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SUMMER 2019

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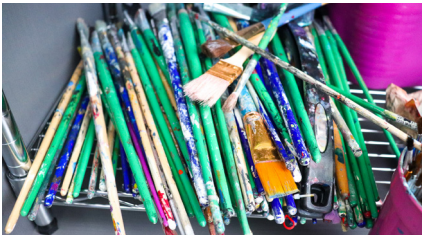
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**Richard V. Graham, P.E.,** named as a new Associate

Spicer Group is proud to announce the recent promotion of Richard V. Graham III, P.E. as a new Associate. Rich earned his bachelor's degree in Civil Engineering in 2009 and his master's degree in Civil Engineering in 2012, both from Lawrence Technological University. He joined Spicer's Water Resources Group in 2013 as a Design Engineer in our Saginaw office. In 2014, he moved to help open our Southeast Michigan Office in Dundee, where he is now serving as a Project Manager. He became a licensed professional engineer in Michigan in 2015. He is also a member of the American Society of Civil Engineers.



**Lucas C. Hanson, P.S.,** named as a new Associate

Spicer Group is proud to announce the recent promotion of Lucas C. Hanson, P.S., as a new Associate. Lucas earned his bachelor's degree in Surveying Engineering and a certificate in Small Business Management from Ferris State University. He first joined Spicer's Survey Group in our Saginaw office in 2013 as a Survey Technician and is now a Staff Surveyor. In 2017, he became a professional licensed surveyor in the State of Michigan. He is also a member of the Michigan Society of Professional Surveyors, and the National Society of Professional Surveyors.



**Christopher B. Mattson, P.E.,** named as a new Associate

Spicer Group is proud to announce the recent promotion of Christopher B. Mattson, P.E., as a new Associate. Christopher earned his bachelor's degree in Civil Engineering in 2010 and his master's degree in Civil Engineering in 2018, both from Lawrence Technological University. He was first hired at Spicer as a Construction Services Intern in 2008 at our Saginaw office. He is now a Project Manager for the Water Resources Group in our St. Johns office. In 2015, he became a licensed professional engineer in the State of Michigan.



# NEW DOCK STRUCTURE ADAPTS TO UNPREDICTABLE GREAT LAKES



## CITY OF MANISTEE DOCKS

CITY OF MANISTEE—An entirely new custom docking structure along the Manistee River is aimed at adapting to the unpredictable conditions of Lake Michigan including water level fluctuations, ice, currents, and even mini tsunamis.

Yes, mini tsunamis do occur on the Great Lakes, only the actual technical term for these events is a meteorological (meteo) tsunami. Meteotsunamis on the Great Lakes are standing waves that result from rapid changes in the barometric pressure which create fluctuations of water levels within a short span of time. Although not a very common occurrence, these events are witnessed yearly and can range from hardly being noticed to massive water level fluctuations causing serious damage.

Being a harbor town along Lake Michigan, or any of the Great Lakes, definitely has its perks. Besides the daily traffic of residents and seasonal vacationers, tourists from all over travel to cities like Manistee by both vehicle and boat to enjoy the sights and sounds, experience the beaches, walk the piers, go fishing and everything else the harbor towns have to offer. But the Great Lakes are very unpredictable and are always reminding us that they are a force that is nearly impossible to control.

The City of Manistee was reminded of the Great Lakes' power on April 13<sup>th</sup>, 2018 when a major change in atmospheric pressure created a meteotsunami along the Lake Michigan shoreline. It caused the water level on the Manistee River to rise



Freighter coming through the Manistee River during construction.

nearly four feet in six minutes and drop nearly an equal amount from its original elevation in a short amount of time. The sheer volume of water influx created a massive surge of water in the Manistee River and a swift exiting current which destroyed nearly all 17 municipal-owned docks in the river.

In the matter of minutes, the water elevations fluctuated from the highest ever recorded elevation to nearly the lowest recorded elevation. This fluctuation of water resulted in massive flows in the channel which caused damage to the channel banks, docks, and other structures all along the Manistee River.

“The extreme channel flows that cycled in and out of the river ripped the City’s marina docks from their timber piles and several docks were washed downstream” Spicer Group Project Manager/ Engineer Rich Kathrens, P.E. said. “It’s a good thing

it was still early spring and no boats were moored, otherwise the boats would most likely have been severely damaged as well.”

Unfortunately, after this event, the City was left with only five working docks throughout last summer while they worked to put a plan together to replace the 12 that were damaged beyond repair and use. The City hired Spicer Group to develop a solution that would counter future extreme events and be able to adapt to yearly lake level fluctuations.

Kathrens and his team looked closely at all forces that impeded the structural integrity of docks along the Manistee River. Strong currents, fluctuating annual lake levels, ice, boat waves, seiches, meteotsunamis and vessel use all had to be factored into the planning of a new dock system that would remain secure.



“ THE EXTREME CHANNEL FLOWS THAT CYCLED IN AND OUT OF THE RIVER RIPPED THE CITY’S MARINA DOCKS FROM THEIR TIMBER PILES AND SEVERAL DOCKS WERE WASHED DOWNSTREAM... ”





Driving piles for the new docks from a barge.

The team designed a dock system that included the use of eight-inch-diameter galvanized steel pilings up to 45 feet long. Using a large crane on a barge, the pilings were mechanically vibrated up to 20 feet deep into the river bottom depending on location. Twenty-foot sections of dock made of galvanized steel stringers and timber decking were then attached to the pilings using custom-designed clamps.

“Although these look like normal docks, they are entirely custom and designed to be lowered or raised depending on mean water level,” Kathrens said. “It’s difficult to design for rapid function and extreme flows and fluctuations of the water like what happened last April that gave no warning of this event.”

Floating docks were considered during the design, however many of the floating docks along the river suffered damaged during the meteotsunami

as well. Although the new docks cannot be raised and lowered fast enough during a meteotsunami, they are designed to remain in place and withstand those types of forces that destroyed the original ones.

Manistee’s new docks are very adaptable to the ever-changing water levels of the Great Lakes. Over the last six years, Lakes Michigan and Huron have risen from an all-time low in 2012 by nearly six feet. Just a short time ago, harbor communities across Michigan were seeking governmental financial help to dredge out their channels and marinas for fear of boats not being able to come to their ports because of shallow water—a major potential economic problem.

Now, many of those same municipalities that have docks set at one permanent height have water levels overtopping them causing people to have to slosh through water to get to their boats. Not many options are available for these types of structures except to hope the water recedes soon, add temporary risers, or replace them with a different docking system that can adapt to the water level changes.

“The weather event devastated our marina and compromised its ability to serve boaters for the entire 2018 season,” Manistee Public Works Director Jeffrey Mikula said. “Fortunately the loss was covered through insurance and we chose to take advantage of the situation to replace the docks with the ability to be adjusted.”

“The previous docks were originally constructed in the 1970’s without the ability for adjustment. We were at the mercy of the lake levels each year. The new docks are a huge upgrade to the facility and as word spreads of the upgrades, we expect it will benefit our marina business,” Mikula said.

“THE NEW DOCKS ARE A HUGE UPGRADE TO THE FACILITY AND AS WORD SPREADS OF THE UPGRADES, WE EXPECT IT WILL BENEFIT OUR MARINA BUSINESS.”

Spicer’s design is unique because one person can raise the rigid sections with a cable ratcheting device known as a come-along. The sections of docks are pinned and create hinge points along the length of the dock. A person can loosen the clamps affixing the hinged sections to the pilings and easily raise or lower each section based on conditions. Having hinged sections allows the docks to be accessible with no steps needed at shore and different sections to be raised or lowered. The new docks range in length from 60 to 80 feet.

“Who knows what next year will bring us regarding the Great Lakes’ water levels,” Kathrens said. “It’s very hard to predict exact levels, but the trends are well documented and eventually the water levels will change. Having a custom-designed adjustable docking system allows the City of Manistee to accommodate many types of vessels and water levels. The new dock system is designed for five feet of adjustment. When the lake levels start dropping, they can simply lower them, if they come back up, we just raise them. And if another

strong meteotsunami occurs, the structures are strong enough to withstand those extreme sudden forces.”

Summer arrived late in Manistee this year, and boaters are enjoying the new docks, and the community can rest a little easier knowing the municipal marina docks can now adapt to Lake Michigan’s unpredictable nature.

“  
...AND IF ANOTHER STRONG METEOTSUNAMI OCCURS, THE STRUCTURES ARE STRONG ENOUGH TO WITHSTAND THOSE EXTREME SUDDEN FORCES.  
”



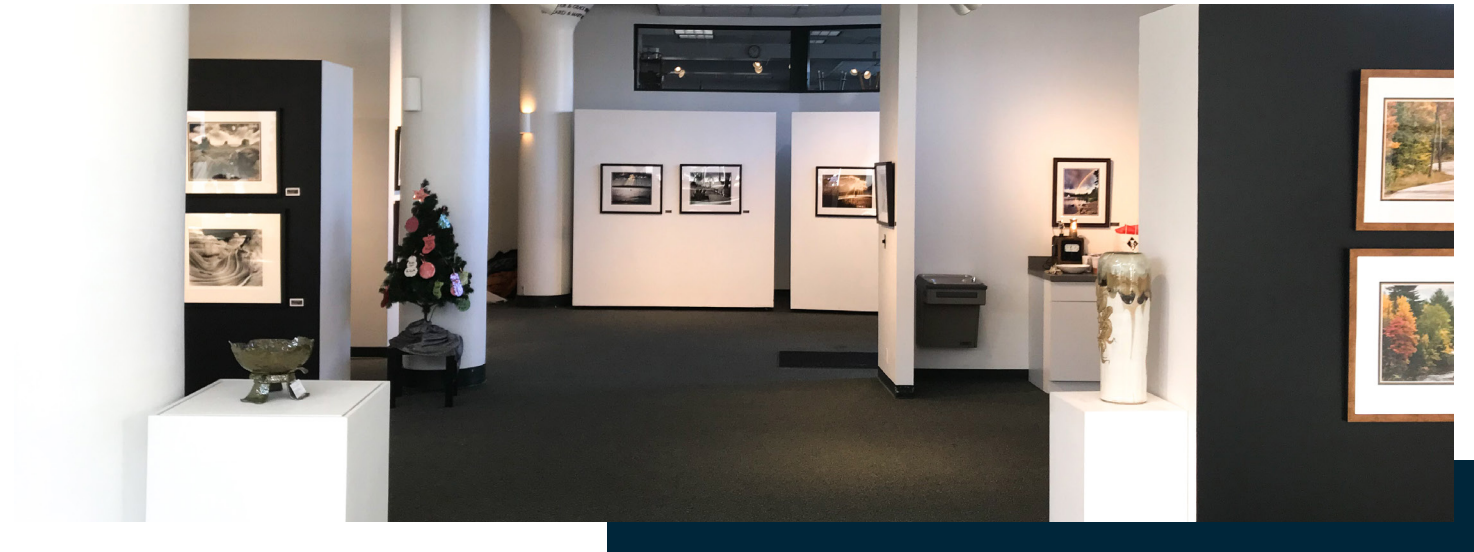
Beautiful day at the marina.



# STUDIO 23 RENOVATIONS

## BAY CITY, MICHIGAN

The Dream List: Renovating Studio 23's historic building space



BAY CITY—After 60 years of life, moving five times, and even spending some years homeless, Bay City arts center Studio 23 was ready for its dream home.

“For our 60th anniversary, we were ready to do a whole makeover renovation,” Tara Welch, the Executive Director at Studio 23, said.

In 1959, Studio 23 began as a grassroots, non-profit arts organization that was created by volunteer artists and community members who were dedicated to bringing more arts to the Great Lakes Bay area. The first home for the arts center began at the Weiland’s Furniture in Bay City, where they displayed exhibits along with the furniture being sold there.

From that location, as education also became a focus of the organization, Studio 23 moved throughout the Bay City area to other homes like the Little Red

Schoolhouse on Knight Road, and even into rooms at City Hall. Each time, the issue of having adequate available space to hold exhibits and art classes came up and it was time to move again.

It wasn’t until 1998, while Studio 23 had no permanent home or facility, that they were invited to move into the first floor of the former Jennison Hardware building along Water Street in Bay City. The building had been renovated and transformed into condos. After a fundraising campaign, Studio 23 was able to retrofit the space into a gallery, classroom areas, a clay studio, a small boutique store, and office space.

Twenty years later, growth and classroom needs had them ready to start construction again.

“As we’ve journeyed throughout the years, education has become such a big component of our mission that we started taking over other spaces to accommodate expanding classes,” Welch said. “The store left and we took that over for more classroom space. People wanted more classes and we were answering that demand.”

In 2015, the organization’s Board of Directors began planning for another renovation. Classes were continuously at capacity and the studio, which also ran classes outside of their primary location as part of their outreach program, was running out of space to put people.



“PEOPLE WANTED MORE CLASSES  
AND WE WERE ANSWERING THAT  
DEMAND.”





“We knew it was coming up on our 60th anniversary, and it became the talk then. We love it here, but some of the items we had were well past their useful life and we needed to rework some of the space to hold better educational programs,” Welch said. “We just decided that it was time to make the move.”

Their planning began with trying to add more classroom space. As the committee within Studio 23 started those conversations, Welch said it quickly “snowballed” into a bigger project.

With a larger renovation project planned, the organization brought experts in for guidance and contacted Spicer Group to provide architectural and engineering services necessary to renovate their 9,600 square foot area.

Drawing up plans and designs for the renovations began in late 2017, and in 2018 Studio 23 began a fundraising campaign for the work. At least 95% of the budget for the renovation came from grants and foundations, Welch said.

“The committee worked really hard to come up with the ‘dream list’ of changes and improvements we wanted to incorporate,” she said. “We wanted to do absolutely everything possible and were able to raise enough money that we didn’t have to cut anything out.”

Previous to this renovation, Studio 23 had only done small improvements or renovations, using staff to perform the work when they could.

“This project was definitely on a much larger scale,” Dave Boersma, Project Manager and Architect for Spicer Group, said.

With a tight construction window due to gallery exhibits being planned for display, construction on the project began in January of 2018, with R.C. Hendrick & Son, Inc. as the contractor and Spicer Group providing construction administration services throughout the length of the project.

The renovations at Studio 23 included replacing and reworking the lighting and ceilings throughout the studio, gallery, and office space to include energy

“THE COMMITTEE WORKED REALLY HARD TO COME UP WITH THE ‘DREAM LIST’ OF CHANGES AND IMPROVEMENTS WE WANTED TO INCORPORATE...WE WANTED TO DO ABSOLUTELY EVERYTHING POSSIBLE AND WERE ABLE TO RAISE ENOUGH MONEY THAT WE DIDN’T HAVE TO CUT ANYTHING OUT.”

efficient LED lighting with the correct color temperature selected. It also included repairing walls throughout the main level gallery and studio, installing new acoustics, and an upgraded security system.

The aged, green carpeting was removed from the gallery and studio, the floors were stripped and polished and covered with an industrial epoxy coating. A new reception counter was installed in the gallery, along with a new multimedia display, and the restrooms received an update.

Boersma said that the upstairs space within Studio 23 was completely reconfigured to create a new office space, a new conference space, a kitchenette and break room, and redesign the clay studio and classroom area. This required new lighting, reworking the HVAC system, installing new flooring, and building new cabinetry and storage space throughout.

“The new plan makes better use of the limited space Studio 23 had, along with increasing the classroom area,” Boersma said. “Tara and the entire staff at Studio 23 were great to work with throughout the project,” he added.

During the early winter months of 2019, crews worked to complete the project renovations. Although a few small changes were made throughout the process, everything was completed on time for the gallery’s 60th anniversary grand re-opening and reception party in early May.

“This is just the better use of our classroom space,” Welch said. “It just looks so different, and with the new updated lighting we have, it makes the artwork look brighter. We are all really happy with the new space, and it is really hard to imagine what it was before.”

“ THIS IS JUST THE BETTER USE OF OUR CLASSROOM SPACE...IT JUST LOOKS SO DIFFERENT, AND WITH THE NEW UPDATED LIGHTING WE HAVE, IT MAKES THE ARTWORK LOOK BRIGHTER.

”





# SAW GRANT FUNDS HELP STREAMLINE DRAIN OFFICE TASKS

VAN BUREN COUNTY—In 2015, the Van Buren County Drain Commissioner was awarded a \$431,000 grant through Michigan’s Stormwater, Asset Management, and Wastewater (SAW) program which enabled them to upgrade the efficiency of record retrieval, drain inspection reporting, soil erosion permit inspecting, and APA soil erosion plans and inspections.

Like many drain commissioners across Michigan, Van Buren County had outdated information regarding the location, legal status, and condition of their drains. On top

of these challenges, the Michigan Department of Environment, Great Lakes, and Energy (EGLE) audited the Van Buren County Drain Office for compliance with Part 91 of the Natural Resources and Environmental Protection Act (NREPA) resulting in a violation notice.

The Van Buren County Drain Commissioner, Joe Parman, has a staff of three people, one of which is dedicated to carrying out the duties of the County Enforcing Agency (CEA) as well as performing inspections on drain projects that are permitted by the Drain Office via its Authorized Public Agency (APA) status.

“In 2018, the Van Buren County Drain Office was up for an EGLE Audit on both the CEA and APA soil erosion and sedimentation programs,” Parman said. “I was confident that our programs

were being run correctly. Unfortunately, like most counties in southwest Michigan, we received a notice of violation. With limited staff and outdated procedures, we needed to find ways to streamline and improve the programs by using today’s technology to our advantage.”

“  
WITH LIMITED STAFF AND OUTDATED PROCEDURES, WE NEEDED TO FIND WAYS TO STREAMLINE AND IMPROVE THE PROGRAMS BY USING TODAY’S TECHNOLOGY TO OUR ADVANTAGE.  
”

During the period of the audit, the Drain Office was working with Max Clever, P.E., of Spicer Group on a project focused on upgrading the Drain Office’s geographic information system (GIS) toolset. Funded by the SAW Grant, Spicer Group created a framework of online services of drain centerlines and districts, high-resolution aerial photography and LiDAR-based elevation data. Two work-flow changes were made upon this framework; web apps and mobile apps are now used to map, inspect, and administer soil erosion permits; and APA maintenance plans are designed using online services of best management practices. Clever recommended that the Drain Office use their new mobile GIS capabilities to help catch up on the inspection tasks required by the audit.

It was clear that additional technology could be implemented to improve and streamline the Drain Office’s day-to-day operations. The Drain Office focused on upgrading the efficiency of record retrieval, drain inspection reporting, soil erosion permit inspecting, and APA soil erosion plans and inspections.

## RECORD RETRIEVAL

In 2016, before the SAW grant upgrades, the Drain Office undertook digitization of all office records. The packets and files for all drains were scanned and delivered to the Drain Office on a hard drive. This system had limited ability as it required that the person know the name or number of the drain for which they were looking. In this system, it was difficult to identify which drains were tributary to a given drain or if the drain may have had other names throughout its history.

This type of information is relevant when researching a proposed drain maintenance or improvement project and when landowners call the Drain Office with questions. The various drain records reside in a variety of separate places throughout the Drain Office. To obtain all available records for a particular drain, it required a thorough understanding of the history of the Drain Office and institutional knowledge of the location of various files. Unless each location is searched, a review of files could often be incomplete.

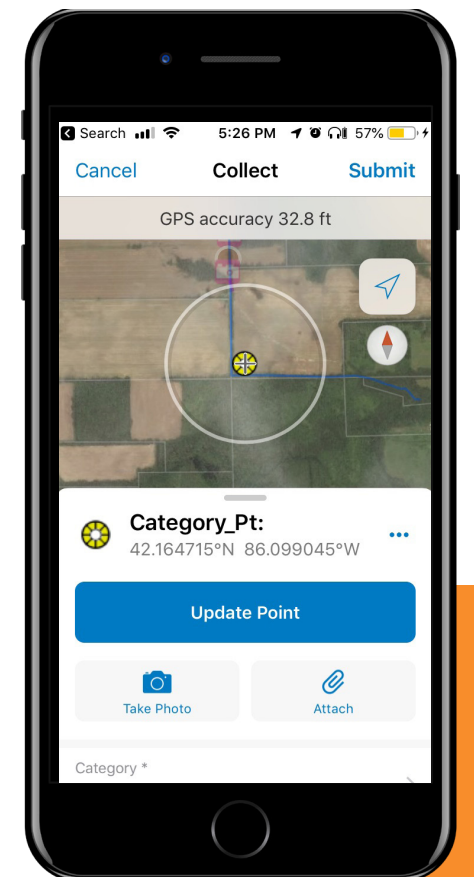
Now, there are still some difficulties with retrieval of records since drains have changed names and these files date back to the mid-1800s. However, file retrieval has been greatly improved by utilization of cloud storage. The scans done in 2016 were moved to the county’s cloud storage platform Microsoft SharePoint, significantly increasing ease of access inside and outside of the office. Now, the full suite of mobile Microsoft applications is able to access these records.

“The SAW grant allowed the Drain Office to scan all drain files, books and plans. As a result, we were able to have digital copies of all county drain files dating back to the 1800’s,” Parman said. “This allowed us to upload the files to the county’s SharePoint account on the cloud. We are now able to access all drain files from our iPads while out in the field, during meetings, basically anywhere. Having digital copies of the drain files was on my bucket list but mobile access to them was an unexpected bonus.”

“  
HAVING DIGITAL COPIES OF THE DRAIN FILES WAS ON MY BUCKET LIST BUT MOBILE ACCESS TO THEM WAS AN UNEXPECTED BONUS.  
”

## DRAIN INSPECTION REPORTING

Before the upgrade, typical field inspections required preparation in the office. The Drain Office had stand-alone ArcGIS desktop software that was used to create maps illustrating drain centerlines, drainage districts, contours, high-resolution aerial imagery, and other GIS data that was stored on the local network file server. Office staff had previously used GIS to collect some spatial information about their drains, such as the drainage district boundary and the drain centerline location. However, the spatial information was being compiled on an as-needed basis and, therefore, only included drains that had received petitions in the past 10 years. Furthermore, this GIS information was not integrated with existing scanned information. This made tracking down information a headache in the office and often impossible in the field.



Collector being used on a phone for drain inspection.



The Drain Office's task of performing drain inspections has been updated so that photos and locations are no longer manually produced from separate files. This was accomplished by assigning route identification numbers to all the county drain GIS features and publishing a new set of GIS layers to record locations and photos of obstructions, debris, and erosion. The inspection layers are collected using iPads in the field with ArcGIS Collector. After the inspection points and photos are collected, the drain inspection's points can be summarized in a drain inspection PDF using an ArcGIS Online Web App specifically set up to report on drains. This report includes a map portion illustrating the photo locations and a corresponding photo report sorted by station.

### SOIL EROSION PERMIT INSPECTIONS

The Drain Office's responsibility as the County Enforcing Agency (CEA) for the Part 91 Soil Erosion and Sedimentation Control (SESC) program was targeted for improvement, as the program had a direct impact on the sediment-related water quality

concerns in county drains. It required a substantial amount of time from office staff to comply. Prior to the SAW Grant, SESC inspections were completed on paper forms or in Microsoft Word and photographs were attached to the reports. These reports were then saved to local network drives, making retrieval difficult.

"The SAW Grant offered an opportunity for office staff to begin using tablets in the field with fillable forms to easily attach photos and automatically digitize the reports," Clever said. "This allowed for reports to be generated in the field quickly and easily, and more importantly, organized and saved in the Drain Office quickly and easily as well."

It also provides inspectors with historical reports while in the field. Coupled with ongoing GIS work, the SESC inspection software allows staff to manage inspections spatially, view past inspections, identify nearby watercourses impacted by a given site, and optimize travel to ongoing construction sites following rain events. As a result, the Drain Office is able to perform many inspections in one day, marking a significant increase in efficiency.

“THE SAW GRANT OFFERED AN OPPORTUNITY FOR OFFICE STAFF TO BEGIN USING TABLETS IN THE FIELD WITH FILLABLE FORMS TO EASILY ATTACH PHOTOS AND AUTOMATICALLY DIGITIZE THE REPORTS.”

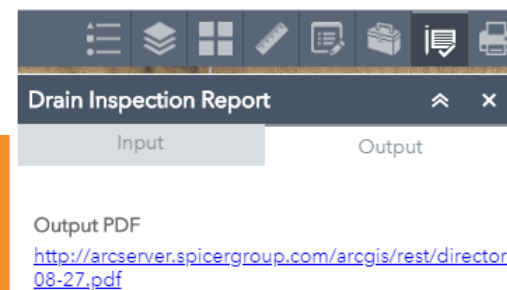
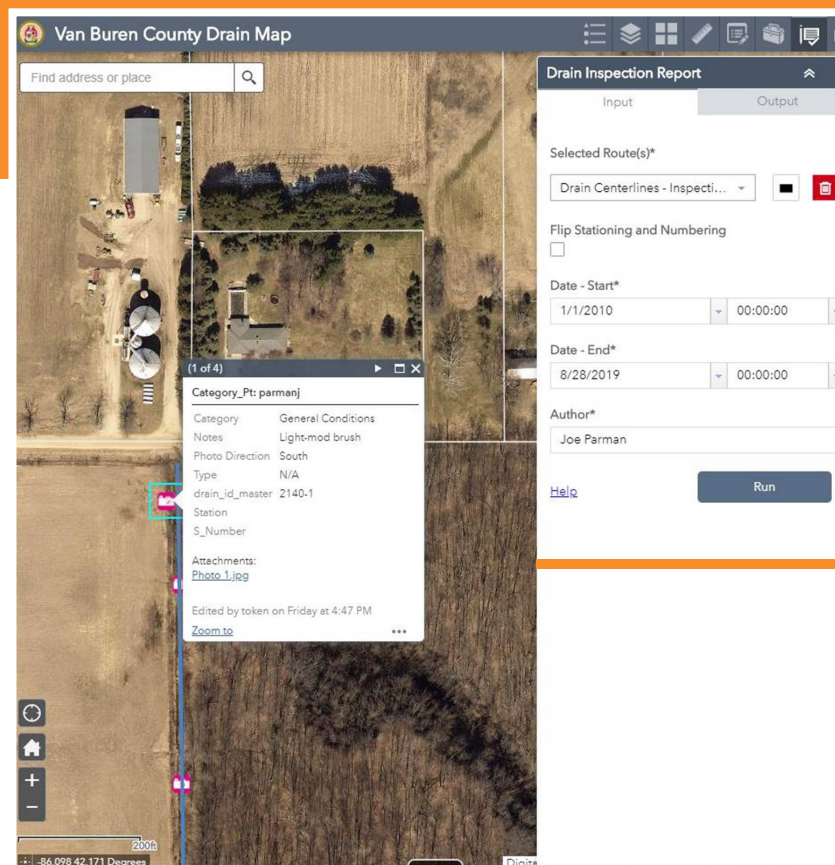
The Drain Office previously put together drain maintenance plans and their corresponding SESC plans internally using AutoCAD. The Drain Office had no established plan standard and some of the APA plans audited by EGLE were flagged as not meeting all the requirements in Rule 1703 for soil erosion plan compliance.

### SOIL EROSION APA PLANS AND INSPECTIONS

The Drain Office developed a plan sheet template that logs all best management practices to be installed and planned maintenance on ArcGIS Online. This template allows the Drain Office to have compliant SESC plans in large-format PDFs (24"x36") and record the resulting plans best management practices on ArcGIS online at the same time for historical record keeping and inspection review in the field using iPad apps such as ArcGIS collector.

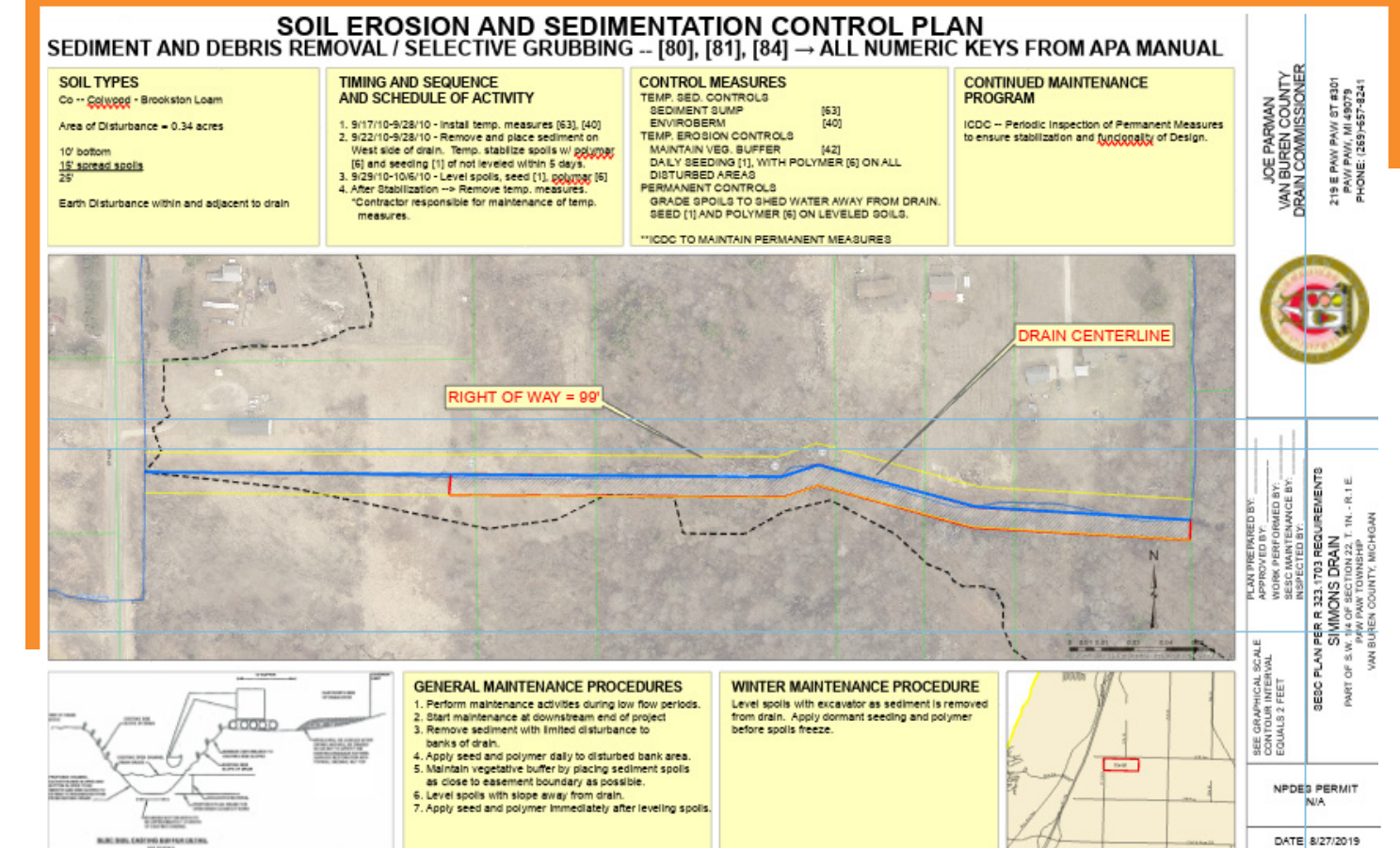
While absolutely necessary for public good, unfunded mandates like those found in NREPA strain the limits of small entities that are doing the best they can to keep our water clean and homes from flooding. Spicer Group and Van Buren County used this SAW grant as an opportunity to stretch dollars and improve drain file access, drain inspections, soil erosion permit program and compliance. This program showed that by asking the right questions and solving the right problems, drain management can be efficient no matter the size of the staff.

Inspection points collected in the field are easily reviewed and summarized through a web app.



Report automated and available as PDF to download.

ArcGIS Pro Template for SESC APA Plan Assembly.





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## NEW HIRES

**KAYLA BIGELOW:** Kayla was recently hired as a Design Engineer for the Municipal Group in our St. Johns office after interning with Spicer for a year. She earned a bachelor's degree in Environmental Engineering from Michigan Technological University.

**STEVEN COATES:** Steven was recently hired as a Survey Crew Chief for the Survey Group in our Atlanta, Georgia office. He comes to us with experience in all areas of the surveying field and has his associate degree and certificate in Surveying from Middle Georgia College.

**ANDRES GOMEZ:** Andres was recently hired as a Design Engineer for the Water Resources Group in our Dundee office. He has a bachelor's degree in Civil Engineering from the University of Michigan.

**BRIAN HAN:** Brian was recently hired as a Design Engineer in the Municipal Group in our Dundee office. He attended the University of Illinois where he earned a bachelor's degree in Civil Engineering.

**BRANDON HAVERCAMP:** Brandon was recently hired as a Construction Services Technician for the Construction Services Group in our Saginaw office. He attended Saginaw Valley State University, where he earned a bachelor's degree in Business Administration Management.

**JEFFREY LENTZ:** Jeffrey was recently hired as a Construction Engineer for the Construction Services Group in our Saginaw office. He has a bachelor's degree in Environmental Engineering from Michigan Technological University.

**KEITH NOBLE:** Keith was recently hired as a NPDES Specialist in our Saginaw office. He obtained both a bachelor's degree in Applied Biology and a bachelor's degree in Science Teaching from Ferris State University

**GARRETT SHAFER:** Garrett was recently hired as a Design Engineer for the Water Resources Group in our Saginaw office. He attended Michigan State University where he earned his bachelor's degree in Civil Engineering.