

PIPELINE

MICHIGAN ASSOCIATION OF COUNTY DRAIN COMMISSIONERS

MANAGING MICHIGAN'S WATER RESOURCES SINCE 1899

NORTH SHORE DRAIN

2017 Innovation & Excellence

Award Winning Project

Endangered Species

Eastern Massasauga Rattle Snake

District Meeting News

NORTH SHORE DRAIN

2017 INNOVATION & EXCELLENCE AWARD W

Brian Cenci, P.E., Eng., Inc.



The North Shore Drain was undertaken to address three separate and distinct drainage issues that affected three different, yet adjoining, drainage areas. Understanding the history and the complexity of the drainage issues is key to understanding the unique and innovative work necessary to accomplish the solutions under one petition, as a County Drain project.

The North Shore Drain is located in the southwest portion of Casco Township in Allegan County. This area of the Drainage District abuts the Van Buren County line and is the north end of the quiet beachside community, South Haven. The properties within the Drainage District are predominately small vacation homes on lots less

than ¼-acre. Within the last several years, larger permanent dwellings and vacation homes began to surface, and corresponding drainage problems intensified.

HISTORY & BACKGROUND OF DRAINAGE ISSUES

WASHINGTON ST.

In 1993, residents of Casco Township submitted a petition to the Allegan County Drain Commissioner (ACDC) to establish a new drainage district and corresponding drain, called the North Shore Drain. The Drain and Drainage District were established in 1994; and in 1995, construction started. The 1995 North Shore Drain project was to provide drainage to low areas near the county

- ALLEGAN COUNTY

INNER



Washington Street post construction (1 month after)

line along Baseline Road, northward along the east side of North Shore Drive, and eastward down Washington Street. The assessment for this extensive project was paid off over many years by residents until 2005.

Unfortunately, the 1995 project did not resolve all of the issues addressed in the petition and, after only a few years of relief, flooding persisted. Some of the flooding was a result of the original Drain being constructed only three to five feet deep in order to avoid utilities and to keep the costs down; also, many properties were not high enough to drain toward the road. Additionally, the 1995 project did not alleviate the standing water or the problems associated with a high perched water

table, and residents complained that their sump pumps ran continuously. The Drain Commissioner received frequent maintenance requests from Washington Street residents subsequent to the 1995 work, partially because the 1995 enclosed drain system often clogged with gravel, since the road was unpaved.

Tragically, residents suffered flooding and residual problems throughout the entire payback period for the 1995 construction work. Property owners understandably expressed frustration and discord throughout the planning and design phase of the project, unparalleled even by drain project standards.



Flooded yard on Washington St. after the 1995 project

COLUMBINE / WEST WING ESTATES

Columbine Estates, constructed in the late 1990s, made up the North Base Drain (consolidated into the North Shore Drain with this more recent petition). In the mid-2000s, several large flooding incidents caused water to back up between

“How do we know that this time the solution is going to work and that the problem is going to get fixed? That’s what they told us the last time we went through this whole complicated process! So, you’re going to need to convince me.....other than just telling me it will work.”

— Washington St. resident in the North Shore Drain Drainage District at the First Scope Mtg. (December 17, 2013)

C o l u m b i n e Estates and West Wing Estates downstream. West Wing Estates, as a private condominium development, had never received official

plan review from the ACDC. Private drains and infrastructure had been installed for the entire development right before the peak of the housing bubble and subsequent crash in 2008. Suddenly, home building in the nearly empty West Wing Estates ceased and the process of turning the infrastructure over to the County halted. This 15-acre densely planned housing development now depended entirely on one 12-inch outlet for its downstream drainage. In the years that followed, a few large rain events overwhelmed the private drain and private detention infrastructure within West Wing Estates. This excess stormwater flooded several basements in the neighboring Columbine Estates, upstream. Lawsuits ensued, but no remedy was possible without an overhaul of the entire North Shore drainage system.

EUCLID, PERSHING AND ADAMS STREETS AND JENSEN’S RV CAMPGROUND

The north end of the Drainage District (later referred to as Branch 1) had longstanding drainage problems, having no prior drain work

or significant drainage infrastructure. This area has some developed properties, the largest of which is a very popular RV Campground that is a staple of the community. This campground and the downstream properties on the gravel roads of Adams, Euclid and Pershing had well documented an increase in flooding since the South Haven Middle School was built just upstream in the early 2000s. Along the roadways, most of the houses are lower than the roads, which are gravel, and the rights-of-way are exceptionally narrow, being only 30 feet wide.

2017 AWARD-WINNING - NORTH SHORE DRAIN PROJECT

On November 19, 2012, Casco Township submitted a consolidation petition to the ACDC for consolidation and improvement to the North Shore Drain, the North Base Drain, and surrounding areas. As a result of this petition, in June of 2013, Eng., Inc. (the consulting engineer for the project) was asked to perform a drain study to examine the existing conditions and determine possible courses of action for repairing any drainage issues within the large consolidated Drainage District. Eng. presented these findings to a Board of Determination. The Board found that the project was necessary and the consolidated North Shore Drain Drainage District was established.

Tackling three different problems in three different areas of a drainage district was rather complex. To add to the challenge, the ACDC and Eng. needed to design the solution on the heels of the somewhat unsuccessful previous project – *which had only recently been paid off by many of the same District residents.* Establishing the drain all the way to a public waterbody (Lake Michigan) was not practical, so the drain would have to end further upstream. Easements would not be obtained from downstream residents, who always feared that increased runoff from the project would further erode their properties along Lake Michigan. However, a total of 17 new drain easements were obtained by Eng. for the ACDC; none required any financial compensation or legal proceedings.

With the decision to stop the drain before reaching Lake Michigan, essentially at either North Shore Drive or Baseline Road, the Engineer needed to design a system that would have no net or negative impact downstream from the vast amount of increased runoff and improved



collection system to be constructed upstream. This imperative became particularly crucial when one resident, who owns property where the legal County Drain both stops and starts, was unwilling to sign an easement and the DEQ required this design parameter be proven before granting a DEQ Permit as well.

In an effort to share resources, the drain contract also included utility and infrastructure work paid directly by Casco Township (local road paving) and the City of South Haven (water main and water service work). Adding to the complexity of the design, the rights-of-way in the Adams, Euclid and Pershing roadways were only 30 feet wide. With the gravel road being approximately 20 feet wide, no more than five feet existed on each side of the road to accommodate a drainage collection system. Incredibly, these rights-of-way already contained full utilities as well (sanitary, gas, electric, water, phone and cable). Any pipe for collecting stormwater would need to be installed amongst this labyrinth of existing infrastructure.



Working on utilities in the narrow right -of-way

Initially, the Township had approached the Drain Commissioner and Road Commission requesting to have these three roads paved. However, after the project was bid, for financial reasons, the Township was forced to cancel all but one of the street paving projects. Paving would have allowed curb and gutter to collect stormwater runoff from the road, relieving adjacent properties. Without it, the Engineer had to redesign the entire area, as paved roadways were no longer part of the stormwater management plan. The new design required a new DEQ Permit subsequent to the bidding and selection of the contractor (Hoffman Bros. of Battle Creek, Michigan).

PUBLIC INVOLVEMENT AND EDUCATION

With so much at stake, property owner input was critical and proved to be invaluable. The ACDC and Eng. made considerable efforts to keep everyone engaged and involved. Most of the homes in the District are vacation homes and homeowners can be absent several months of the year. With property owners located all over the country, the ACDC and Eng. used several methods to keep communication open, including:

- Two separate scope meetings were held (December 2013 and August 2015) at the Preliminary and Final stages of design. At both meetings, design alternatives with their cost estimates were presented and discussed with residents. Project Manager, Brian Cenci, PE, and Project Engineer, Ryan McEnhill, PE, attended both meetings and presented project solution options that guided the long-term design and success of the project. Doing these two separate scope meetings at distinctly different key project milestones helped to keep residents informed of the

status of the project, but more importantly, its scope and ultimate design.

- Project Manager Cenci also personally met or spoke with nearly half of the property owners in the Drainage District (approximately 110 properties) to discuss the history of their property, the project and potential drainage solutions.
- Cenci, on behalf of the ACDC, sent out regular emails to update property owners and stakeholders detailing critical points of the project, keeping them involved and part of the process. Since most of the homes were seasonal, email was a valuable communication tool allowing Eng. to present different design options and obtain feedback. Prior to construction, these updates were sent every two or three months for nearly two years; during construction, emailed progress updates were sent each month.

DESIGNS, INNOVATIVE CONCEPTS, ENVIRONMENTAL AND WATER QUALITY BENEFITS

The most unique component of this project was the low-impact design used to retrofit the new storm drain infrastructure into a constricted utility corridor (30-foot rights-of-way for all the streets, except 40-foot for Washington Street). Along Washington Street, which became the only street to be paved, very shallow infiltration swales were constructed with sand, pea stone, specialized filter fabric and perforated pipes adjacent to the



Narrow 30-foot right-of-way on Pershing St.

roadway to facilitate sub-surface drainage. This bio-engineered soil profile significantly reduced the amount of sediment entering the system and reduced peak flows as well, allowing for smaller pipes to be used for the entire collection and conveyance system. Consequently, ditches along the roadway were not necessary, and small catch basins could be installed between driveways with shallow swales that were still visually appealing and easily mowable.



Downstream eroded ditch near North Shore Drive prior to construction

On Branch 1, since the existing rights-of-way were only 30 feet wide, areas were needed to store the large increase in directed stormwater runoff that would drain toward the already eroding ravine down to Lake Michigan (the non-County drain section previously described). The ACDC and Engineer worked with residents and the Road Commission to turn over a collection of unused road rights-of-way to the Drain Commissioner. Areas of the platted North Shore Manor, formerly known as Lincoln Avenue, Wilson Street and Harrison Streets, were used to develop a series of in-line detention areas to provide detention volume, so that no negative impact would occur on downstream properties from the North Shore Drain. These in-line detention areas were also planted with native wetland seeds to restore the wetland vegetation and habitat lost as part of the

construction activities in this area. This detention system was key to this project's success, since obtaining easements for a large detention area over several small existing buildable lots would have been nearly impossible and not economically viable. The detention areas were installed linearly, adjacent to homes, so that a maximum amount of stormwater could be contained in each area.



In-Line Detention area during construction

Each of these areas was also designed with an underdrain system to eliminate standing water in dry times. Property owners did not want stagnant water with mosquitoes next to their homes. This was a critical moment of trust between the design team and the public. The public needed to trust that stormwater could accumulate next to their homes after large rain events in a "holding area," yet would eventually drain out as designed – leaving no stagnant water.

Additionally, these in-line detention areas were used in West Wing Estates and on Jensen's RV Park, which is located to the east of North Shore Drive. The in-line detention areas helped to reduce the pipe size from a 36-inch down to only a 15-inch discharging from this area. Again, this was necessary to meet the burden of proof to downstream residents and the DEQ that no adverse or negative impacts would be witnessed from the increase in stormwater volume and improved collection now flowing downstream.

Respecting the nearly 100-year-old trees that line North Shore Drive and Washington Street was also a large component of this project. The trees are part of the history of this area, and neither the residents nor the design team wanted them damaged. Consideration for the trees impacted design and construction methods; a deeper drain had to be installed below both the sanitary sewer and the water main, all the way up Washington Street and along North Shore Drive in order to avoid these trees. This is rarely done in urban areas, and required the construction to be limited to the width of a small trench box along North Shore Drive, all the while encountering a high perched water table that required constant dewatering. In the end, not a single large specimen tree was lost or had its roots damaged on the project.



In-Line Detention areas constructed adjacent to existing residence

With the close proximity to Lake Michigan, a high concentration of sand in the top layer of soil made sediment loading a significant concern. Several of the in-line detention areas were built like two-stage ditches, where a small pilot channel transported the majority of stormwater and cross veins were installed to control sediment. For large storm events, a wider bench cross-section could be accessed to dissipate flooding and downstream impacts from the increase in stormwater.

Green stormwater design techniques using fascines, strategically placed limestone riprap, cross veins, j-hooks and coir fiber logs (filled with topsoil and native seed for a growing medium) were installed for toe erosion management in the existing ditch and ravine for several hundred feet from Lincoln Avenue to North Shore Drive. To mitigate concerns raised by downstream residents, remediation of excessive scouring and erosion in this ravine was necessary, especially

with the improved collection and conveyance drain system constructed upstream. Once the upstream in-line detention areas were installed, the residents noticed a remarkable improvement. The bank restoration work was performed using small machinery, and the absolute minimum number of existing trees were removed during installation.


COST EFFECTIVENESS

After bids were received, the Township found it could not afford the majority of previously planned paving work in conjunction with the North Shore Drain. Thus, much of the prior designed collection methods of rolled curb and gutter in the road were not possible. This affected the design and the DEQ Permit, since the initial bid project had far more infrastructure within the roadway for a collection system. The new design needed to move the collection system off the gravel roadways and into front yards wherever possible. The initial total project cost was \$1.85 million, with a construction cost of \$1.35 million. After all the redesign work (and the removal of the street paving from the project), the total project cost

presented at the Day of Review was \$1.28 million, with a total construction cost of around \$900,000 making up the majority of that cost. The Engineer was able to work with the low bid contractor (Hoffman Bros.), the DEQ, Road Commission and residents to eliminate approximately \$200,000 in paving costs from the construction contract. The redesigned collection system near Washington, Euclid, Pershing and Adams Streets netted a cost savings of nearly \$350,000 (\$250,000 in construction) to residents of the Drainage District on top of that. In the end, the project cost was reduced by almost 1/3 after initial bids were taken. This made the project more affordable to the residents within the Drainage District.


SUMMARY

The North Shore Drain project started out with a difficult set of circumstances: a large petition project from the 90s that was mostly ineffective, persistent flooding problems, high resident frustration was high and financial limitations altered the design. However, Eng. and the ACDC were able to overcome these and a myriad of other physical and permitting obstacles in order



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to complete one project that addressed several separate drainage issues.

As with most projects in this area of the state, the North Shore Drain project was planned so that the majority of the work would not occur between Memorial Day and Labor Day. Construction started in December of 2015, resumed in April of 2016 and was substantially complete by early June of 2016. All roads were paved by Memorial Day, 2016.

In February, MACDC presented the ACDC and the design team with the 2017 Innovation and Excellence Award for the North Shore Drain. 2017 is the second year in a row that the Allegan County Drain office and Eng., Inc. received an Innovation and Excellence Award while working together (in 2016 for the Walker Drain). This achievement – consecutive winner by the same drain office and engineer – is unmatched since the drain awards have been structured in their current format.

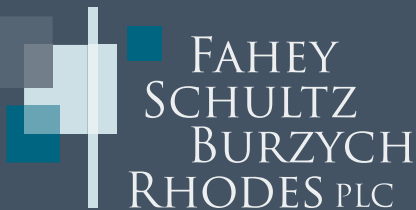


Medemar

DRAIN COMMISSIONER RESPONSE

“For the second year in a row I’m truly humbled and honored to be receiving this award. I think winning an award for this project shows that, just like with our 2016 winner the Walker Drain (Eng., Inc. was also the engineer on that project), that unique projects which are well designed, functional and work well don’t need to be several millions of dollars to build. Here we took bids and the cost was way too much to spread on the residents so I had Brian (project manager Brian Cenci, PE of Eng., Inc.) go back and value engineer every aspect of the project. We went from a 1.35 million dollar construction project to \$900,000 in less than a month. The fact that we could reduce costs that much and still build such a high-end project is pretty remarkable and a testament to Eng., Inc. (engineer), Hoffman Bros. (contractor) and my office staff working together. I want to thank the Association again for this Award and for recognizing what a good project this ended up being.”

Denise Medemar, Allegan County Drain Commissioner



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