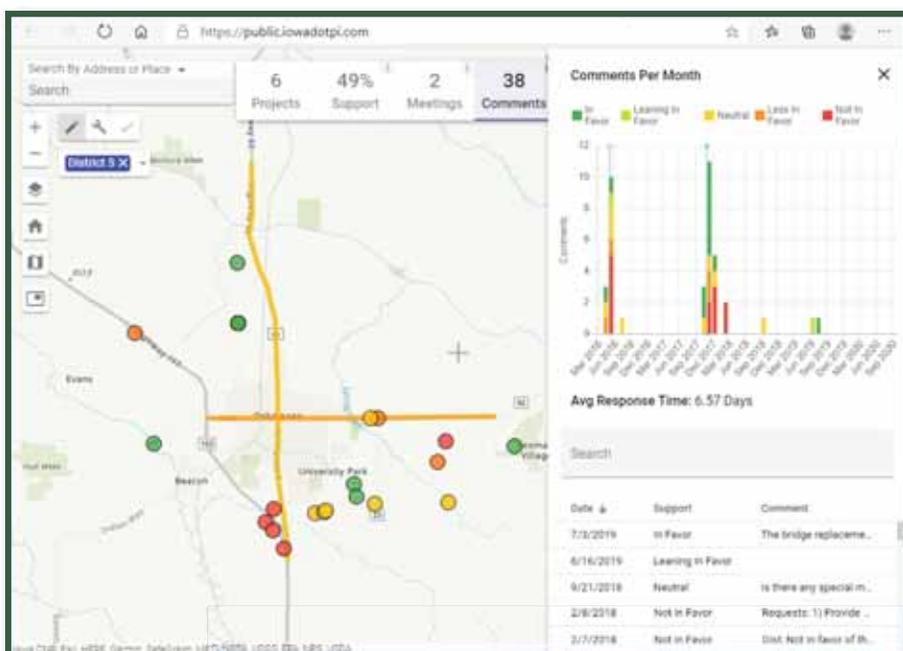
### Did you know?

In Michigan, the Michigan Department of Transportation (MDOT) uses MI Drive to communicate with the public. MI Drive is a web application that shows potential road hazards and delays such as construction work, road maintenance, and incidents. Drivers can use a desktop or mobile version to check their route for obstacles ahead of time and change course if necessary. The application also features snowplow tracking information and real-time camera views. The map interface is similar to Iowa’s PIMA, displaying information in a simple, visual way. Check out *The Bridge 31-2* for more information on MI Drive.

Local road-owning agencies in Michigan also use technology to communicate with the public. Kent County Road Commission’s (CRC) website ([www.kentcountyroads.net](http://www.kentcountyroads.net)) displays detailed information about future and current projects and even provides a daily update! Current projects can be located on a map similar to those used in PIMA and MI Drive, and each project on the map can be selected for more information. Grand Traverse CRC’s website ([www.gtcr.org](http://www.gtcr.org)) includes project information, and they even provide the public with access to board meeting recordings on their site. Every board meeting since August 27th has included an option for the public to attend via Zoom. Each Zoom meeting is recorded and uploaded to YouTube for people to watch later if they were unable to attend the meeting.



Kent CRC website (left). Grand Traverse CRC website (right).



# Note Taking: Strategies for the Digital World – Part 2

Laura Bufanda, *Front Office Intern*  
Victoria Sage, *Technical Writer*  
Center for Technology & Training

Our notes document for us what transpired at a meeting, what was seen or decided on a project, or what we learned at a conference. With the recent and ongoing flux between on-site and remote office environments, the ability to share notes and collaborate has taken on new significance. Digital note-taking apps like Microsoft OneNote and Evernote facilitate the documentation process and allow for organization of notes and handouts (see *The Bridge 33.1*).

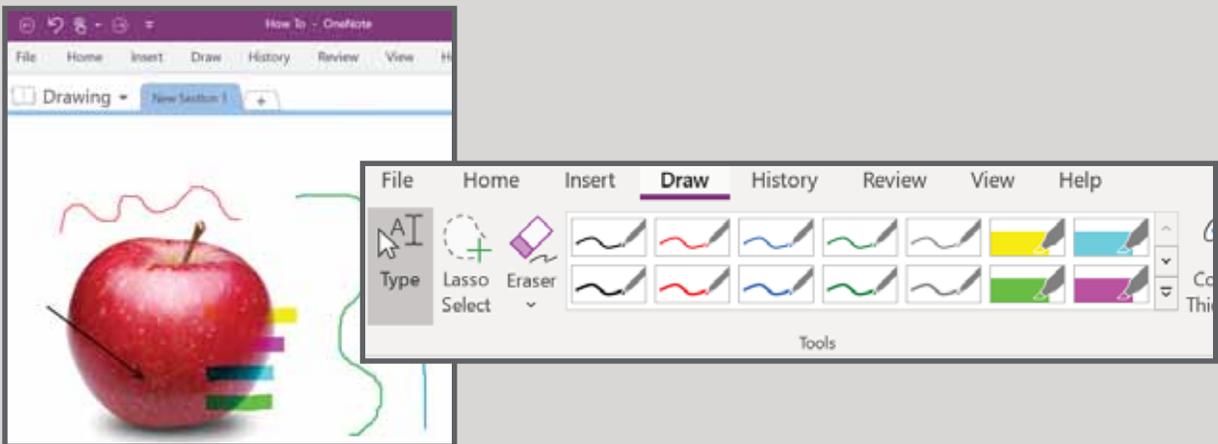
While notes in and of themselves are a useful tool, they can be made even more powerful when linked to images. It's often said that a "picture is worth a thousand words", and Katie Thurmes said that "we take photos as a return ticket to a moment otherwise gone". These ideas speak to the impact that images can have. Digital note-taking apps make it easy to link images to our notes. Plus, they also allow for freehand drawing, capturing one of the best features of pen and paper.

And, digital note-taking apps also enable linking to files. So, notes can be linked with those files that serve as supporting documentation. For example, notes from a conference can have links to the digital files for the agenda and conference handouts.

Most Windows users have the Microsoft Office Suite, which includes OneNote. This digital note-taking app is also available as a free, standalone app. Here are a few ways OneNote can help you take your notes to another level.

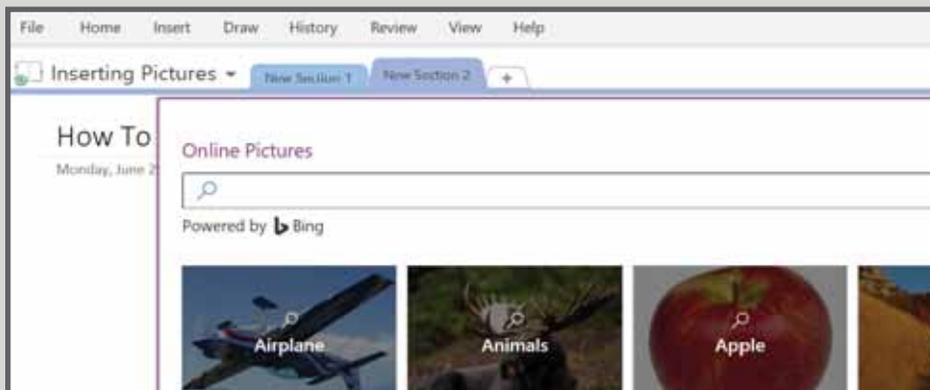
## Drawing

In some cases, drawing on your notes can be the best way to illustrate relationships or mark up other images. To draw, select the **Draw** ribbon; then, select your preferred drawing tool from the *Tools* group. Position the cursor on your notes page, click and hold the left mouse button to draw, and release the left mouse button to stop drawing.



## Inserting Pictures

OneNote notes can be accented with images, either personal pictures or pictures from online sources, to help remind you of the full story. To add images to notes, select the **Insert** ribbon; then, select **Pictures** or **Online Pictures** in the *Images* group. For online pictures, search by keyword using the *Online Pictures* dialogue box.



Layout by Hannah Bershing, *Technical Writing Intern* – CTT

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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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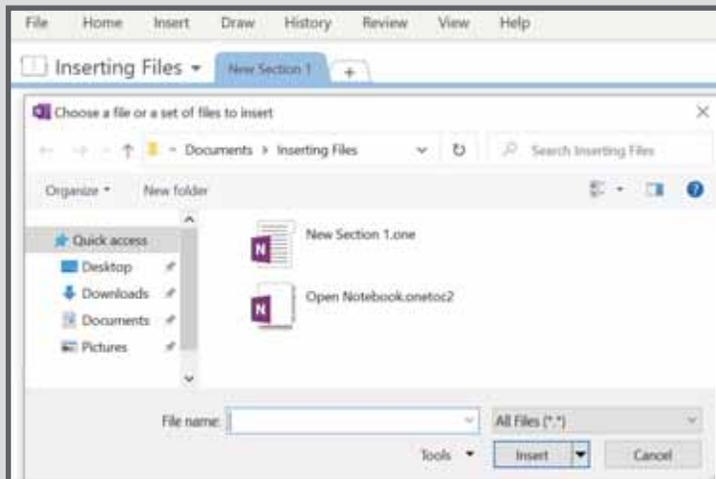
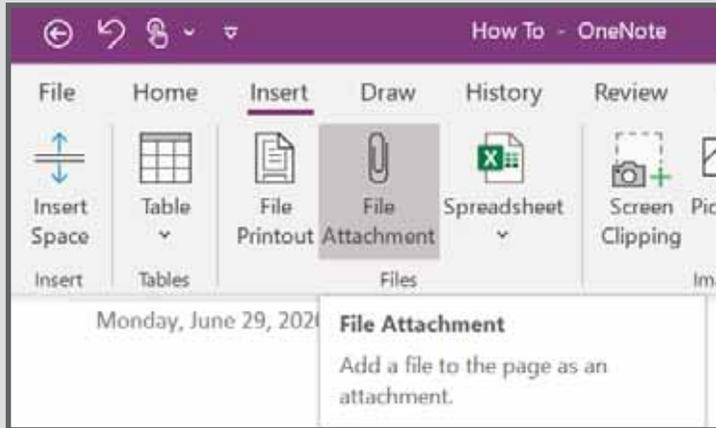
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## Inserting/Attaching Files from Your Computer

Digital notes can include links to supporting or other reference documents, making it easy to find files related to your notes. To link to a file, select the **Insert** ribbon; then, select **File Attachment** from the *File* group and insert your files using the *Choose a file or a set of files to insert* window. Or, find your file in Windows Explorer, and drag and drop it onto your OneNote page.



## Tips & Tricks

- If you don't have images readily available, you can freely use Creative Commons images without violating copyrights. Search for usable images on search.creativecommons.org or on sites like Pixabay, Unsplash, and Pexels.



The Center for Technology & Training (CTT) is a part of the Department of Civil & Environmental 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](http://ctt.mtu.edu).

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## Upcoming Events

REGISTER & MORE INFORMATION AT [ctt.mtu.edu/training](http://ctt.mtu.edu/training)

\* See page 2 for more information about on-site and online events

### 2020 Two-span Continuous Steel Plate Bridge Girder Design Workshop

December 1 & 3 – two-day webinar

### Mark Your Calendar: 2021 County Engineers' Workshop

February 9-11 – Bellaire (see What's Going to Happen, p. 2)

### Mark Your Calendar: 2021 Michigan Bridge Week

March 16-18 – Ypsilanti (see What's Going to Happen, p. 2)

### Mark Your Calendar: 2021 Highway Maintenance Conference

WORKSHOP: April 27 | CONFERENCE: April 28 – Bellaire (see p. 2)

### Coming Soon: 2021 Writing & Presentation Skills Workshop

April – webinars

## More training opportunities!

Visit [ctt.mtu.edu/webinars-and-workshops](http://ctt.mtu.edu/webinars-and-workshops) to learn about webinars and workshops offered by the Michigan LTAP/Center for Technology & Training

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