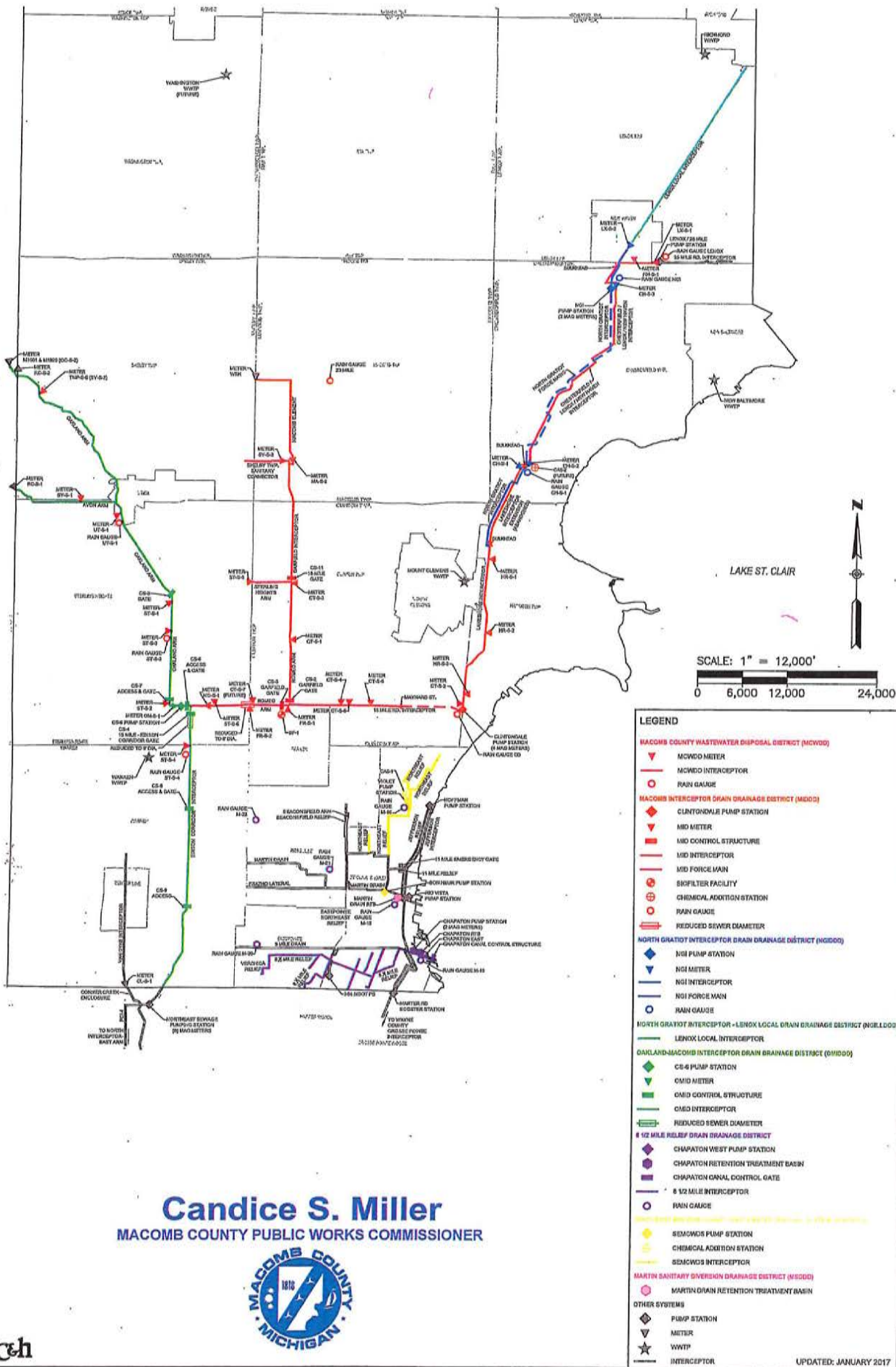


EIGHT AND ONE-HALF MILE RELIEF DRAIN  
INTRA-COUNTY DRAINAGE BOARD  
MAY 14, 2018  
10:45 A.M.  
AGENDA

	Page
1. Call of meeting to order and roll call	
2. Approval of Agenda for May 14, 2018	
3. Approval of Minutes for April 9, 2018	3
4. Public participation	
5. Recommendation to award proposal for Basin Segmentation and Disinfection System Upgrade – Vince Astorino	6
Motion: To award the proposal by Wade Trim at a not-to-exceed amount of \$137,500 for the Basin Segmentation and Disinfection System Upgrade	
6. Recommendation to award proposal for a Total Chlorine Monitoring Study and purchase monitoring equipment – Vince Astorino	21
Motion: To award the proposal by OHM Advisors in the amount of \$22,000 to perform a Total Chlorine Monitoring Pilot Study at the Chapaton Basin and to authorize the purchase of monitoring equipment at a not-to-exceed cost of \$10,000	
7. Recommendation to award quote for mowing of drain sites – Vince Astorino	28
Motion: To award the quote from Green Meadows Landscape in the amount of \$29,785 for mowing of Public Works' drain sites, with the 8 ½ Mile Relief share of cost at \$6,615	
8. Consideration for approval of invoices (see attached)	31
9. Financial Report – Bruce Manning	47
10. Adjourn	

# MACOMB COUNTY WASTEWATER SYSTEMS



**Candice S. Miller**  
 MACOMB COUNTY PUBLIC WORKS COMMISSIONER



An adjourned meeting of the Intra-County Drainage Board for the **EIGHT AND ONE-HALF MILE RELIEF DRAIN** was held in the Office of the Macomb County Public Works Commissioner, 21777 Dunham, Clinton Township, Michigan, on April 9, 2018, at 11:09 A.M.

PRESENT: Candice Miller, Chair  
Veronica Klinefelt, Member

ABSENT: Bryan Santo, Member

ALSO PRESENT: Robert Mijac, Macomb County Board of Commissioners; Brian Baker, Chief Deputy, Karen Czernel, Deputy, Vincent Astorino, Operations & Flow Manager, Evans Bantios, P.E., Construction and Maintenance Manager, Jeff Bednar, P.E. Environmental Engineer, Dan Heaton, Public Relations Manager, Bruce Manning, Financial Manager, Barbara Delecke, Administrative Services, Macomb County Public Works; Stephen Saph, Nickel & Saph, Inc.

The meeting was called to order by the Chair, Candice Miller. The agenda was approved as presented.

Minutes of the meeting of March 12, 2018 were presented. A motion was made by Ms. Klinefelt, supported by Ms. Miller to approve the minutes as presented.

Adopted: YEAS: 2  
NAYS: 0

The meeting was opened to public participation, then closed, there being no comments from the public.

Mr. Astorino explained the permanent flow metering system being installed at Chapaton. The MDEQ has indicated that it will probably be mandated in the next NPDES Permit. The permit will require flow-based sampling. Last year, \$150,000 was budgeted for this project that includes the flow meters and installation costs.

A motion was made by Ms. Klinefelt, supported by Ms. Miller to approve the sole source purchase and installation of flow metering equipment from HESCO at a cost not to exceed \$37,478 and award the proposal from Motor City Electric Technologies, Inc. at a cost not to exceed \$103,919 for related SCADA electrical work for a total cost of \$141,397.

Adopted: YEAS: 2  
NAYS: 0

Mr. Saph, Nickel & Saph, Inc. introduced himself. His agency has been the agent of record for Macomb County for the last five years. The drainage districts are independent entities that are separate and distinct from the County. Therefore, the County's policy does not extend to the drainage district, board members, volunteers or employees working on the drains. Property, liability coverage, pollution and infrastructure were examined. Mr. Saph presented a proposal that includes both the 8 ½ Mile Relief Drain and the Macomb Interceptor Drain which provides

coverage for general liability (bodily and property damage), public officials and automobile liability.

A motion was made by Ms. Klinefelt, supported by Ms. Miller to approve insurance coverage with Argonaut Insurance Company in the amount of \$182,352, with the 8 ½ Mile Relief Drain cost being \$3,647.04.

Adopted: Yeas: 2  
Nays: 0

The Chair presented the invoices totaling \$21,007.91 to the board for review and approval.

A motion was made by Ms. Klinefelt, supported by Ms. Miller to approve the invoices as presented.

Adopted: YEAS: 2  
NAYS: 0

A motion to receive and file the financial report given by Mr. Manning was made by Ms. Klinefelt and supported by Ms. Miller.

Adopted: YEAS: 2  
NAYS: 0

Ms. Klinefelt stated the Commissioners who serve on the Drain Boards do not have the ability to appoint an alternate representative when they cannot be present. The Public Works Commissioner and the County Executive have been afforded the ability to appoint an alternate and Ms. Klinefelt would like the Commissioners to have the same opportunity.

There being no further business, it was moved by Ms. Klinefelt, supported by Ms. Miller, that the meeting of the Eight and One-Half Mile Relief Drain Board be adjourned.

Adopted: YEAS: 2  
NAYS: 0

The meeting was adjourned at 11:48 a.m.

  
\_\_\_\_\_  
Candice S. Miller, Chair  
Macomb County Public Works Commissioner

STATE OF MICHIGAN  
COUNTY OF MACOMB

I certify that the foregoing is a true and correct copy of proceedings taken by the Intra-County Drainage Board for the Drainage District shown on the attached set of minutes, on April 9, 2018 the original of which is on file in the Public Works Commissioner's Office. Public notice of the meeting was given pursuant to Act No. 267, Public Acts of Michigan, 1975, including, in the case of a special or rescheduled meeting or a meeting secured for more than 36 hours, notice by posting at least 18 hours prior to the time set for the meeting.

  
\_\_\_\_\_  
Candice S. Miller, Chair  
Macomb County Public Works Commissioner

DATED: 4/11/18

9209.bd



**Candice S. Miller**

Public Works Commissioner  
Macomb County

From: Macomb County Public Works Office

Date: 5-1-2018

To: 8 ½ Mile Relief Drain Board

Copy: File  
Evaluation Committee

RE: Proposal Evaluation Project Award Recommendation  
MCPWO RFP No.: **MCPWO-WWS-2018-RFP-006**  
MCPWO Proposal Name: **Basin Segmentation & Disinfection System Upgrade**

This is an open competitive contract. The Request for Proposals (RFP) was advertised from 3-21-18 to 4-24-18 on the Michigan Inter-Governmental Trade Network (MITN) website. Six-Hundred Eighty (680) solicitations were sent out via MITN and Thirty (30) firms downloaded the RFP.

One (1) Addendum was issued during the course of the RFP. The Addendums provided responses to vendor questions submitted during the question period.

On 4-24-18, proposals were received from 2 firms. Each member of the Evaluation Committee independently reviewed and scored the proposals in accordance with MCPWO's policy. The possible range of scores was from 0 to 100%. The proposers were ranked as follows:

<b>Firm</b>	<b>Score</b>	<b>Proposed Cost</b>
Tetra Tech	85%	\$126,479.00
Wade Trim	96%	\$137,500.00

The Evaluation Committee recommends that **Wade Trim**, the number one ranked proposer, be named as the consultant for the above referenced Project.

On behalf of the Board please indicate your approval of this recommendation by signing below. Thank you for consideration of this recommendation.

\_\_\_\_\_  
Vince Astorino  
Operations & Flow Manager  
MCPWO Engineering-Wastewater Services

\_\_\_\_\_  
Evans Bantios, PE  
Construction & Maintenance Manager  
MCPWO Engineering-Wastewater Services

---

Steve Rozycki, PE  
Engineer II  
MCPWO Engineering-Wastewater Services

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Stephen Downing  
Engineer II  
MCPWO Engineering-Wastewater Services

Approved: \_\_\_\_\_

Not Approved: \_\_\_\_\_

Hold: \_\_\_\_\_

---

Authorized Board Member Signature  
Board Name

---

Authorized Board Member Name (print)



**Wade Trim Associates, Inc.**

500 Griswold Street, Suite 2500 • Detroit, MI 48226  
313.961.3650 • www.wadetrim.com

April 24, 2018

8½ Mile Relief Drain & Martin Sanitary Diversion Drainage Districts  
Macomb County Public Works Office  
21777 Dunham Road  
Clinton Township, MI 48036

Attn: Madison Tanghe, Senior Secretary

Re: Technical Proposal for Basin Segmentation and Disinfection System Upgrade, MCPWO-WWS-2018-RFP-006

Dear Selection Committee:

The Macomb County Public Works Office has elected to conduct a feasibility study to explore improvements to the Chapaton and Martin Retention Treatment Basins (RTBs) in an effort to increase facility capabilities to better control and reduce pollutants from combined sewer overflow (CSO) into Lake St. Clair. Selecting an experienced firm and project team that have previously completed studies and designed cost-effective improvements and solutions for RTBs from the conceptual stage through the construction phase is critical.

Wade Trim has designed and performed extensive hydraulic analysis and evaluations at a significant number of wet weather facilities and systems located in southeast Michigan, Indianapolis, Pittsburgh, St. Louis, Omaha, and Cincinnati that have spanned over a 25-year period. We have the most comprehensive local experience and in-house design capabilities that include the necessary key engineering disciplines required for new construction, rehabilitation and improvement projects at existing wet weather facilities. It is through decades of project successes that has enabled Wade Trim to gain the specialized institutional knowledge and experience in the latest technologies necessary to develop innovative solutions for this RTB study.

The goals of this study at the Chapaton and Martin Basins are to:

- Increase protection of our local waterways and environment from harmful pollutants
- Reduce owner operational cost
- Improve facility efficiencies

These goals will be achieved through hydraulic analysis including computational fluid dynamics (CFD) modeling for specific concerns, coordinated basin segmentation, first flush configurations at Chapaton, and improvements to each facility's disinfection systems.

The keys to success of this study include but are not limited to:

- Compartment sizing and layout for first flush captures
- Evaluation of the newest technologies and replacement of existing chemical feed pumps that have become expensive to maintain to ensure operational reliability
- Evaluation and identification of sampling locations inside the basins for real time sampling that can be run back to a single point for examination to ensure water treatment quality
- Perform constructability reviews of segmentation and disinfection options given the unique and difficult challenges of construction within a below grade RTB, while in service



April 24, 2018


Wade Trim has recently performed similar design tasks as part of our ongoing work on the Omaha Saddle Creek CSO RTB. For this project, a CSO capture analysis was completed that showed the increase or decrease of CSO release in comparison to different basin sizing. Utilizing hydraulic analysis and CFD modeling, Wade Trim was able to design a segmented basin to take advantage of first flush capture and influent volume to maximize treatment and reduce facility operational and maintenance cost. This allowed for sizing of the disinfection system which included sodium hypochlorite feed pumps and mixers for this High Rate Treatment (HRT) facility. This work played a key role in educating decision makers and helped guide the final disinfection requirements and segmented compartment size within the RTB.

To conduct the Chapaton and Martin Basins study, Wade Trim has assembled a project team with expertise in CSO RTB design and construction that can provide the creative and innovative solutions required. Our Project Manager, John Arvai, PE, has comprehensive knowledge of the challenges of constructing water and wastewater projects within confined areas that also require critical sequencing and phasing of the work to keep facilities operational. To complement John's expertise, he will be supported by experienced technical CSO design experts in hydraulics modeling and flow analysis, process disinfection, structural, constructability, and cost estimating.

Our team is eager for the opportunity to continue our work with Macomb County on this important project that will protect our water, reduce operational costs and improve facility efficiencies. We acknowledge receiving Addendum No. 1 of the MCPWO-WWS-2018-RFP-006 that was issued on April 18, 2018. Please call us at 313.961.3650 to discuss any questions or obtain any further information needed.

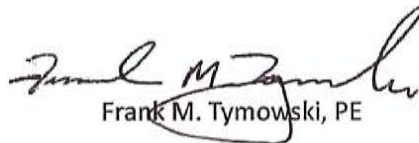
Very truly yours,

Wade Trim Associates, Inc.



John J. Arvai, PE

Project Manager



Frank M. Tymowski, PE

Principal

## Section 4



## WORK PLAN

### UNDERSTANDING OF THE PROJECT

Macomb County operates two combined sewer retention treatment basins (RTBs) that provide disinfection of treated overflows discharged into Lake St. Clair. The Chapaton RTB has a capacity of 28 million gallons and the Martin RTB 10 million gallons. These facilities were originally constructed in the mid-1960s in accordance with the design standards at that time, as single compartment storage basins.

While the facilities have functioned well for their intended purpose, it is becoming increasingly more difficult for operators to obtain replacement parts to maintain the aging disinfection pumps and disinfection equipment. The County is requesting an engineering study be completed to:

- Evaluate the existing disinfection systems at the 2 facilities
- Identify potential improvements that will increase treatment efficiency, and
- Reduce operations and maintenance requirements

The study is to consider advances in disinfection technologies and controls that have been developed since the original installation, and review both current and anticipated future regulations, such as dechlorination, that may impact the selection of disinfection improvements. In addition, the larger Chapaton Basin is to be evaluated for potential segmentation of the storage tank to enhance first flush capture and thereby increase pollutant removal efficiency and reduce overflow disinfection requirements.

### Keys to Success

Based on observations from our site visit and discussions with County staff, we have identified the following key items to be addressed in the study:

- **Maximize First Flush Pollutant Capture.** A major focus of the study is evaluating the potential to compartmentalize the existing single cell, 28 MG Chapaton Basin to contain first flush capture of pollutants. As discussed later in our work plan task descriptions, we employ several calculation methods to identify target storage compartment volumes to optimize benefits of the first flush capture, using our experience and evaluation of available facility flow records, modeling and water quality data. A key for the study is to identify the target first flush volume that can be accommodated in an optimal retrofit segmentation arrangement in the existing facility, considering hydraulics and structural needs, while minimizing impacts on the existing facility operation, especially during construction.
- **Upgrade Chemical Pumps.** The Pulsafeeder 7660 chemical feed pumps at both Chapaton and Martin Basins are old and require replacement, as they are no longer manufactured, and replacement parts are not available from suppliers. We will look at several options to replace these with new chemical feed pumps that offer ease of maintenance and reliability. One of the newer technology options available, and increasingly selected for CSO applications is the peristaltic hose pump. Maintenance for this type of pump is minimized as the corrosive disinfection chemicals do not come into direct contact with the

### Chemical Feed Pumps



*The chemical feed pumps at both Chapaton and Martin Basins require upgrading because replacement parts are no longer available from suppliers.*

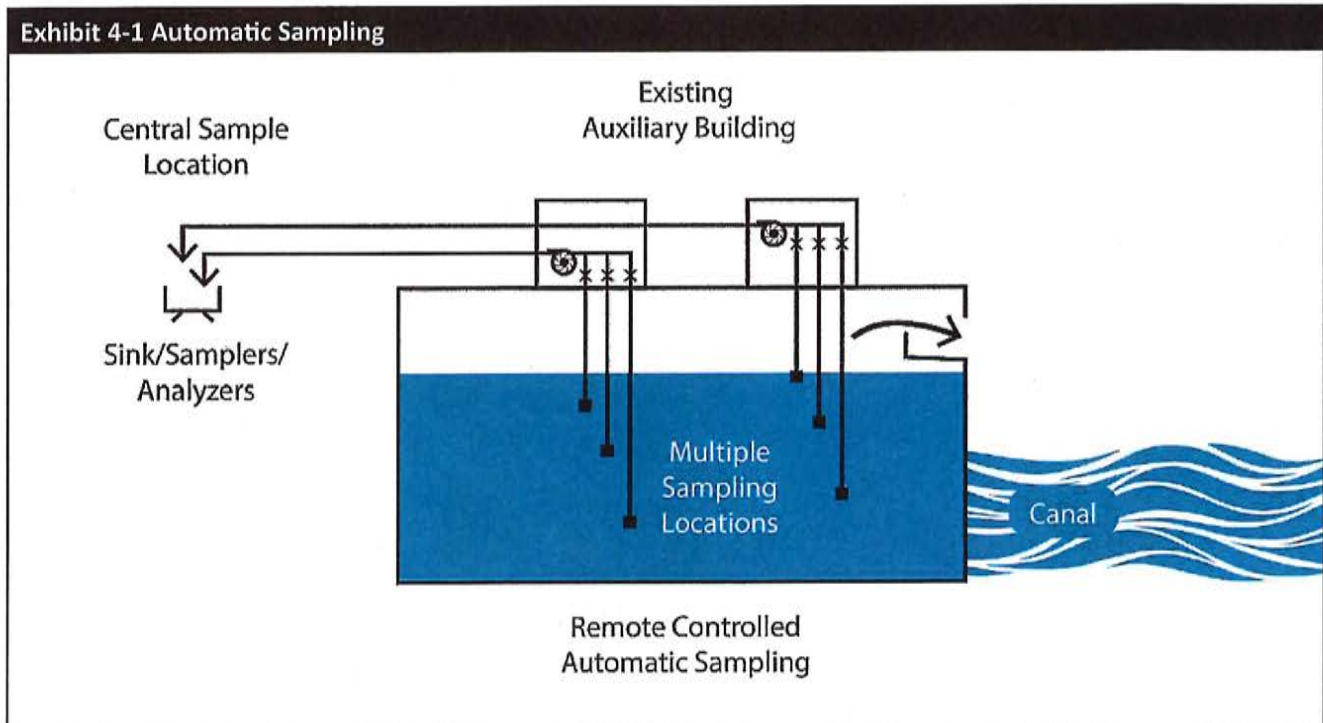
pump mechanical parts, thereby reducing wear on expensive mechanical equipment in exchange for less costly periodic hose replacement. Wade Trim was the lead design engineer for a retrofit design of similar Pulsafeeder pumps at the Wayne County Dearborn Heights, Redford Township, and River Rouge CSO Basin facilities that employed the use of this upgraded technology.

- **Improve Dosing Efficiency.** The existing disinfection system requires the operators to use their skill and experience to select initial chemical doses by estimating flows into the facility from pump operation and basin levels, and then manually adjust the sodium hypochlorite feed rates as pollutant concentrations decrease during an event. These dosing decisions are dependent on accuracy of control system data available to operators during the CSO event.

Data collection for chemical dosing decisions will be enhanced in the future with installation of influent flow meters being installed this year by the County. As part of the study, we will evaluate options to integrate data from the new flow meters in the

SCADA operations to improve dosing selection and treatment efficiencies. We will also review the existing SCADA control system to identify any deficiencies or enhancements requiring SCADA upgrades, to improve the chemical disinfection processes for more efficient operation.

For example, in order to check the success of their dosing selection within the tanks, operators must currently walk outside the facility during the rain event to an access location on the basin roof, lower a dip stick to grab a sample, and manually test for chlorine residual. Potential upgrades to install sample pumps within the basin are to be evaluated for automatic and remote collection of samples at multiple points and depths in the basin, as shown schematically in Exhibit 4-1, offering safer operations and better data collection for more efficient chemical dosing adjustments. This is a design feature we employed on the Saddle Creek RTB in Omaha, NE, which provides the operating staff with continuous sampling of a cross section of the basin geometry. Sampling at numerous points is accomplished with self priming pumps and multiple suction valves for each pump, so operators may



*Potential upgrades to install sample pumps within the basin are to be evaluated for automatic and remote collection of samples at multiple points and depths in the basin, offering safer operations and better data collection for more efficient chemical dosing adjustments. This is a design feature we employed on the Omaha Saddle Creek CSO RTB to provide operating staff with continuous sampling of a cross section of the basin geometry.*

have a sample of the selected location(s) for process control.

- **Assess Chemical Mixing/Contact Time.** The existing Chapaton disinfection system feeds sodium hypochlorite at the pump discharge, using the energy of the pump and turbulence at the pump discharge to mix the chemical, which is quite effective, but may be impacted in the future by the basin segmentation options. The Martin facility uses relatively simple diffuser pipes injected at the gravity sewer influent point of the basin. No additional mechanical mixing is provided at either facility.

Based on this configuration, it is assumed that the sodium hypochlorite is fully mixed and additional equipment to enhance mixing is not required. However, experience has shown that fully mixed flow entering the main basin compartment has the potential to short circuit the basin. Short circuiting results from very low shear velocities in the basin that can lead to portions of the basin becoming stagnant while allowing a smaller portion of the basin to convey most of the flow. This short circuiting leads to a shorter effective contact time with the sodium hypochlorite before discharging.

To identify and reduce the risks associated with short circuiting, a computational fluid dynamics (CFD) model will be developed for the preferred basin segmentation option. Wade Trim led the CFD modeling evaluation of the Oakland County GWK RTB that resulted in the identification of stratified flow and recommendations to modify the mixer arrangement. Our work plan includes CFD modeling of the Chapaton Basin to identify and address any concerns for short circuiting that may require mixing upgrades for the first flush compartment modifications.

- **Constructability Review.** The potential improvement alternatives must not only enhance the treatment performance, but also minimize future operation and maintenance, be cost effective, and most importantly, be constructable. These goals are particularly true for retrofit work within an existing facility which needs to remain in service during construction. Constructability issues, therefore, need to be considered during the study phase to ensure that costs and risks of retrofit construction

## Indianapolis Lift Station 507



*Constructability issues need to be considered during the study to ensure that costs and risks of retrofit construction and operational impacts are appropriately identified for future CIP planning including evaluating ancillary impacts of basin segmentation on other existing processes. Wade Trim performed a study that included constructability for conversion of the Indianapolis lift station baffled storage facility into a CSO RTB.*

and operational impacts are appropriately identified for future CIP planning. This includes evaluating ancillary impacts of basin segmentation on other existing processes in the facility, such as the existing dewatering and flushing system.

## 4.1 TASK 1 CHAPATON BASIN SEGMENTATION

### 4.1.1 Benefits of First Flush Capture

The existing Chapaton Basin is currently designed as a single cell flow through basin that provides full capture of smaller storms and flow through screening and disinfection of larger storm events that exceed basin capacity. Macomb County is interested in improving the efficiency of this basin by partitioning a portion of the basin into a first flush compartment. The advantages of having a first flush compartment include:

- Capture and segregation of heavily polluted CSO waste stream to prevent resuspension
- Operational efficiency for capturing smaller storms without using the entire basin
- Simplify chemical dosing due to a more consistent pollutant concentration within the main compartment of the basin

The first flush compartment is intended to capture and hold the higher concentrations of pollutants that occur during the initial part (first flush) of a storm. A first flush occurs in a combined sewer system due to sediment buildup during periods of low flow and velocity in large pipes. During wet weather, this sediment is resuspended and flushed downstream. As the storm progresses, this source of sediment is exhausted and the remaining stormwater begins to dilute the pollutant load associated with the sanitary flow component. The pollutant concentration profile shown in Exhibit 4-2 demonstrates the first flush concept based on combined sewer overflow (CSO) total suspended solids (TSS) data collected in southeast Michigan.

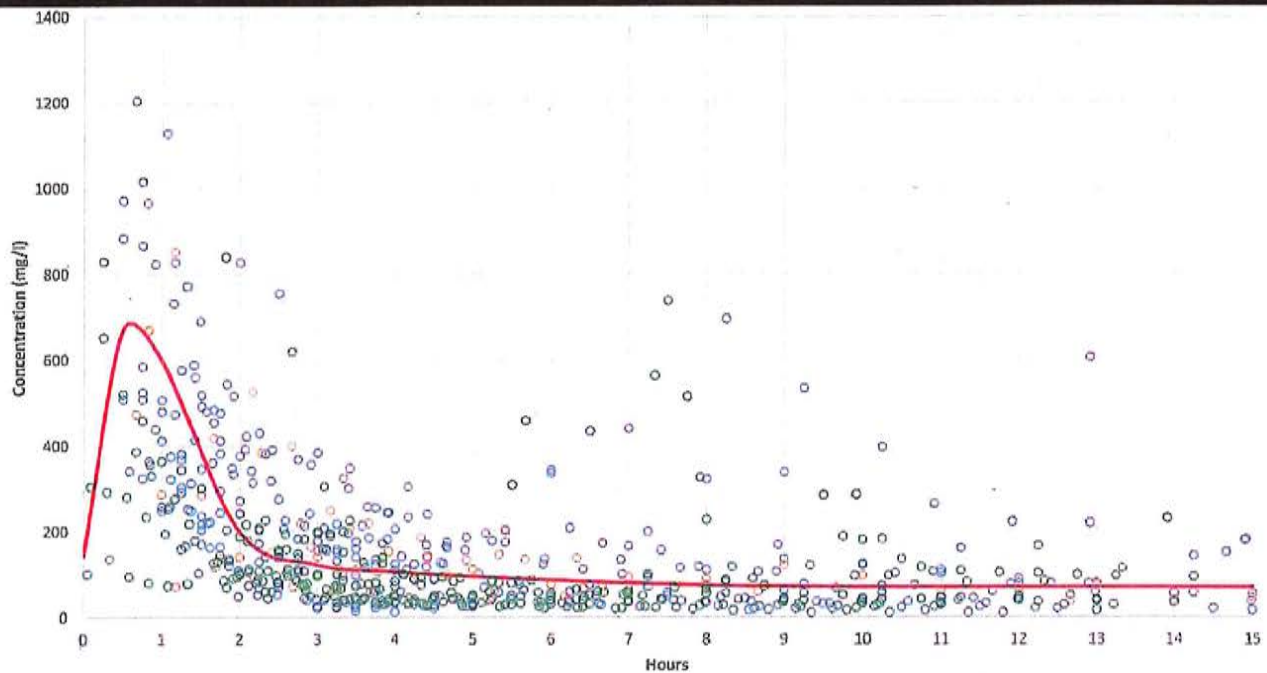
Based on this data, TSS increases by a factor of four above average baseflow concentrations during the first 30 minutes of a storm. This first flush concentration then drops after approximately 2 hours after the start of the storm. Diverting and holding this initial flow with significantly higher concentration in a separate storage compartment to be dewatered back to the sanitary sewer during dry weather conditions can significantly improve treatment efficiency and reduce disinfection treatment costs.

#### 4.1.2 Determination of Target First Flush Capture Design Volume

The analysis of CSO flow and characteristics in the Macomb County facilities will reveal a “first flush” volume of CSO overflow that could be contained in a first flush tank, allowing 100% capture of this volume. There are three approaches to sizing the required first flush compartment volume, which will help establish the approach to developing layout options for the Chapaton Basin segmentation.

**1. Capture based on tributary area.** One approach is to size the first flush tank based on a volume that is equivalent to 0.05-inch runoff over the tributary area. This “rule of thumb” sizing volume can be readily calculated using the tributary area to the basin. Wade Trim developed this approach for sizing the first flush capture in the Inkster CSO Basin during the Rouge River Demonstration Program. Based on calculations for runoff results from various size rainfall events, it was determined that the equivalent of .05-inch total runoff volume applied to the tributary area provided adequate first flush storage for the collection system runoff. Upon review of the demonstration basin performance for this facility and other CSO demonstration basins, the CSO Work Group’s Operator Forum unanimously agreed that

**Exhibit 4-2 Representative Pollutant Concentration Profile – TSS**



*The pollutant concentration profile shown here demonstrates the first flush concept based on combined sewer overflow (CSO) total suspended solids (TSS) data collected in southeast Michigan.*

this sizing parameter and layout for the Inkster Basin first flush capture volume was the preferred approach.

**2. Capture based on typical year storm events.** A second approach is to review the distribution of a typical year storm inflow volume at the facility and look for a cut-off point for the number of storms that can be captured in the first flush compartment. This approach usually shows a large number of smaller storms that can be completely captured, while minimizing the number of compartments used and therefore needing to be cleaned. This statistical approach can be completed using available historical data from basin operational records. We anticipate running the model for a typical year historical rainfall record that has already been selected by Macomb County, or using the typical year used by other agencies in southeast Michigan such as DWSD/GLWA. A variation of this method would be to run or estimate the runoff volume from a subset of storms rather than a typical year data. The number of storms falling within each group can be estimated in the evaluation. Wade Trim used this approach in sizing the Wayne County Basins, to minimize the number of hydraulic model runs required.

**3. Capture based on pollutant load.** This approach will only be used if hourly influent flow and TSS concentration data can be obtained or estimated from available records. If the site-specific flow and sampling data is available for the Chapaton Basin, an actual inflow hydrograph with monitored pollutant concentrations will be analyzed with the other two methods to establish the optimal first flush capture volume. If this data is not available, the two previous methods should provide adequate starting point for first flush volume estimation.

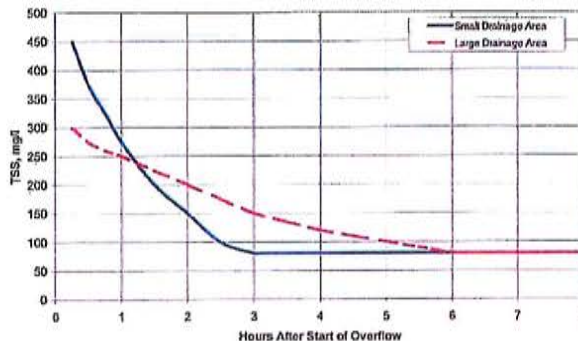
The optimal first flush capture volume “sweet spot” for enhanced treatment is where these three approaches converge to a range of sizes typically 20% up to 33% of the total basin volume. This is a general assessment based on previous experience; the final numbers could be plus/minus depending on the site specifics of the facility and the operator’s and client’s preferences.

During the Rouge National Wet Weather Demonstration Program, Wade Trim led the data collection and analysis for 6 CSO basins within southeast Michigan, evaluating up to 6 years of performance data from Detroit and Wayne County Basins as well as additional data collected from Garden City, Dearborn, Dearborn Heights

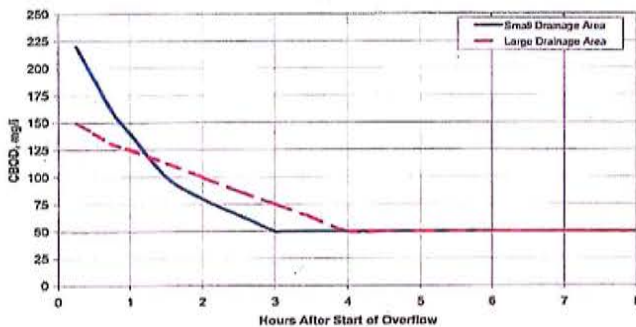
and Redford Township. This data clearly demonstrated an overall first flush profile for TSS and CBOD. Sample graphical representations for both a smaller and a larger facility are shown in Exhibit # 4-3.

**Exhibit 4-3 Representative First Flush Concentration Profiles for TSS and CBOD**

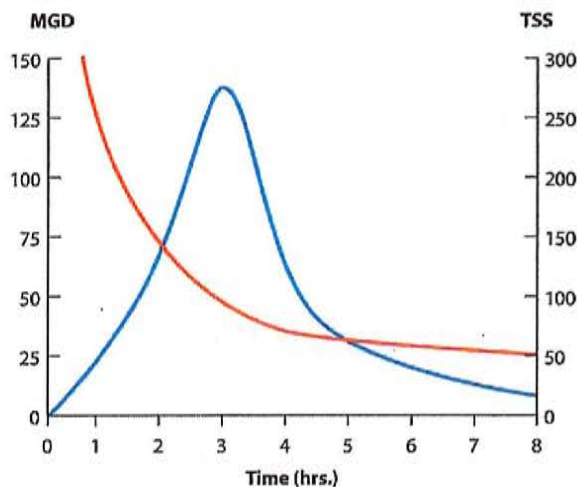
**Representative concentration profiles for Detroit CSOs – TSS**



**Representative concentration profiles for Detroit CSOs – CBOD**



**Typical flow hydrograph and total suspended solids pollutant profile**



These graphs typically show the decreasing trend of CSO pollutants within the first few hours of runoff. It should be noted that this is a general trend that applies to a majority of the events analyzed over the 2- to 6-year period of the Rouge River Demonstration projects. This information can be used with the design hydrographs as well as the distribution of a Typical Year rainfall event to determine the best sizes for the first flush capture compartment and the subsequent compartments. Other considerations include the need to simplify operations by segmenting the existing basin into equal basin compartments. This approach was used in determining the optimum basin compartments for the Saddle Creek CSO Basin.

#### 4.1.3 Develop Basin Segmentation Options

With the target storage volume identified, various options for compartmentalizing the basin will be developed. The actual sizing and design layout will be based on the review of the target capture volume in conjunction with the below listed design layout considerations, using the most practical partition wall arrangement that best fits within the existing facility structural and hydraulic constraints. Development of design layouts will include a preliminary constructability review to assess contractor access and construction sequencing limitations for conducting the retrofit work. Design considerations for the alternatives must consider the following items:

1. Wall configuration to segment the proposed compartments needs to be compatible with the existing structure and structural design load requirements, and should serve to enhance the structural performance, or at least not compromise the structure. Operators generally prefer similarly sized compartments with the ability to isolate the first flush chamber once full, and progressively fill the subsequent chambers to minimize cleaning requirements for smaller storms.
2. The existing Chapaton Basin is currently filled to a depth of 6 feet by gravity inflow prior to any influent pumping. To minimize retrofit costs, the basin segmentation options must accommodate the existing pump station inlet/outlet locations and the existing inlet sewer locations, to the extent possible. Design layouts must also address any hydraulic impacts on current basin filling and pumping operation protocols.

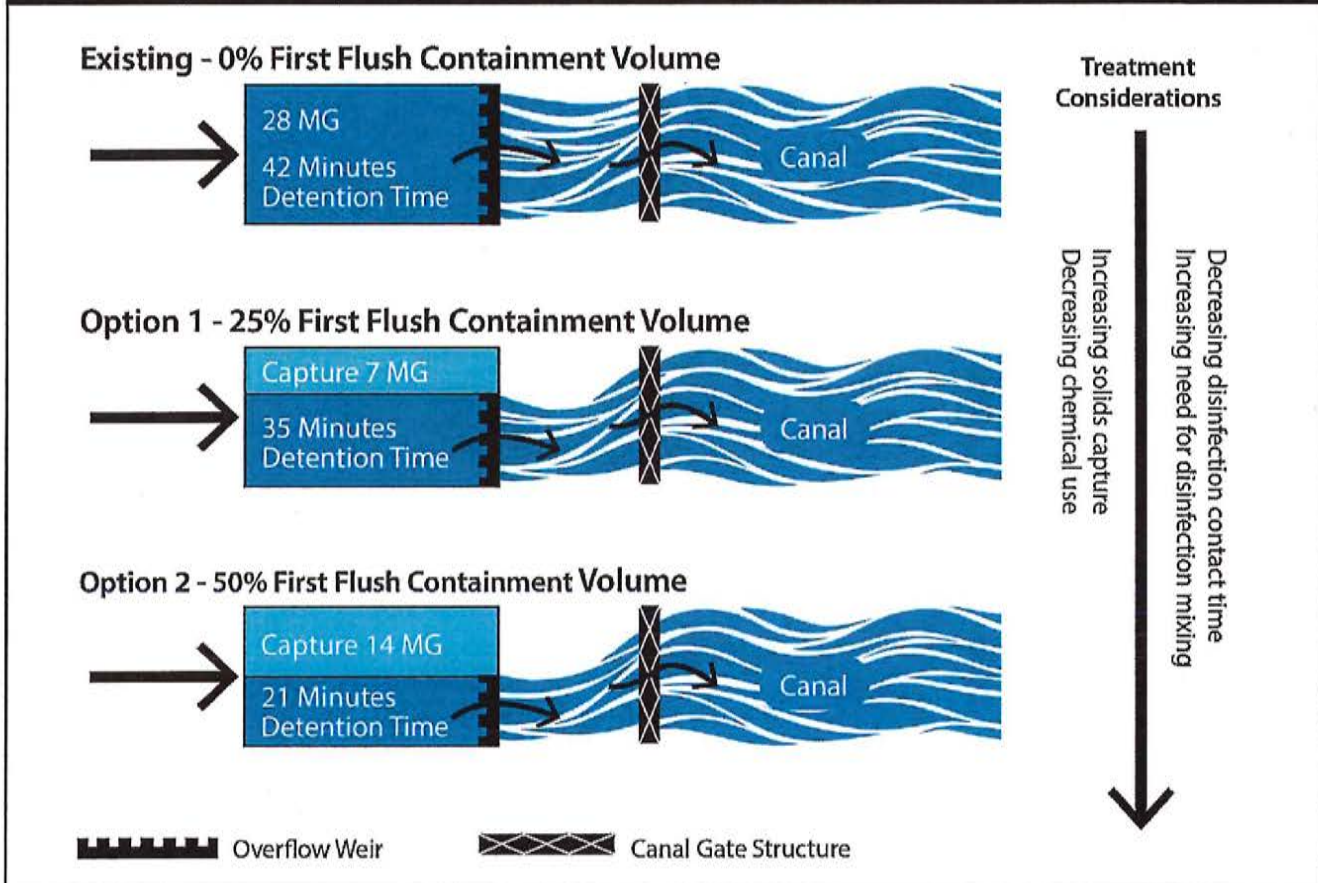
3. The control for filling the compartments needs to be passive, such as weirs, so reliability is not affected by unnecessary control gates or mechanical equipment. Use of dewatering control gates must be evaluated for segmentation impacts and modifications to the existing flushing system.
4. The compartment(s) which may overflow needs to provide sufficient detention time, contribute to plug flow, and be compatible with the disinfection system. The design must be coordinated with other disinfection system improvements evaluated under Task 2, including chemical injection and residual chlorine sampling locations.
5. The compartment(s) need to be compatible with the existing flushing system, or be compatible with a modified cost-effective cleaning system. We note that flushing is currently performed by canal water, using 30-year-old pumps that flush the basin with a pipe and nozzle system in 10 segments. The flushing system is specifically arranged around existing flushing channels), and will require modification in some manner to accommodate compartmentalizing the basin. As part of the segmentation study, we will investigate potential upgrades to the existing flushing system, including potential use of stored combined sewage to flush the basin, eliminating the need for energy consuming equipment, maintaining pumps, and adding "external" water to the system which would be metered and treatment paid for.

These design considerations for the alternatives will be evaluated in coordination with the treatment objectives to best fit the treatment goals and objectives within the retrofit constraints of the existing facility. Up to 3 layout options will be developed for segmenting the Chapaton Basin. Exhibit 4-4 schematically depicts how various first flush capture volumes can impact treatment considerations.

#### 4.1.4 Cost Estimating and Constructability Review of Segmentation Options

Constructability is a project management technique that reviews the construction processes from start to finish. The goal of this tool is to prevent errors, delays, obstacles and cost overruns prior to the project actually being built, or in this case, ensuring the study options are viable, and anticipated costs accurate for budgeting

Exhibit 4-4 Segmentation Options – Evaluation of First Flush Volumes on Treatment Processes



With the target storage volume identified, segmentation options for compartmentalizing the basin will be developed and evaluated to optimize treatment processes as depicted above. Specific first flush sizing options will be developed to best match desired treatment goals with existing facility retrofit constraints.

and programming capital improvements before proceeding into preliminary design.

It is absolutely critical that this procedure be applied during the study phase when the first flush basin segmentation options are being developed. Employing this early review can prevent the spending of large amounts of effort exploring potential design options that have a significant constructability issue. Flushing out such issues to examine if a fatal flaw exists, or adding appropriate budget in the construction estimate to mitigate the risk, can prove to be well worth the effort as it can save significant cost and time.

In addition to our Project Manager, John Arvai, Wade Trim has other construction professionals familiar with the Chapaton RTB facility on our study team who will also be assisting with constructability. Dan DiPonio and Steve D'Alecy were involved in the estimating and

construction of portions of the existing Chapaton Basin facility, and will assist with this effort. The importance of understanding the construction element during this study development, and how proposed options can or cannot be built is critical and should not be discounted or ignored.

#### 4.1.5 Basin Hydraulics CSO Flow and Characteristics

Modifications to the Chapaton Basin will include changes to the disinfection system, partitioning of the basin compartment with added weirs and flow paths, and potential changes to the outlet channel. These changes can impact the head loss through the basin possibly impacting upstream backwater conditions. To ensure no harmful upstream impacts, the existing and proposed conditions of the basin will be evaluated with hydraulic modeling.



The model will extend from the inlet channel through the entire basin to the effluent channel. The model will consider head loss associated with friction and minor losses at expansions and contractions. In locations with discrete losses such as screens and backwater gates, user input losses will be added directly into the model.

The proposed conditions model results will be compared to the existing conditions results to determine potential impacts to the upstream system. If head losses through the basin are found to be excessive, modifications to the basin segmentation design will be made to improve hydraulic performance.

#### 4.1.6 Computational Fluid Dynamic Modeling

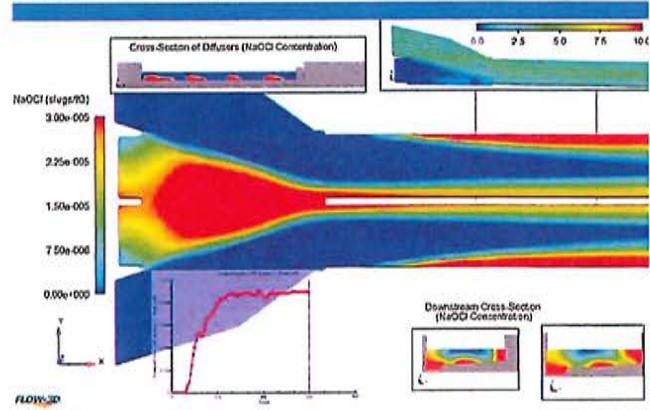
Computational fluid dynamic (CFD) modeling is a tool for analyzing complex hydraulic systems in a 3-dimensional model environment. Although a CFD has many applications, CFD modeling for this project will be used to analyze sodium hypochlorite plume definition in the basin, and potential short circuiting of flow through the basin for the recommended segmentation option.

The development of a CFD model requires an initial 3D representation of the system. Wade Trim builds these 3D models within the Revit building information modeling (BIM) environment. It is our understanding that Macomb County has a 3D Revit model of the existing storage basins that will be provided for use in this study. This 3D model is then brought into the Flow-3D CFD model environment. The Flow-3D CFD model will then be further developed for use in the application described below.

#### Basin Short Circuiting CFD Model

RTBs are designed to maintain low velocity and minimize turbulence to facilitate settling and prevent the resuspension of settled solids. Unfortunately, these low velocities reduce the sheer velocity of the flow to almost zero. These low sheer velocities will allow a flow stream to pass through the center of the basin without any significant interaction with adjacent “stagnant water.” This phenomenon is referred to as short circuiting. Short circuiting effectively reduces the contact time before overflow by and amount proportional to the fraction of the storage that is being short circuited. To prevent short circuiting, it is necessary to ensure an initial uniform distribution of flow across the entire cross-section at the upstream end of the basin.

#### GWK RTB CFD Model



Hydraulic analysis with Computational Fluid Dynamic (CFD) modeling was used by Wade Trim to evaluate and optimize chemical mixing for retrofit design on the Oakland County George W. Kuhn combined sewer RTB.

To verify the effectiveness of the basin, a CFD model will be developed for the influent channel and recommended basin segmentation option with first flush compartment. The model will be run for a range of flow rates to verify plug flow through the basin without any significant short circuiting. If problems are identified, modifications to the basin will be developed to improve the basin performance. Improvements may include ported inlets, baffles, and/or changing the distribution of basin inlets and sizes.

### 4.2 TASKS 2 AND 3 (TASK 2, CHAPATON RTB AND TASK 3, MARTIN RTB) DISINFECTION SYSTEM EVALUATION

#### 4.2.1 Initial Assessment/Design Flow Development

The existing Martin and Chapaton Basin facilities currently disinfect with sodium hypochlorite, applied with diaphragm metering pumps and diffuser pipes. Our assessment will begin with interviewing operations staff and reviewing available data to determine effectiveness of the existing system in terms of meeting permit requirements, experience with chlorine residuals and dosage required, and operating experience with the mechanical system.

This data gathering phase will also include identification of basis of design flows and permit requirements for the disinfection processes. It is our understanding that Macomb County has an existing computer model of the

collection system that can be used to identify design flows delivered to the treatment facilities. This information will be obtained and reviewed in conjunction with basin operation records and existing disinfection system capacities to confirm with staff the design flows to be used for sizing disinfection system improvements.

We are also aware that there is a concurrent study being conducted by others to review potential Chapaton Basin Expansion options, which may include upstream collection system upgrades to reduce or modify existing flows delivered to the Chapaton Basin. While this project is to specifically address retrofits for potential segmentation and disinfection improvements to the existing facility, we will incorporate to the extent possible any available information and findings of the concurrent expansion study that may impact flow rates or storage volumes for developing the segmentation and disinfection options, provided the information is received in a timely manner for our project schedule.

#### 4.2.2 Disinfection Options to be Evaluated

Based on our preliminary discussions with operations staff during the proposal walk through visit, we understand that the existing hypochlorite disinfection system has been generally successful, and the chemical feed lines and valves are in relatively good shape. In addition, the chemical storage tanks have adequate volume, were recently relined, and can be restocked within a short turnaround time from available vendors. These

#### Observation of Chapaton Basin During Site Visit



*Based on our preliminary discussions with operations staff during the proposal walk through visit, we understand that the existing hypochlorite disinfection system has been generally successful. This image is of the existing Chapaton Basin residual sand and grit after flushing.*

components, including the continued use of sodium hypochlorite, are expected to be adequate for future use, but will be reviewed to confirm and identify any specific item requiring an upgrade.

The main focus for disinfection improvements will be directed at replacement of the chemical feed pumps and review of chemical dosing components, including instrumentation and controls, and disinfection system operations to suggest how to use hypochlorite more effectively. This includes a review of the sampling system requirements for an updated automated sampling system and other equipment that may improve ease of operation and maintenance.

We will review and evaluate alternate technologies to pump the chemical including diaphragm pumps, gear pumps, hose pumps, centrifugal pumps and perhaps gravity system using control valves and no pumps. A sample comparison matrix to evaluate various types of chemical pumps is presented in Exhibit 4-5. Final selection will be based on review of costs and operator preferences on pump features. Finally, the way the disinfecting agent is dispersed or mixed in the CSO flow is critical to effectiveness and detention time requirements. Diffuser pipes, induction mixers, other ways to effectively impart the disinfectant to the flow stream will be studied, and options presented.

#### 4.2.3 Alternative Disinfection Processes/Future Dechlorination

A significant decision for a modern disinfection system is the type of disinfecting agent to choose. We are aware of successful facilities using sodium hypochlorite, calcium hypochlorite, ultraviolet radiation, and peracetic acid. Bromine based disinfectants have been considered, but not used. One of our clients is more comfortable with handling pellets than liquid, so a pellet feeder system was designed and constructed.

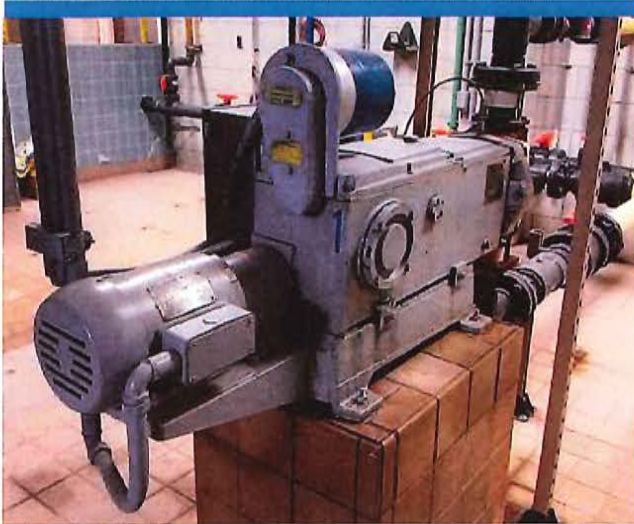
It is our understanding that use of sodium hypochlorite has been successful at the Chapaton and Martin RTBs and is the chemical of choice for other existing RTB facilities in southeast Michigan. While we will review the alternate chemical options with Macomb County, we do not believe a change to a different disinfection system chemical will be cost-effective or warranted based on current and anticipated future regulations.

**Exhibit 4-5 Chemical Pump Options**

DIAPHRAGM PUMP	HOSE PUMP	GEAR PUMP
<b>Pros</b>		
Generally wide turndown range, usually a guaranteed value (10:1 is typical)	Accurate measurement	Accurate measurement
Highly accurate metering, usually a guaranteed value over the turn-down range	Pump can run dry indefinitely	Continuous, non-pulsating flow
High pressure capability	Off gassing does not affect pump	Turndown capability dependent on drive
Internal relief valve for pump protection	Can be provided with a revolution counter	Minimal dry run capabilities
Available with lead detection for diaphragm failure	High suction lift capabilities	
	Can pump solids	
	Available with leak detection for hose failure	
	Turndown capability dependent on drive	
<b>Cons</b>		
Pumps are prone to air binding/vapor lock	Maintenance based on hose life	Can vapor lock if not flushed well
Require pulsation dampeners	May require pulsation dampeners	
Requires backpressure valve		Pumped product also used for pump lubrication
Wide range of material selection		Cannot pump solids
		Flushing is critical
<b>Cost</b>		
\$\$	\$	\$
		All metal pumps are very expensive
		Seal-less plastic pumps are less
<b>Maintenance</b>		
Low maintenance interval	Low maintenance interval	Low maintenance interval
Complicated maintenance procedure	Hose replacement is simple	Maintenance procedure more complicated than hose pumps

*We will review and evaluate alternate technologies to pump the chemical including diaphragm pumps, gear pumps, hose pumps, centrifugal pumps and perhaps gravity system using control valves and no pumps. A sample comparison matrix to evaluate various types of chemical pumps is presented above.*

### Existing Chemical Feed Pump in Chapaton Basin

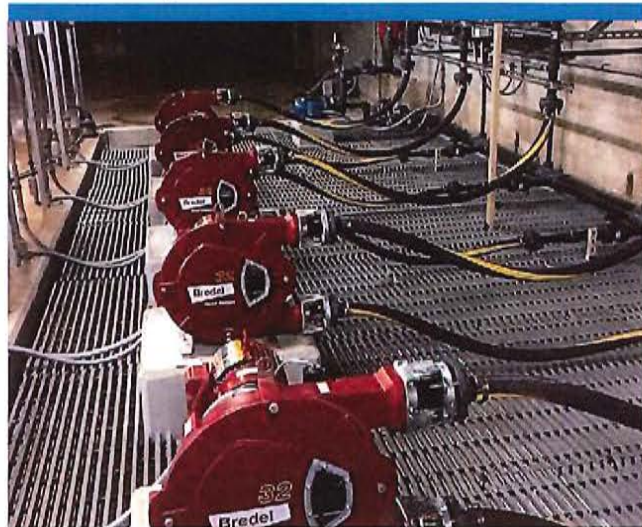


*The study will be directed at replacement of the chemical feed pumps and review of chemical dosing components, instrumentation and controls, and treatment operations to suggest how to use hypochlorite more effectively.*

At this time Michigan does not require dechlorination, although more emphasis is being given to meeting chlorine residual goals. Any chlorine based disinfectant will need to be managed, and real time measurement of residual chlorine would be a valuable tool. To date, real time residual chlorine analyzers at intermittently operated facilities have not been successful due to the need to keep analyzers wet and the continuous calibration effort with chemical reagents needed to keep the system functioning accurately. However, technology continually changes and improves, and we will review and present state of the art options and better ideas of sampling locations for consideration.

Given that the State of Michigan does not yet require dechlorination of CSO RTB effluent, it is not an immediate concern for the facility upgrades. However, Wade Trim has experience with our clients in Nebraska, Ohio and New York that have dechlorination as a requirement. Our study evaluation will include a review of the existing site and development of a preliminary footprint layout for future dechlorination facilities to confirm the space requirements to be reserved on site for a dechlorination system storage tank, feed and application points if necessary to meet future State of Michigan regulations.

### Use of Alternative Chemical Feed Pumps at the Dearborn Heights CSO Basin



*Wade Trim was the lead designer for replacement of existing diaphragm chemical pumps with hose pumps at the Wayne County Dearborn Heights CSO basin. The new installation included a raised FRP grated platform within the pump containment area to facilitate improved operator maintenance access.*

### INFORMATION REQUIRED FROM MCPWO

Wade Trim will need the following information from Macomb County to complete the project:

- All items listed in the RFP Addendum 1 will be made available prior to the kick-off meeting. Any deficiencies in available information impacting our proposed scope of services, schedule or budget will be identified for discussion with Macomb County and adjusted accordingly.
- The existing hydraulic model will be provided by Macomb County for use in the study and will not require new calibration.
- An existing typical year (rainfall record) that has been identified either by Macomb County or GLWA/DWSD will be used for the analysis.

The information requested here, along with additional assumptions are presented in Section 7 of our proposal.



**Candice S. Miller**

Public Works Commissioner  
Macomb County

To: Candice Miller, Macomb County Public Works Commissioner

CC: Brian Baker, Chief Deputy

From: Vincent Astorino, Operations & Flow Manager

Date: May 7, 2018

Subject: Real-Time Total Residual Chlorine Monitoring Pilot Study Recommendation

The Macomb County Public Works Office (MCPWO) has been working with the consulting firm OHM Advisors to perform a pilot study at the Chapaton Retention Basin for real-time total residual chlorine monitoring.

OHM Advisors along with other team members have recently won a challenge called the Internet of H2O Challenge in which they developed a real-time water quality monitoring program to monitor nutrient levels in the Lake Erie Basin. An attachment of this event is attached. This event is what brought OHM and their successes to our attention. The MCPWO started discussing with OHM the ability to monitor real-time Total Residual Chlorine (TRC) values at the Chapaton Basin. These TRC numbers are critical to properly treating the water entering the basin to ensure that sufficient E. Coli elimination to within the Chapaton permitted values are attained. Too high or too low TRC numbers can result in fish and aquatic kill or high E. Coli values both of which would be a violation of the NPDES permit.

The current method for acquiring the TRC values at the Chapaton basin is labor intensive and done through grab samples at the perimeter of the basin. By implementing a real-time strategy for TRC monitoring, operators will have the ability to monitor these values through the Supervisory Control and Data Acquisition (SCADA) system. This will provide the operators the ability to make instantaneous control decisions of the disinfection system and ultimately improving water quality that is discharged at the basin.

The attached quote by OHM Advisors for \$22,000 is to perform a pilot study at the Chapaton Basin to test the automated equipment and ensure that it will fit our needs. As part of this pilot study, OHM Advisors will also develop a conceptual engineering plan for a long-term monitoring program.

To keep costs down, MCPWO will purchase the equipment for this task. It is estimated to cost \$8,000 to \$10,000.

**OFFICE LOCATION:** 21777 Dunham Road, Clinton Township, Michigan 48036 • Phone: 586-469-5325 • Fax: 586-469-5933

**MAILING ADDRESS:** P. O. Box 806, Mt. Clemens, Michigan 48046-0806

**ENGINEERING** • Phone: 586-469-5910 • Fax: 586-469-7693 ♦ **SOIL EROSION** • Phone: 586-469-5327 • Fax 586-307-8264

I recommend moving forward with this pilot study and having the board approve OHM Advisors to perform the work at the not-to-exceed value of \$22,000. I also recommend having the board approve MCPWO purchasing the equipment for this at the not-to-exceed value of \$10,000.

Attachments: Team GLASS Award Letter  
OHM Advisors Proposal – 4/27/18

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## Team GLASS makes a Big Splash and wins the Internet of H2O Challenge:

Harmful algal blooms (HABs) are a major threat to the water quality of Lake Erie and the millions of residents who depend on the lake as a source of drinking water. Measuring, disseminating and tracking nutrient levels in and entering the lake from tributaries is a critical component of understanding and predicting HABs and improving the water quality of Lake Erie. Solutions to these problems have been hampered by the absence of a nutrient detection method and the ability to make data available in a real-time, analytical platform.

The Internet of H2O Challenge, organized by the Cleveland Water Alliance, sought to develop a robust and resilient nutrient monitoring program with the potential to scale across the Great Lakes. Five teams competed for the \$50,000 of cash prizes, decided by judges comprised of industry leaders and government managers.

Team GLASS was a collaborative effort between H2Ometrics, OHM Advisors, Green Eyes, and HESCO. Together, the team delivered a robust, scalable, interoperable, real-time nutrient monitoring system. The team members offered unique expertise and access to technologies that allowed for advanced nutrient detection, telemetry, cloud data analytics, and system integration. The technology demonstrated for the competition included the Green Eye Science NewLAB automated chemical measurement system, Trimble Telog remote telemetry units to collect and transmit the data to the cloud, and the H2Ometrics platform for data monitoring and analytics.

Team GLASS demonstrated the readiness of its technology by performing a pilot deployment at Rock Creek in Tiffin, OH with a fully functioning nutrient monitor that transmitted measurements to a cloud data analytics platform. This technology showed a scalable solution that could be deployed at dozens or hundreds of monitoring sights in a relatively short period. To demonstrate this capacity, the Team developed a deployment plan for scaling the monitoring system to 100 sites within the Maumee River watershed and its tributaries. This plan for the Maumee Watershed is representative of the type of scaling that could be reproduced across the Lake Erie Basin. These components have the potential to make Lake Erie the smartest lake in the world and provide a model for other lakes and watersheds to monitor and improve their water quality.



Members of Team Glass at Pitch Day for the Challenge. From left, Vince Kelly (Green Eyes), Nathan Zgnilec (OHM Advisors), Karlin Danielsen (OHM Advisors), Robert Czachorski (H2Ometrics)



ARCHITECTS. ENGINEERS. PLANNERS.

April 27, 2018

Macomb County Public Works, MI  
Vincent Astorino, Operations and Flow Manager  
21777 Dunham Road  
Clinton Township, MI 48036

**RE: Real-Time Total Residual Chlorine Monitoring at Chapaton Retention Treatment Basin – Phase 1 Pilot Study**

Dear Mr. Vince Astorino:

The Office of the Macomb County Public Works Commissioner is interested in improving total residual chlorine (TRC) monitoring throughout the Chapaton Retention Treatment Basin (RTB). The goal is to optimizing the application of sodium hypochlorite to minimize the TRC in effluent waters during discharge events. The County operates the Chapaton RTB providing disinfection of CSOs to protect public health and meet effluent fecal coliform limits described in their permit. The RTB provides contact time for the disinfection process as well as solids capture through screening, sedimentation, and skimming. The RTB is consistently meeting the fecal coliform permit limit and successfully operating the sodium hypochlorite disinfection system to achieve the TRC operational goals of the permit. Operators of the RTB monitor and maintain effluent TRC below the event average operational goal of 1.5 mg/L.

OHM Advisors has prepared this proposal to assist the County in integrating continuous, real-time TRC monitoring into the standard operations at the Chapaton RTB. Quantifying TRC on a continuous basis would provide a deeper understanding of the facilities' performance and its influence on the receiving waters. This process will consist of three critical phases, as follows:

Phase 1: Demonstrate the effectiveness of continuous, real-time TRC monitoring through a pilot deployment and develop a conceptual plan for monitoring TRC throughout the RTB.

Phase 2: Design, install, and integrate TRC equipment into the standard operation of the RTB. If the County decides to bid the mechanical installation, design would include bid documents, specifications, and drawings.

Phase 3: Analyze data from the instruments to optimize the sodium hypochlorite disinfection process.

This proposal outlines the tasks that OHM Advisors will perform in order to complete Phase 1, including a pilot deployment of a TRC autonomous monitoring device. Specifically this pilot study will:

- Select the appropriate monitoring device.
- Test the performance of an autonomous monitoring device to quantify TRC concentrations.
- Demonstrate how continuous, real-time monitoring could facilitate data driven decision making during discharge events.
- Develop a conceptual plan for integrating real-time TRC monitoring into the standard operations at the Chapaton RTB.





## Scope of Services

### **Task #1      Understanding Facility and Site      (\$1,000)**

The first step in successfully performing a pilot study at the Chapaton RTB is for OHM Advisors to gain an in-depth understanding of the facility. This insight will be necessary for proper deployment of the monitoring equipment and understanding the water quality issues affecting the facility. Support from staff at the Chapaton RTB will be necessary to complete this task. OHM Advisors will perform the following tasks:

- Tour the Chapaton RTB to identify the present challenges in monitoring TRC
- Identify the resources available to support deployment of the monitoring equipment
- Review past reports or studies relating to the Chapaton RTB
- Collect flow and water quality records from the RTB, including
  - discharge frequency
  - discharge volume
  - observed water quality
  - sampling records from receiving water

### **Task #2      Select the TRC Sensor      (\$3,000)**

OHM Advisors will review TRC sensors available on the market to identify which sensor will best facilitate the collection and transfer of real-time data to support the long-term operation of the Chapaton RTB. OHM Advisors will coordinate with the equipment provider to review sensors and assist the County in purchasing a TRC autonomous monitoring device.

### **Task #3      Installation Coordination and Validation of TRC Equipment      (\$6,000)**

OHM Advisors will coordinate installation of the TRC sensor with the equipment provider and compare the performance of the sensor to the present monitoring process. Two OHM Advisors staff members will make three half-day visits to the RTB to be present for installation, and (up to) two discharge events. Support from staff at the Chapaton RTB will be necessary to gain access to the site for installing and maintaining the sensor. It is expected that a single discharge event will be sufficient to complete this task. However, if the first event is too brief or issues are encountered with the TRC sensor, it may be in the County's best interest to monitor sensor performance during a second discharge event. The costs for monitoring a second discharge event as part of the pilot study are included in this proposal.

As part of this task, OHM Advisors will:

- Coordinate with the equipment provider to prepare, deploy, and maintain the monitoring equipment at the Chapaton RTB. The equipment provider will install the TRC sensor and supporting equipment. The costs for purchasing, installing, and maintaining the equipment are not included in this proposal but are expected to be \$8,000-10,000.
- Following installation of the TRC equipment, OHM Advisors will verify the performance of the TRC equipment by comparing TRC grab samples taken by RTB staff to measurements taken by the TRC autonomous monitoring device during a discharge event.
- Analyze the data collected by grab samples and the TRC autonomous monitoring device. Once satisfactory performance of the TRC sensor is confirmed, the vertical stratification of TRC within the RTB will be analyzed, either with the TRC autonomous monitoring device or through grab samples.



**Task #4      Develop a Conceptual Engineering Plan for a Long-Term Monitoring Program      (\$9,000)**

OHM Advisors will consider the applicability of long-term, real-time TRC monitoring to optimize the treatment processes at the Chapaton RTB. This effort will include the following tasks:

- Interview operators to determine ease of use requirements.
- Determine strategy for selecting the number and placement of monitoring equipment.
- Outline piping and electrical supply requirements.
- Develop a strategy for maintaining monitoring equipment between discharge events.
- Determine networking equipment and data transfer needs.
- Prepare a conceptual engineering plan of the system-wide TRC monitoring program, including a layout of the system and drawings demonstrating the location of sensors and supporting equipment.
- Prepare a conceptual cost estimate for integrating the TRC equipment at the RTB.

**Task #5      Deliverables      (\$3,000)**

OHM Advisors will prepare a brief letter report summarizing the findings of the pilot study. The report will present a conceptual plan and costs for integrating real-time TRC monitoring into the standard operations at the Chapaton RTB.

**Total OHM Advisors Costs      (\$22,000)**

**Schedule**

	January, 2018	February, 2018	March, 2018	April, 2018	May, 2018	June, 2018	July, 2018	August, 2018	September, 2018
Understanding Facility and Site									
Select the TRC Sensor									
Deploying and Validating TRC Equipment									
Develop a Full-scale Monitoring Program									
Deliverables									



**Contract Terms and Conditions**

Work will be performed through OHM Advisors' standard terms and conditions, attached to this proposal.

**Acceptance**

If this proposal is acceptable to you, a signature on the last page of this letter will serve as our authorization to proceed.

Thank you for giving us the opportunity to be of service. We look forward to working with you on this project.

Sincerely,  
OHM Advisors

Authorization to Proceed

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Robert S. Czachorski, P.E.  
robert.czachorski@ohm-advisors.com  
D: 734.466.4548

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Signature

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Date

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Printed Name

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Title

### 2018 Lawn Maintenance RFQ Summary & Cost Comparison

A Request for Quotation (RFQ) was published on MITN for Lawn Maintenance at locations identified in Table 2. The RFQ was posted from March 28<sup>th</sup> to April 12<sup>th</sup>, with 39 contractors downloading documents during the posting period. On April 12<sup>th</sup> there were 6 proposals received, which are summarized in Table 1.

The contractors were directed to provide pricing to perform lawn maintenance service from May 1<sup>st</sup> through October 31<sup>st</sup>. Green Meadows Lawnscape is the low bidder for the sites described in the RFQ. Additionally, the largest MIDD community, Sterling Heights, highly recommends Green Meadows Lawnscape. They also provide services for Shelby Township, Macomb Township, Troy and Rochester Hills.

Table 1

	<b>Contractor</b>	<b>Cost</b>
1	Green Meadows Lawnscape	\$29,785.00
2	Marino's Landscape	\$33,451.00
3	Expert Lawn and Snow	\$37,000.00
4	Premier Group Associates	\$39,675.00
5	Ultimate Lawn Service	\$47,120.00
6	Premier Professional Landscape	\$73,632.00

## Green Meadows Lawnscape Cost Breakdown

Table 2

No.	Drainage District	Name/Location	Cut	Trim	Frequency	# of Cuts	Cost Per Cut	Total Cost for Season
1	Clinton River Spillway	Clinton River Spillway	Yes	No	Twice a Month	13	\$500.00	\$6,500.00
2	Roseville Consolidated	Roseville Consolidated	Yes	No	Twice a Month	13	\$60.00	\$780.00
3	Bridgewood	Bridgewood	Yes	Yes	Twice a Month	13	\$30.00	\$390.00
4	Hildebrandt	Hildebrandt	Yes	Yes	Twice a Month	13	\$135.00	\$1,755.00
5	MIDDD	Sewage Flow Meter Site CH-S-1	Yes	Yes	Twice a Month	13	\$25.00	\$325.00
6	MIDDD	Sewage Flow Meter Site CH-S-2	Yes	No	Twice a Month	13	\$25.00	\$325.00
7	Shanahan Drain	Shanahan Drain Property	Yes	No	Twice a Month	13	\$85.00	\$1,105.00
8	MIDDD	Bio Filter	Yes	Yes	Once a Week	27	\$65.00	\$1,755.00
9	MIDDD	Sewage Meter Facility SY-S-3	Yes	Yes	Twice a Month	13	\$30.00	\$390.00
10	MIDDD	Sewage Meter Facility ST-S-3	Yes	Yes	Twice a Month	13	\$30.00	\$390.00
11	MIDDD	North Gratiot Pump Station	Yes	Yes	Once a Week	27	\$35.00	\$945.00
12	MIDDD	Clintondale Pump Station	Yes	Yes	Once a Week	27	\$60.00	\$1,620.00
13	MIDDD	Sewage Flow Meter Site NH-S-1	Yes	Yes	Twice a Month	13	\$30.00	\$390.00
14	MIDDD	ARV Vaults – 23 locations	Yes	Yes	Once a Month	7	\$460.00	\$3,220.00
15	11 ½ Mile Relief	11 ½ Mile Relief Property	Yes	Yes	Twice a Month	13	\$55.00	\$715.00
16	SEMCWDS	Bon Huer Pump Station	Yes	Yes	Once a Week	27	\$30.00	\$810.00
17	SEMCWDS	Violet Pump Station	Yes	Yes	Once a Week	27	\$30.00	\$810.00
18	8 ½ Mile Relief	Chapaton Retention Treatment Basin	Yes	Yes	Once a Week	27	\$220.00	\$5,940.00
19	8 ½ Mile Relief	Vacant Lot on Gaukler Street	Yes	Yes	Once a Week	27	\$25.00	\$675.00
20	Martin Sanitary Diversion	Martin Retention Treatment Basin	Yes	Yes	Once a Week	27	\$35.00	\$945.00

The total cost allocated to the respective drainage districts is summarized in Table 3. The contractor awarded this work would be required to execute a contract with each of the 10 drainage districts.

Table 3

No.	Drainage District	Drain Chapter	Total Cost
1	MIDDD	20	\$9,360.00
2	8 ½ Mile Relief	20	\$6,615.00
3	Martin Sanitary Diversion	20	\$945.00
4	SEMCWDS	342	\$1,620.00
5	Clinton River Spillway	21	\$6,500.00
6	Roseville Consolidated	20	\$780.00
7	Bridgewood	4	\$390.00
8	Hildebrandt	4	\$1,755.00
9	Shanahan Drain	20	\$1,105.00
10	11 ½ Mile Relief	20	\$715.00
<b>TOTAL</b>			<b>\$29,785.00</b>

Table 4 compares the cost incurred during the 2017 season versus 2018 costs for six locations using Green Meadows Lawnscape.

Table 4

No.	Drain	2017 Cost Per cut	2018 Cost Per cut	Savings Per cut	Total Savings for Season
1	Clinton River Spillway	\$980.00	\$500.00	\$480.00	\$6,240.00
2	MIDDD ARV Vaults	\$920.00	\$460.00	\$460.00	\$3,220.00
3	Bridgewood	\$520.00	\$30.00	\$490.00	\$6,370.00
4	Hildebrandt	\$520.00	\$135.00	\$385.00	\$5,005.00
5	Roseville Consolidated	\$520.00	\$60.00	\$460.00	\$5,980.00
6	Shanahan Drain	\$520.00	\$85.00	\$435.00	\$5,655.00
<b>TOTAL SAVINGS</b>					<b>\$32,470.00</b>

Further, if we spend a \$15,320 of the \$32,470 savings generated by contracting Green Meadows Lawnscape to maintain sites previously maintained by our MIDDD and Chapaton staff, we can redirect our full-time staff to more important and skilled tasks such as cleaning out the Air Relief Valves which we now pay a contractor \$120,000 per year, providing additional savings.

Green Meadows Lawnscape is cheaper than hiring part-time seasonal staff to cut grass, as they can cut all of our sites (absent Sterling Relief) for less than \$30,000 per year.

EIGHT AND ONE-HALF MILE RELIEF DRAIN - MAY 14, 2018

Funding Source	Apportionment	Manager	Vendor	Amount	Invoice Detail	Project Summary	Project Balance		
1/2 Mile Relief	Chapter 20 State of MI - 16.04% County of Macomb - 2.25% Dept. of Roads - 2.25% Eastpointe - 54.33% St. Clair Shores - 25.13%								
		Astorino	Consumers Energy	\$ 735.31	Monthly Gas - 2/23/18 - 3/23/18	Chapaton West Building			
		Astorino	Cummins Bridgeway	\$ 512.57	Invoice #006-62658 - 3/21/18	Generator Batteries			
		Astorino	DTE Energy	\$ 9,237.94	Monthly Electric - 3/8/18 - 4/9/18	Chapaton RTB - SWPs			
		Astorino	Fishbeck, Thompson, Carr & Huber, Inc.	\$ 4,707.00	Invoice #373666 - 4/4/18 Engineering Services - ending 3/23/18	As-needed Engineering			
		Astorino	Grainger	\$ 538.98	Invoice #9758642392 - 4/16/18	Sump Pump - B-4 - Chapaton RTB			
		Astorino	Jones Chemicals, Inc.	\$ 4,073.10	Invoice #733540 - 4/17/18	Hypochlorite Solution - 4,501 gallons			
		Astorino	Macomb Community College	\$ 2,688.00	Invoice #005645579 - 4/3/18	Confined Space Training - 8 employees			
		Astorino	Nickel & Saph, Inc.	\$ 3,647.04	Invoice #18927 - 4/10/18	General Liability, Public Officials' Liability & Hired and Non-owned Auto Liability			
		Astorino	Paul Conway Shields	\$ 3,213.00	Invoice #0420688-IN - 4/9/18	Equipment for Confined Space Trailer			
		Astorino	St. Clair Shores	\$ 3,349.17	Water - 12/15/17 - 3/15/18	Lab Analysis of Water Samples			
		Astorino	Test America	\$ 1,311.00	Invoice #19012371 - 4/19/18	Lab Analysis of Water Samples			
		Astorino	Test America	\$ 759.00	Invoice #19012431 - 4/25/18	Lab Analysis of Water Samples			
					<b>Total</b>	\$ 34,772.11			



**Questions:**  
Visit: [ConsumersEnergy.com](http://ConsumersEnergy.com)  
Call us: **800-805-0490**

Amount Due: **\$735.31**  
Please pay by: **April 18, 2018**

**CHAPTON PUMPING STATION  
MACOMB CO DRAIN COMM  
21777 DUNHAM RD  
CLINTON TOWNSHIP MI 48036-1005**

APR 02 2018  
MH

▶ **Thank You** - We received your last payment of **\$822.65** on **March 12, 2018**

▶ **Service Address:**  
23001 E 9 MILE RD  
SAINT CLAIR SHORES MI  
48080-1576

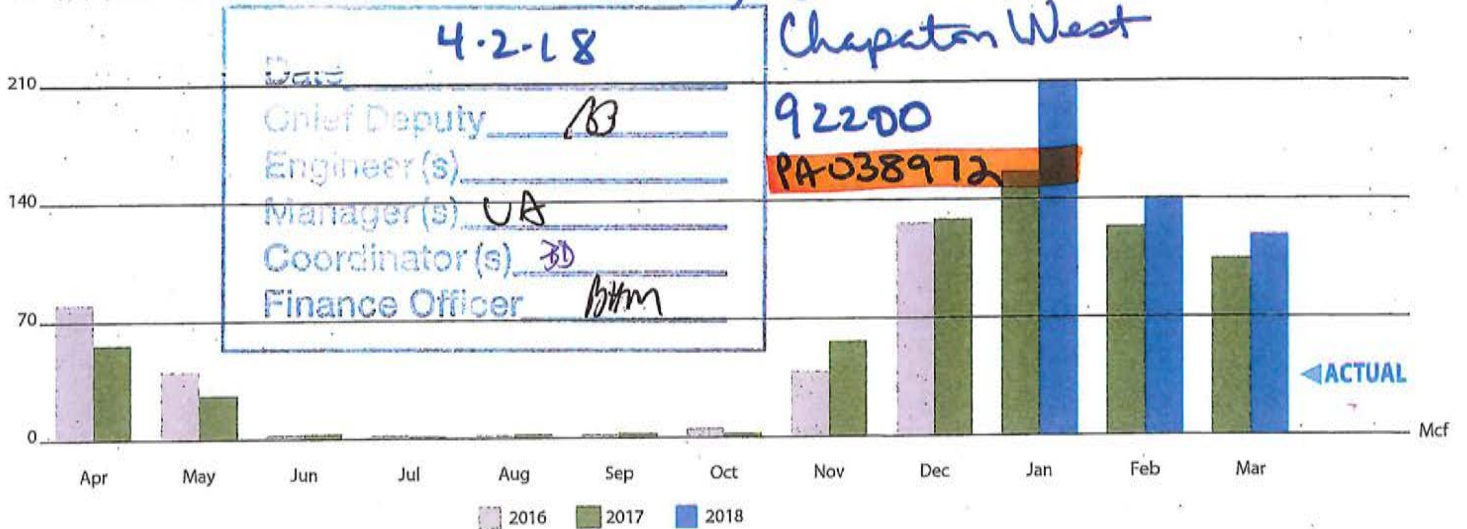


**March Energy Bill**

Service dates: February 23, 2018 - March 23, 2018 (29 days)

**Total Natural Gas Use** (Mcf - thousand cubic feet)

Chg: 8 1/2 Mile  
Chapaton West



**March Natural Gas Use**

**118.6 Mcf**  
March 2017 use: 105 Mcf

Cost per day:

**\$25.36**

Mcf per day:

**4.090**

Prior 12 months of gas use:

**746 Mcf**

Staff 4-17-18  
Board 5-14-18

**STAY SAFE:** Call 9-1-1 and 800-477-5050. We'll respond day or night.



**Downed power lines.**  
Stay 25 feet away. Call from a safe location.



**If you smell natural gas.**  
If the "rotten egg" odor of gas is apparent, call from a safe location.



**Explore Energy Efficiency Solutions for Your Business**

Discover the many ways your business can save, or tell us a little about your business to find the solutions best suited to you.

**Get started**

[www.ConsumersEnergy.com/startsaving](http://www.ConsumersEnergy.com/startsaving)







# Sales and Service

NEW HUDSON  
54250 Grand River Avenue  
New Hudson, MI 48165-  
(248)573-1900

\$512.57  
**RECEIVED**  
APR 02 2018  
BY: MIT

Payment terms are 30 days from invoice date unless otherwise agreed upon in writing.

Remit to: #774494  
4494 Solutions Center  
Chicago, IL 60677-4004

INVOICE NO
006-62658
Remit to: #774494 4494 Solution Ctr. Chicago, IL 60677

### BILL TO

MACOMB COUNTY DPW  
21777 DUNHAM ROAD  
CLINTON TWP., MI 48036-

### OWNER

MACOMB COUNTY OPW  
23001 9 MILE RD  
ST CLAIR SHORES, MI 48080-  
PETER TROMBLEY - 586 772-3425

PAGE 1 OF 2

\*\*\* CHARGE \*\*\*

DATE	CUSTOMER ORDER NO.	DATE IN SERVICE	ENGINE MODEL	PUMP NO.	EQUIPMENT MAKE
21-MAR-2018			GFGA		ONAN
CUSTOMER NO.	SHIP VIA	FAIL DATE	ENGINE SERIAL NO.	CPL NO.	EQUIPMENT MODEL
133741		20-MAR-2018	HM08H31673201		GEN SET
REF. NO.	SALESPERSON	PARTS DISP.	MILEAGE/HOURS	PUMP CODE	UNIT NO.
186134	21109				CHAPATAN

QUANTITY ORDERED	BACK ORDERED	QUANTITY SHIPPED	PART NUMBER	DESCRIPTION	PRODUCT CODE	UNIT PRICE	AMOUNT
------------------	--------------	------------------	-------------	-------------	--------------	------------	--------

OSN/MSN/VIN HM08H31673201

COMPLAINT REPLACE BATTERIES

CAUSE ESTIMATED REPAIR

CORRECTION LOCKED OUT BATTERY CHARGER. REMOVED CABLES AND CLEANED BATTERY TERMINALS. INSTALLED NEW BATTERIES. ATTACHED CABLES AND SEALED TERMINALS. TURNED ON CHARGER AND RAN UNIT TO TEMP. VERIFIED CHARGING SYSTEM WAS OPERATING PROPERLY. JOB IS COMPLETE.

THANK YOU FOR USING CUMMINS SALES AND SERVICE.

COVERAGE	QUANTITY	DESCRIPTION	UNIT PRICE	AMOUNT
	2	C8DXH P G8D CCA1400 RC450	185.41	370.82
	2	E-CORE-D CORE	52.50	105.00
	-2	E-CORE-D CORE	52.50	105.00

Chg: 8 1/2 M. de reg  
Date 4-4-18  
Chief Deputy BB  
Engineer(s) \_\_\_\_\_  
Manager(s) JA  
Coordinator(s) BD  
Finance Officer pkm

PARTS:	370.82
PARTS COVERAGE CREDIT:	0.00 CR
TOTAL PARTS:	370.82
SURCHARGE TOTAL:	0.00
LABOR:	135.00
LABOR COVERAGE CREDIT:	0.00 CR
TOTAL LABOR:	135.00
MISC.:	6.75
MISC. COVERAGE CREDIT:	0.00 CR
TOTAL MISC.:	6.75
HAZ WASTE DISPOSAL	6.75

TAX EXEMPT NUMBERS: PA 039023 93000

Billing Inquiries? Call 877-480-6970 or email CBSBridgeway.Receivables@cummins.com

THERE ARE ADDITIONAL CONTRACT TERMS ON THE REVERSE SIDE OF THIS DOCUMENT, INCLUDING LIMITATION ON WARRANTIES AND REMEDIES, WHICH ARE EXPRESSLY INCORPORATED HEREIN AND WHICH PURCHASER ACKNOWLEDGES HAVE BEEN READ AND FULLY UNDERSTOOD.



# Sales and Service

NEW HUDSON  
54250 Grand River Avenue  
New Hudson, MI 48165-  
(248)573-1900

Payment terms are 30 days from invoice date unless otherwise agreed upon in writing.

Remit to: #774494  
4494 Solutions Center  
Chicago, IL 60677-4004

### INVOICE NO

006-62658

Remit to: #774494  
4494 Solution Ctr. Chicago, IL 60677

### BILL TO

MACOMB COUNTY DPW  
21777 DUNHAM ROAD  
CLINTON TWP., MI 48036-

### OWNER

MACOMB COUNTY OPW  
23001 9 MILE RD  
ST CLAIR SHORES, MI 48080-  
PETER TROMBLEY - 586 772-3425

PAGE 2 OF 2

\*\*\* CHARGE \*\*\*

DATE	CUSTOMER ORDER NO.	DATE IN SERVICE	ENGINE MODEL	PUMP NO.	EQUIPMENT MAKE
21-MAR-2018			GFGA		ONAN
CUSTOMER NO.	SHIP VIA	FAIL DATE	ENGINE SERIAL NO.	CPL NO.	EQUIPMENT MODEL
133741		20-MAR-2018	HM08H31673201		GEN SET
REF. NO.	SALESPERSON	PARTS DISP.	MILEAGE/HOURS	PUMP CODE	UNIT NO.
186134	21109				CHAPATAN

QUANTITY ORDERED	BACK ORDERED	QUANTITY SHIPPED	PART NUMBER	DESCRIPTION	PRODUCT CODE	UNIT PRICE	AMOUNT
			HM08H31673201	OSN/MSN/VIN			

Billing Inquiries? Call 877-480-6970 or email CBSBridgeway.Receivables@cummins.com

THERE ARE ADDITIONAL CONTRACT TERMS ON THE REVERSE SIDE OF THIS DOCUMENT, INCLUDING LIMITATION ON WARRANTIES AND REMEDIES, WHICH ARE EXPRESSLY INCORPORATED HEREIN AND WHICH PURCHASER ACKNOWLEDGES HAVE BEEN READ AND FULLY UNDERSTOOD.

SUB TOTAL: 512.57  
TOTAL TAX: 0.00

TOTAL AMOUNT: US \$ 512.57

34

AUTHORIZED BY (print name)

SIGNATURE

DATE

## Account Information

MACOMB COUNTY  
MACOMB COUNTY DRAIN COMM  
21777 DUNHAM RD  
CLINTON TWP, MI 48036



**Account Number** 9100-0005-3785

DTE-Energy Federal ID No. 38-3217752

Programs you are enrolled in **BY:**

18-169

### How to contact us:

Power Outage  
Billing Inquiry

See Detail Charges  
1-734-397-4309

Please make any inquiry or complaint about this bill to DTE Energy before the Due Date.  
DTE Energy is regulated by the Michigan Public Service Commission, Lansing, Michigan

## Important Information

For the average Michigan residential customer, renewable energy is estimated to avoid \$3.08 per month of new coal-fired generation costs.

Chg: 8 1/2 Mile

Date	4.16.18
Chief Deputy	BD
Engineer(s)	
Manager(s)	UA
Coordinator(s)	BD
Finance Officer	hmm

PA 039127 92300



# Detail Charges

For Service at: 23001 E 9 Mile Rd, St Clair Shores, MI 48082

Outage Contact Number: 1-313-235-1300

Invoice: 200060733497

Billing Period: 03/08/2018 through 04/09/2018

Days Billed: 33

## Metering Information

Meter Number	Start Date	Start Read	Stop Date	Stop Read	Read Difference	Units Multiplier	Usage Used	Type
6321448	03/08	258.1A	04/09	263.9A	5.8	6,400.0000	37,120.0	P - In-V
6321448	03/08	313.3A	04/09	321.9A	8.6	6,400.0000	55,040.0	P - In-W
6321449	03/08	0.0A	04/09	0.0A	0.0	- 6400.000	0.0	P - Out-W
6321449	03/08	0.7A	04/09	0.7A	0.0	- 6400.000	0.0	P - Out-V
6321451	03/08	0.4A	04/09	0.4A	0.0	6,400.0000	0.0	P - In-V
6321451	03/08	0.4A	04/09	0.4A	0.0	6,400.0000	0.0	P - In-W
<b>Total KVARH</b>							<b>37,120.00</b>	
<b>Total KWH</b>							<b>55,040.00</b>	

Invoice: 200060733497 Service Name: Chapaton Pumping Station

Item: 7004376662 Cycle: 05

General Service Municipal Pumping-Net Metering

## Billing Status Information

1	On-peak Billing Demand	794	KW	ESTABLISHED	04/04/2018	12:00
3	65% High OP Bill Dmd June-Oct prec 11 mths	1697	KW	ESTABLISHED	09/19/2017	15:30
8	Highest Single Billing Demand	1536	KW	ESTABLISHED	04/03/2018	23:30
A	Current PV High Monthly Demand	1536	KW	ESTABLISHED	04/03/2018	23:30
B	50% of the Contract Capacity for PV	0	KW			
C	Primary Voltage Maximum Demand	4101	KW	ESTABLISHED	08/28/2017	21:00
	Contract Capacity for Location	6738	KW	ESTABLISHED	08/16/2016	05:00
	Power Factor (ratio) for all voltages	82	PCT			
	Total Number of days in the Billing Period	33	DAYS			
	Avg Kilowatthours Used Per Day This Period	1668	KWH			
	Avg Kilowatthours Used Per Day A Year Ago	1900	KWH			
	kWh percentage change from a year ago	-12	PCT			
	Metered outflow	0	KWH			
	Net Delivery Billed (inflow)	55040	KWH			
	Net Inflow (In - Out)	55040	KWH			

## Charges for 03/08/2018 through 04/09/2018

### Power Supply Charges:

Power Supply Energy:						
Power Supply Energy Charge	55,040	KWH	@ \$	0.0774300	Per Total KWH	4,261.75
Surcharges:						
Power Supply Cost Recovery Factor	55,040	KWH	@ \$	-0.0008700	Per Total KWH	- 47.88
<b>Sub Total:</b>						<b>4,213.87</b>

### Delivery Charges:

Service Charge						11.25
Distribution:						
Distribution Energy	55,040	KWH	@ \$	0.0392000	Per Total KWH	2,157.57
Surcharges:						
Transitional Recovery Mechanism	55,040	KWH	@ \$	0.0013560	Per Total KWH	74.63
U-18255 IS	55,040	KWH	@ \$	0.0032520	Per Total KWH	178.99
Nuclear Surcharge	55,040	KWH	@ \$	0.0007280	Per Total KWH	40.07
Energy Waste Reduction	2	MTR	@ \$	29.8500000		59.70
LIEAF Factor	2	MTR	@ \$	0.9300000		1.86
<b>Sub Total:</b>						<b>2,524.07</b>
Special Facilities Charge						2,500.00

### Invoice Subtotal

9,237.94

Michigan State Sales Tax On Taxable Portion

0.00

### Invoice Total

\$9,237.94



Fishbeck, Thompson, Carr & Huber, Inc.  
 engineers | scientists | architects | constructors  
 Federal I.D. No. 38-1841857 | Incorporated

**Payment Options**

Remit Wire/ACH payments to Acct: 100094457 ABA: 072413829  
 Remit checks to: 1515 Arboretum Drive, SE | Grand Rapids, Michigan 49546

RECEIVED  
 APR 04 2018  
 BY: MH

Attention: Mr Vincent Astorino  
 Macomb County Public Works Commissioner  
 21777 Dunham Road  
 Clinton Township, MI 48036  
 United States

Invoice: 373666  
 Invoice Date: 4/4/2018  
 Project: 130622  
 Project Name: Macomb Co PW/As-needed Assist  
 Bill Term: 1

**For Professional Services Rendered Through 3/23/2018**

J - Macomb Co PW/SEMSD_Chapaton Meters	4,707.00
Work Included:	
- Site Visits to Chapaton and Martin RTB to locate permanent Meters	
- Preparation of plans for the installation of permanent meters at Chapaton	
- Update of the overall SEMSD temporary metering Map	
Rate Labor	4,707.00
	4,707.00
<b>Current Billings</b>	<u>4,707.00</u>
<b>Amount Due This Bill</b>	<u>4,707.00</u>

Chg: 8 1/2 Mile

Date	4.4.18
Chief Deputy	BS
Engineer(s)	
Manager(s)	UA
Coordinator(s)	BD
Finance Officer	MM

PA039013 80300

Staff 4.17.18  
 Doura 5.14.18

09-0014.22

25940 GROESBECK HWY.  
WARREN, MI 48089-4144  
www.grainger.com

GRAINGER ACCOUNT NUMBER 803170893  
INVOICE NUMBER 9758642392  
INVOICE DATE 04/16/2018  
DUE DATE 05/16/2018  
AMOUNT DUE 538.98

PO NUMBER: BOB BUGAMELLI  
CALLER: BOB BUGAMELLI  
CUSTOMER PHONE: (586) 772-3434  
ORDER NUMBER: 1318536311  
INCO TERMS: FOB ORIGIN

BILL TO  
MDG2018 00002007 1 AB 0408

ATTN AP  
MACOMB COUNTY PUBLIC WORKS  
21777 DUNHAM RD  
CLINTON TWP, MI 48036-1005



Pay invoices online at:  
[www.grainger.com/invoicing](http://www.grainger.com/invoicing)  
Sign up for paperless invoicing at:  
[www.grainger.com/paperlessinvoicing](http://www.grainger.com/paperlessinvoicing)

THANK YOU!

FEI NUMBER 36-1150280

FOR ANY QUESTIONS ABOUT THIS INVOICE OR ACCOUNT CALL 1-800-472-4643

PO LINE #	ITEM #	DESCRIPTION	QUANTITY	UNIT PRICE	TOTAL
	3BB83	<p>The following items were for: MACOMB COUNTY PUBLIC WORKS 23001 E 9 MILE RD SAINT CLAIR SHORES MI 48080-1576</p> <p>PUMP, EFFLUENT, 1/2HP MANUFACTURER # 3BB83 Delivery# 6393453660 Date: 04/16/2018 Carrier: UPS GROUND No. of pkgs: 1 Wt: 79.75 Trk#: 1Z3018W70370766568 SHIPPED FROM: DC MACEDONIA, OH - 935 8211 BAVARIA ROAD MACEDONIA OH 44056-2259</p>	1	538.98	538.98
<p><b>RECEIVED</b> APR 23 2018 Chy: MIT Date: 4-26-18 Chief Deputy: [Signature] Engineer(s): [Signature] Manager(s): VA Coordinator(s): [Signature] Finance Officer: [Signature]</p> <p>19039208 93000</p>					
INVOICE SUB TOTAL					538.98

THIS PURCHASE IS GOVERNED EXCLUSIVELY BY GRAINGER'S TERMS OF SALE, INCLUDING: (i) DISPUTE RESOLUTION REMEDIES, AND (ii) CERTAIN WARRANTY AND DAMAGES LIMITATIONS AND DISCLAIMERS IN EFFECT AT THE TIME OF THE ORDER, WHICH ARE INCORPORATED BY REFERENCE HEREIN. GRAINGER'S TERMS OF SALE ARE AVAILABLE AT WWW.GRAINGER.COM. PRODUCT RETURN INSTRUCTIONS ARE AVAILABLE AT WWW.GRAINGER.COM/RETURNS.

These items are sold for domestic consumption. If exported, purchaser assumes full responsibility for compliance with US export controls. Diversion contrary to US law prohibited.

PAY THIS INVOICE; NO STATEMENT WILL BE SENT. PAYMENT TERMS NET 30 DAYS IN U.S. DOLLARS.

**AMOUNT DUE 538.98**

PLEASE DETACH THIS PORTION AND RETURN WITH YOUR PAYMENT.

BILL TO:  
ATTN AP  
MACOMB COUNTY PUBLIC WORKS  
21777 DUNHAM RD  
CLINTON TWP, MI 48036-1005

REMIT TO:  
GRAINGER  
DEPT. 803198225  
PALATINE, IL 60038-0001

803198225975864239210000538981000000010000000100000018051667

Staff 5-1-18  
Board 5-14-18

ACCOUNT NUMBER 803170893 DATE 04/16/2018 INVOICE NUMBER 9758642392 AMOUNT DUE 538.98

FOR COMMENTS OR CHANGE OF ADDRESS, ENTER INFORMATION ON REVERSE SIDE.



www.jcichemicals.com

INVOICE

RECEIVED  
 APP 20 2018  
 MH

\*\*\* ORIGINAL \*\*\*  
 JCI JONES CHEMICALS, INC..  
 RIVERVIEW BRANCH LOCATION  
 18000 PAYNE AVENUE  
 RIVERVIEW, MI 48192  
 Phone: (734) 283-0677  
 Fax: (734) 283-0979  
 email: cs@jclchem.com

Inv Date	Invoice #
04/17/2018	753540
Date Shipped	Order/BOL #
04/17/2018	555077

Customer Number  
 21543215

S MACOMB COUNTY  
 O ATTN: ACCTS PAYABLE  
 L 23001 9 MILE ROAD  
 D Saint Clair Shores, MI 48080-  
 T USA  
 O

S ID #: 1  
 H  
 I CHAPATON PUMPING STATION  
 P 23001 NINE MILE RD  
 ST CLAIR SHORES, MI 48080-  
 T USA  
 O

Customer PO #		FOB Remark		Freight Terms		Sales ID			
VERBAL-PETE		Destination		Delivered		NORTH			
Release #		Ship Via		Terms		Due Date		Discount Due Date	
		JCI		N 30		05/17/2018		5/17/2018	
Units	Package	Product Name		Total Quantity	Unit Price	Amount			
4,501.00	1 Gal Bulk	HYPOCHLORITE SOLUTION, SS150 1201-001 BULK (\$85 Stop Fee) (+ fsc)		4,501.0000/Gal	0.9000 /Gal	4,050.90			
General Remarks:		<> EMAIL INVOICE TO: michelle.houvener@macombgov.org <> OUTSIDE CARRIER: HAROLD MARCUS NET WEIGHT: 45460 FSC							
		Fuel Surcharge				22.20			
		Chg: 8 1/2 M. Lee Ref Date: 4.20.18 Chief Deputy: [Signature] Engineer(s): Manager(s): UA Coordinator(s): [Signature] Finance Officer: [Signature]							
		PA039134		74200					

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

Staff 5.1.18  
 Board 5.14.18

Total: **4,073.10**

Remit To: JCI Jones Chemicals, Inc.  
 PO Box 12549  
 Newark, NJ 07101-3550 USA

PLEASE PAY  
 THIS AMOUNT





**Pay by Mail:** Macomb Community College, Cashier CC-G131, 14500 Twelve Mile Rd., Warren, MI 48088-3896  
**Pay by Fax:** Fax completed Credit Card information to 586-226-4754  
*To receive a receipt, provide an E-mail address or fax number in the space below:*

Company AR Invoice (CREN)

Account ID	Account Name	AR Type	Term	Invoice Number
0900101	Macomb County Public Works	43	2018NC	005645579
Invoice Description		Invoice Date	Payment Due	Amount Due
Confined Space Rescuer		04/03/18	04/18/18	14,000.00

Check/Money Order       VISA       MasterCard       Discover

Macomb County Public Works  
 Attn: Alex Pirkovic  
 21777 Dunham Rd  
 Clinton Twp, MI 48036

Card Holder Signature (as it appears on card)

Billing Street Address

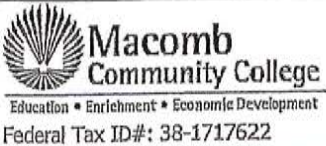
City, State, Zip

16 Digit Card Number

Exp Date (mm/yy)

3 Digit Security Code

*Remit Top Portion With Your Mailed Check, Money Order or Credit Card Payment*



**Questions on your invoice: Contact Financial Services at 586-445-7335**  
**Email: regpay@macomb.edu**

Page 1

Account ID	Account Name	AR Type	Term	Invoice Number
0900101	Macomb County Public Works	43	2018NC	005645579
Invoice Description		Invoice Date	Payment Due	Amount Due
Confined Space Rescuer		04/03/18	04/18/18	14,000.00

Code	Description	Charges	Credits
HSIND	Health & Safety hs.ind18	14,000.00	
	Confined Space Rescuer 2/7, 8, 15, 16, 27/2018 12 students		
	3/6, 7, 8, 14, 15/2018 13 students		
	Client Contact: Alex Pirkovic 586-772-3425 alex.pirkovic@macombgov.org		
	<b>Total:</b>	14,000.00	0.00



**\$2688.00**

Invoice Net.....: 14,000.00  
 Payments/Adjustments:  
 Balance Due.....: 14,000.00

Chg: 8 1/2 Mile Ref

Date	4-6-18
Chief Clerk	AB
Engineer(s)	
Manager(s)	WA
Coordinator(s)	SA
Finance Officer	MH

**PA039033 95820**

Staff 4-17-18  
 Board 5-14-18



Nickel & Saph, Inc.  
 P. O. Box 46907  
 Mt. Clemens, MI 48046-6907  
 Phone: 586-463-4573

RECEIVED  
 APR 10 2018  
 MLT

INVOICE NO. 18927		Page 1
ACCOUNT NO. CS#	DATE	
MACO-17 MA	04/10/2018	
Commercial Application		
POLICY #		
BINDER		
EFFECTIVE	EXPIRATION	BALANCE DUE ON
04/26/2018	04/26/2019	04/26/2018

Macomb County Intra-County  
 Drains Drainage Districts  
 21777 Dunham Road  
 Clinton Twp., MI 48036

Item #	Eff Date	Trn Type	Description	Amount
67230	04/26/18	MEM PCKG	Annual Premium	\$182,352.00
Invoice Balance:				\$182,352.00

Excess general liability, public officials' liability, & hired and non-owned auto liability. Thank you.

8 1/2 mile \$3,647.04  
 Chg: MIDD \$178,704.96

Date 4.10.18  
 Chief Designer AB  
 Engineer  
 Manager US  
 Coordinator(s) BD  
 Finance Officer HM

PA-039092 91000

Staff 4.17.18

Board 5.14.18

Invoice

RECEIVED  
APR 11 2018  
BY: MH

Paul Conway Shields  
14100 W. Cleveland Ave.  
New Berlin, WI 53151  
service@paulconwayshields.com  
(262) 782-1886



**PAUL CONWAY  
SHIELDS**

Invoice Number: 0420688-IN  
Invoice Date: 4/9/2018  
Invoice Due Date: 5/9/2018  
Order Number: 0328580

Salesperson: SSF  
Customer Number: 00-0669979

Date: 4-11-18  
 Chief Deputy: AB  
 Engineer(s): \_\_\_\_\_  
 Sold To: UA  
 Macomb Co Public Works BB  
 21777 Dunham \_\_\_\_\_  
 Clinton Township, MI 48036 hym  
 Finance Officer \_\_\_\_\_

Chg: MIDD \$5,356.00  
 8 1/2 Mile \$3,213.00  
 Martin \$1,338.75  
 SEMCOWDS \$ 803.25

Ship To:  
Macomb Co Public Works  
23001 East Nine Mile  
ATT: Alex Pirkovic  
Saint Clair Shores, MI 48080

Confirm To: PA039104 97600

Customer P.O.	Ship VIA	F.O.B.	Terms
18-9325	UPS		Net 30

Item Number	Unit	Ordered	Shipped	Back Ordered	Price	Amount
202832	EACH	1.00	1.00	0.00	393.75	393.75
CMC Harness, Helix, Small						
						Whse: 000
202834	EACH	5.00	5.00	0.00	393.75	1,968.75
CMC Harness, Helix, Medium						
						Whse: 000
202835	EACH	1.00	1.00	0.00	393.75	393.75
CMC Harness, Helix, Large						
						Whse: 000
346200	EACH	10.00	10.00	0.00	118.25	1,182.50
CMC Kask Superplasma HD Helmet, White						
						Whse: 000
757000	EACH	1.00	0.00	1.00	1,420.32	0.00
CMC Tripod, Sked-Evac Industrial Tripod						
						Whse: 000
757010	EACH	1.00	0.00	1.00	96.60	0.00
CMC Tripod Bag for Sked-Evac Industrial Tripod						
						Whse: 000
333000	EACH	1.00	1.00	0.00	650.00	650.00
CMC Rescue MPD						
						Whse: 000
360305	EACH	1.00	1.00	0.00	567.00	567.00
CMC SURECLIP W/ HOT-STICK, CMC						
						Whse: 000
300233	EACH	1.00	1.00	0.00	45.50	45.50
CMC Autolock "G" Carabiners						
						Whse: 000
300221	EACH	10.00	10.00	0.00	40.00	400.00
CMC CMC ProSeries Aluminum Carabiner - Screw Lock						
						Whse: 000
500104	EACH	2.00	2.00	0.00	386.75	773.50
CMC Rescue - AZTEK ProSeries System-AZTEKPRO-500104						
						Whse: 000
500102	EACH	1.00	0.00	1.00	1,273.50	0.00
CMC Rescue - CSR2 Pulley System-125mm-Red-500102						
						Whse: 000
200203	EACH	1.00	1.00	0.00	114.35	114.35
CMC Tubular Web, 2" Red 50 yd Spool						
						Whse: 000
200102	EACH	150.00	150.00	0.00	0.39	58.50
CMC WEBBINCHG 1INCH TUBULAR WEB PER FOOT BLUE						
						Whse: 000
K03160	EACH	200.00	200.00	0.00	1.25	250.00
CMC New England Rope KM III 1/2 Blue						
						Whse: 000
430202	EACH	1.00	0.00	1.00	71.75	0.00
CMC Rope Bag, #2 Blue						
						Whse: 000
K05160	EACH	200.00	200.00	0.00	1.25	250.00
CMC New England Rope, KM III, Orange/Blue						
						Whse: 000

\*\*\*PRICE PER FOOT\*\*\*  
 Staff 4-17-18  
 Board 5-14-18

Invoice

Paul Conway Shields  
 14100 W. Cleveland Ave.  
 New Berlin, WI 53151  
 service@paulconwayshields.com  
 (262) 782-1886



Invoice Number: 0420688-IN  
 Invoice Date: 4/9/2018  
 Invoice Due Date: 5/9/2018  
 Order Number: 0328580

Salesperson: SSF  
 Customer Number: 00-0669979

**Sold To:**  
 Macomb Co Public Works  
 21777 Dunham  
 Clinton Township, MI 48036

**Ship To:**  
 Macomb Co Public Works  
 23001 East Nine Mile  
 ATT: Alex Pirkovic  
 Saint Clair Shores, MI 48080

**Confirm To:**

Customer P.O.	Ship VIA	F.O.B.	Terms
18-9325	UPS		Net 30

Item Number	Unit	Ordered	Shipped	Back Ordered	Price	Amount
430201	EACH	1.00	0.00	1.00	71.75	0.00
CMC Rope Bag, #2 Orange						
						Whse: 000
300430	EACH	2.00	2.00	0.00	130.00	260.00
CMC Rescue - PMP Swivel Pulley - 300430						
						Whse: 000
341103	EACH	1.00	1.00	0.00	80.00	80.00
CMC Rescue - Ascender - 341103						
						Whse: 000
293083	EACH	5.00	5.00	0.00	16.50	82.50
CMC PRUSIK, SEWN LOOP 8MM RED 18"						
						Whse: 000
293086	EACH	5.00	5.00	0.00	16.50	82.50
CMC PRUSIK, SEWN LOOP 8MM GREEN 25"						
						Whse: 000
752201	EACH	1.00	1.00	0.00	713.00	713.00
CMC Sked Basic Rescue System with Cobra Buckles, Orange						
						Whse: 000
753001	EACH	1.00	1.00	0.00	215.65	215.65
CMC Skedco Oregon Spine Splint II, Orange						
						Whse: 000
721903	EACH	1.00	1.00	0.00	1,716.00	1,716.00
CMC Spec Pak Patient Extrication System						
						Whse: 000
726125	EACH	1.00	0.00	1.00	876.60	0.00
CMC Traverse Advantage Plastic Litter						
						Whse: 000
724131	EACH	1.00	1.00	0.00	141.00	141.00
CMC Rescue Litter Harness						
						Whse: 000
294029	EACH	1.00	1.00	0.00	36.75	36.75
CMC Edge Guards						
						Whse: 000
294030	EACH	1.00	0.00	1.00	33.25	0.00
CMC Rescue - Edge Guard, MD, CMC						
						Whse: 000
993214	EACH	1.00	1.00	0.00	60.00	60.00
CMC Confined Space Rescue Technician Manual						
						Whse: 000
44311	EACH	2.00	0.00	2.00	176.00	0.00
Streamlight Vulcan 180 Standard System - 120V/100V AC AC/12V DC, includes quick release shoulder strap - Orange - Div 2						
						Whse: 000

Net Invoice: 10,435.00  
 Less Discount: 0.00  
 Freight: 275.00  
 Sales Tax: 0.00  
**Invoice Total: 10,710.00**



# St. Clair Shores Water Bill

ACCOUNT NUMBER	SERVICE ADDRESS	SERVICE TYPE
23287-00	23001 NINE MILE	Government

PREVIOUS READ	CURRENT READ	CONSUMPTION	FROM: SERVICE PERIOD TO:
1170	1205 E	200	12/15/2017 03/15/2018

DUE DATE	PAY AFTER DUE DATE	PAY BY DUE DATE
04/23/2018	3516.62	3349.17

PREVIOUS BALANCE	0.00
Water	947.60
Sewer	1285.00
Customer Chg	342.00
Retention Basins O&M	0.49
Storm Water	774.08

**CURRENT BALANCE** 3349.17

**MONTHLY BUDGET**

Temp-Return Service Requested

8267 1 AB 0.408 8267-8267-20  
 MACOMB COUNTY PUBLIC WORKS  
 21777 DUNHAM RD  
 CLINTON TWP MI 48036-1005



Chg: 8 1/2 M. J. Ref

Date 4.2.18  
 Chief Deputy BB  
 Engineer(s) \_\_\_\_\_  
 Manager(s) UR  
 Coordinator(s) BD  
 Finance Officer MM

PLEASE RETAIN THIS UPPER PORTION FOR YOUR RECORDS. YOUR CANCELLED CHECK IS YOUR RECEIPT.

IF YOU HAVE AN ESTIMATED BILL, PLEASE CALL 586-447-3317 FOR A SERVICE APPOINTMENT.



City of St. Clair Shores

27600 Jefferson Ave. St. Clair Shores, MI 48081

92100 PA 038929

FOR FURTHER INFORMATION PLEASE CALL:  
 BILLING INFORMATION - (586) 447-3317  
 SERVICE INFORMATION - (586) 445-5374  
**VISIT US ON THE WEB AT [www.scsmi.org](http://www.scsmi.org)**

To Pay by Credit Card or Electronic Check



Visit [www.scsmi.org](http://www.scsmi.org) Online Payments and Services or call 1-855-414-9009 (credit card only)

Point and Pay LLC, the service provider, charges a fee for this service of: 3.00% for credit cards (\$1.50 minimum) Electronic checks are provided as a FREE service.

**IMPORTANT INFORMATION - SEE REVERSE SIDE**

REMOVE DOCUMENT ALONG THIS PERFORATION AND MAKE SURE RETURN ADDRESS APPEARS THROUGH WINDOW

Staff 4.17.18  
Board 5.14.18

**RECEIVED**  
 APR 19 2018  
 BY: MLT

<b>Invoice/Credit No.</b>	19012371	<b>Invoice Date</b>	April 19, 2018
<b>Terms</b>	See Below	<b>Federal Tax ID</b>	23-2919996
<b>Remit to</b>	TestAmerica Laboratories, Inc. PO BOX 204290, Dallas, TX 75320-4290		

**Bill to:**

Macomb County Public Works Office  
 Attn: Accounts Payable  
 23001 9 Mile Rd.  
 St Clair Shores, MI 48080

**Ship to:**

Macomb County Public Works Office  
 23001 9 Mile Road  
 St Clair Shores, MI 48080

<b>P.O. Number</b>	<b>W.O. Number</b>	<b>Contract Number</b>	<b>Work Ordered by</b>
Purchase Order not required			Terry Moore
<b>Job Description</b>	<b>Site Name</b>	<b>SDG Number</b>	<b>Invoice Contact</b>
See below			Barb Delecke (accts payable)

Job No.	Job Description	Receipt Date	Quantity	Unit Price	Amount
J15954-1	<b>Chapaton Rain Event</b> 5210 B-2011 - CBOD SM4500 P E-2011 - Phosphorus 4500 NH3 C-2011 - Ammonia 2540 D-2011 - Total Suspended Solids 2540E-2011 - Volatile Suspended Solids Safe and Environmentally Responsible Waste Management (per sample)	04/05/2018			
			19.00	20.00	380.00
			19.00	18.75	356.25
			19.00	11.25	213.75
			19.00	7.50	142.50
			19.00	10.00	190.00
			19.00	1.50	28.50

chg: 8 1/2 Mile

Date 4-20-18

Chief Deputy AB

Engineer(s) \_\_\_\_\_

Manager(s) UA

Coordinator(s) BD

Finance Officer bwm

PA039141

74100

<b>Project Number</b>	<b>Client Number</b>	<b>Project Manager</b>	<b>Subtotal (USD)</b>	<b>\$1,311.00</b>
19000006	1407288	Sue Schafer		
<b>Latest Sample Receipt Date</b>	<b>Latest Report Date</b>	<b>Phone Number</b>	<b>Total (USD)</b>	<b>\$1,311.00</b>
04/05/2018	04/19/2018	(810) 229-2763		

For proper credit, please include invoice number on all remittance.

Staff 5-1-18  
 Board 5-14-18

TestAmerica Michigan - 10448 Citation Drive, Suite 200, Brighton, MI 48116

This invoice falls under TestAmerica Laboratories Inc. Standard T&C's of Net 30 Days unless superseded by another valid contract vehicle in place at the time these services were rendered.



Invoice/Credit No.	19012431	Invoice Date	April 25, 2018
Terms	See Below	Federal Tax ID	23-2919996
Remit to	TestAmerica Laboratories, Inc. PO BOX 204290, Dallas, TX 75320-4290		

**Bill to:**

Macomb County Public Works Office  
Attn: Accounts Payable  
23001 9 Mile Rd  
St Clair Shores, MI 48080

**Ship to:**

Macomb County Public Works Office  
23001 9 Mile Road  
St Clair Shores, MI 48080

<b>P.O. Number</b>	<b>W.O. Number</b>	<b>Contract Number</b>	<b>Work Ordered by</b>
Purchase Order not required			Terry Moore
<b>Job Description</b>	<b>Site Name</b>	<b>SDG Number</b>	<b>Invoice Contact</b>
See below			Barb Delecke (accts payable)

Job No.	Job Description	Receipt Date	Quantity	Unit Price	Amount
J16056-1	<b>Chapaton Rain Event</b> 5210 B-2011 - CBOD SM4500 P E-2011 - Phosphorus 4500 NH3 C-2011 - Ammonia 2540 D-2011 - Total Suspended Solids 2540E-2011 - Volatile Suspended Solids Safe and Environmentally Responsible Waste Management (per sample)  Week-end lab charges included on invoice for 190-16055 Martin <i>Chg: 8 1/2 Mile</i> Date <u>4.26.18</u> Chief Deputy <u>AS</u> Engineer (S) <u>AS</u> Maintenance <u>CA</u> Operations <u>BD</u> Finance Officer <u>KM</u>  <b>19039217 74100</b>	04/15/2018			
			11.00	20.00	220.00
			11.00	18.75	206.25
			11.00	11.25	123.75
			11.00	7.50	82.50
			11.00	10.00	110.00
			11.00	1.50	16.50

<b>Project Number</b>	<b>Client Number</b>	<b>Project Manager</b>	<b>Subtotal (USD)</b>	<b>\$759.00</b>
19000006	1407288	Sue Schafer		
<b>Latest Sample Receipt Date</b>	<b>Latest Report Date</b>	<b>Phone Number</b>	<b>Total (USD)</b>	<b>\$759.00</b>
04/15/2018	04/25/2018	(810) 229-2763		

For proper credit, please include invoice number on all remittance.

TestAmerica Michigan - 10448 Citation Drive, Suite 200, Brighton, MI 48116

*Staff 5-1-18*  
*Board 5-14-18*

**Income Statement**  
**8.5 Mile Relief**  
**As of April 30, 2018**

	<b>9-30-2017</b>	<b>10-1-17 to 3-31-18</b>	<b>April 2018</b>	<b>Total</b>
	<b>Total Fund</b>	<b>O&amp;M</b>	<b>O&amp;M</b>	<b>April 30 2018</b>
<b>Revenues</b>		1,329,619	1,308,558	2,638,177
<b>Expenditures</b>		578,931	45,422	624,353
<b>Equity**</b>	3,105,754			5,119,578

**NOTES**

Reserves as of Sept 30, 2017	600,000
Required SRF repair & replacement reserve balance 9/30/17	1,308,558
<b>Total</b>	<b>1,908,558</b>

**\*\* Broken out as follows:**

Engineering carryover balance at 9/30/2017	356,050
Repair and Maintenance carryover at 9/30/2017	422,000
SCADA reserve at 9/30/2017	40,000
Equipment carryover balance at 9/30/2017	131,800
Required SRF repair & replacement reserve balance 9/30/17	1,308,558
Emergency Reserve	600,000