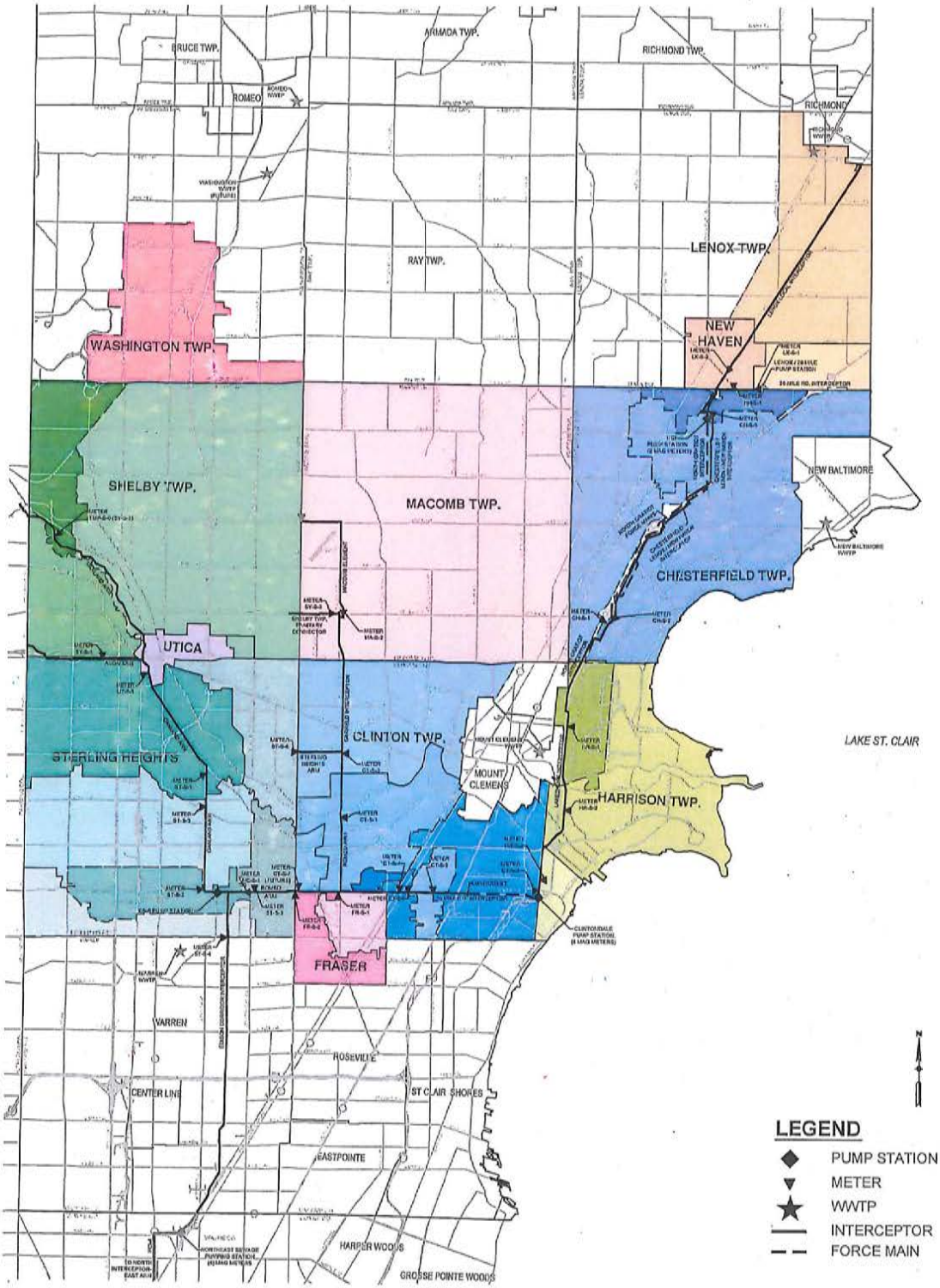
Miller
Santo
VanSyckel

MACOMB INTERCEPTOR DRAIN
INTRA-COUNTY DRAINAGE BOARD
FEBRUARY 8, 2021
10:30 A.M.
AGENDA

NOTE: THIS MEETING WILL BE HELD BY TELECONFERENCE

Call in Number: 1-520-800-2214
Access Code: 638 167 355

MACOMB INTERCEPTOR DRAIN DRAINAGE DISTRICT



Candice S. Miller
MACOMB COUNTY PUBLIC WORKS COMMISSIONER

UPDATED: FEBRUARY 2017

An adjourned meeting of the Intra-County Drainage Board for the **MACOMB INTERCEPTOR DRAIN** was held via telephone conference per the State Public Act 228 of 2020 due to the COVID-19 pandemic, on January 11, 2021, at 10:30 A.M.

PRESENT: Candice S. Miller, Chair
Location: Harrison Township, MI

Don VanSyckel, Member
Location: Sterling Heights, MI

Bryan Santo, Member
Location: Mt. Clemens, MI

ALSO PRESENT: Brian Baker, Chief Deputy, Karen Czernel, Deputy, Stephen Downing, Construction & Maintenance Manager, Bruce Manning, Financial Manager, Tom Stockel, Construction Engineer, Vince Astorino, Operations & Flow Manager, Kellie Kource, Drain Account Specialist, Emily Engelmann, Administrative Assistant, Macomb County Public Works; Sydney Hilgendorf, Sterling Heights; John Caron, St. Clair Shores

The meeting was called to order by the Chair, Candice S. Miller. A motion was made by Mr. VanSyckel, supported by Mr. Santo to approve the agenda as presented.

Adopted: YEAS: 3
NAYS: 0

Minutes of the meeting of December 14, 2020 were presented. A motion was made by Mr. Santo, supported by Mr. VanSyckel to approve the minutes as presented.

Adopted: YEAS: 3
NAYS: 0

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

Mr. Downing updated the board the Segment 5 rehabilitation project is back on site after the holiday break and have installed the steel ribs in the interceptor. They have started excavating the shaft again which will continue for the next few weeks.

Mr. Astorino updated the board that the inspection program will start soon with a pre-construction meeting next week. The odor and corrosion design RFP is out and coming back this month. The plan is to have a recommendation to the board at the February meeting. Segment 6 is the next major rehab project and a public notice regarding the plan has posted. We plan to go out to bid in March, with construction to start fall 2021.

A motion was made by Mr. VanSyckel, supported by Mr. Santo to receive and file the project updates by Mr. Downing and Mr. Astorino.

Adopted: YEAS: 3
NAYS: 0

The Chair presented the invoices totaling $5,341,017.46 to the board for review and approval.

A motion was made by Mr. Santo, supported by Mr. VanSyckel to approve the invoices as presented.

Adopted: YEAS: 3
NAYS: 0

A motion to receive and file the financial report given by Mr. Manning was made by Mr. VanSyckel and supported by Mr. Santo.

Adopted: YEAS: 3
NAYS: 0

There being no further business, it was moved by Mr. Santo, supported by Mr. VanSyckel, that the meeting of the Macomb Interceptor Drain Board be adjourned.

Adopted: YEAS: 3
NAYS: 0

The meeting was adjourned at 10:42 a.m.

Candice S. Miller

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 taking by the Intra-County Drainage Board for the Drainage District shown on the attached set of minutes, January 11, 2021 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

Candice S. Miller, Chair
Macomb County Public Works Commissioner

DATED: 1/11/21

MACOMB COUNTY PUBLIC WORKS OFFICE

CANDICE S. MILLER

MACOMB COUNTY PUBLIC WORKS COMMISSIONER

Macomb Interceptor Drain Drainage District Project Updates

Presented on February 8, 2021

Active Projects

Candice S. Miller
Macomb County Public Works Commissioner

Segment 5 Rehabilitation

Drop Shaft & Connecting Sewer Rehabilitation

Phase II Grouting

egment 5 Rehabilitation

Candice S. Miller
Macomb County Public Works Commissioner

Segment 5 Rehabilitation

Candice S. Miller
Macomb County Public Works Commissioner

egment 5 Rehabilitation

Candice S. Miller
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Segment 5 Rehabilitation

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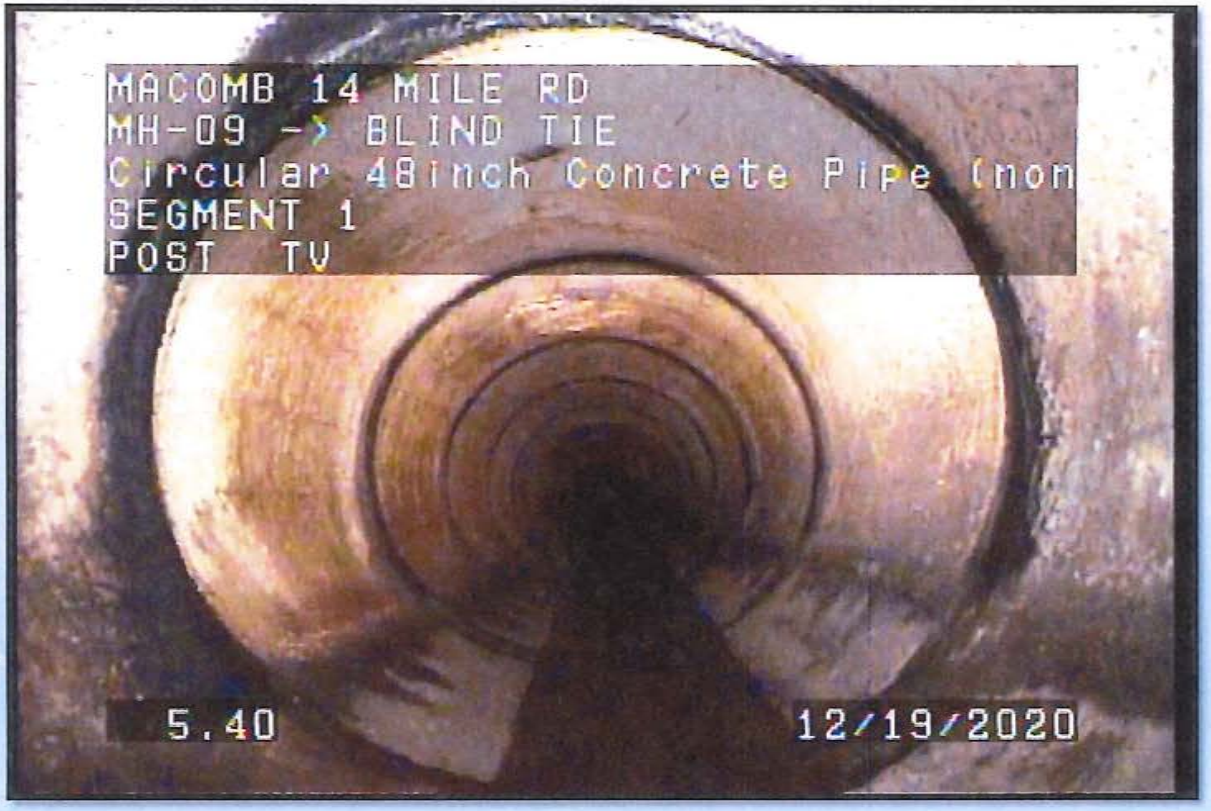
Segment 5 Rehabilitation

Candice S. Miller
Macomb County Public Works Commissioner

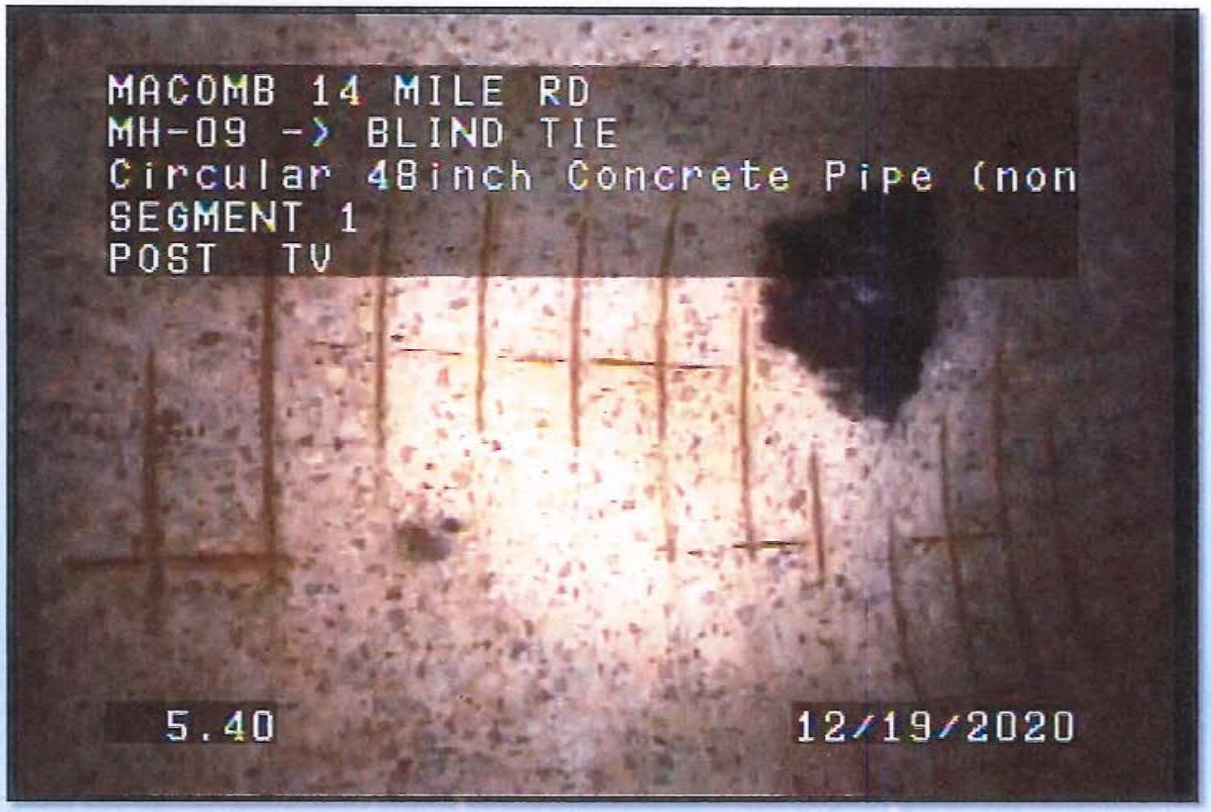
Drop Shaft Rehabilitation

Candice S. Miller
Macomb County Public Works Commissioner



Drop Shaft Rehabilitation

Candice S. Miller
Macomb County Public Works Commissioner



Drop Shaft Rehabilitation

Candice S. Miller
Macomb County Public Works Commissioner

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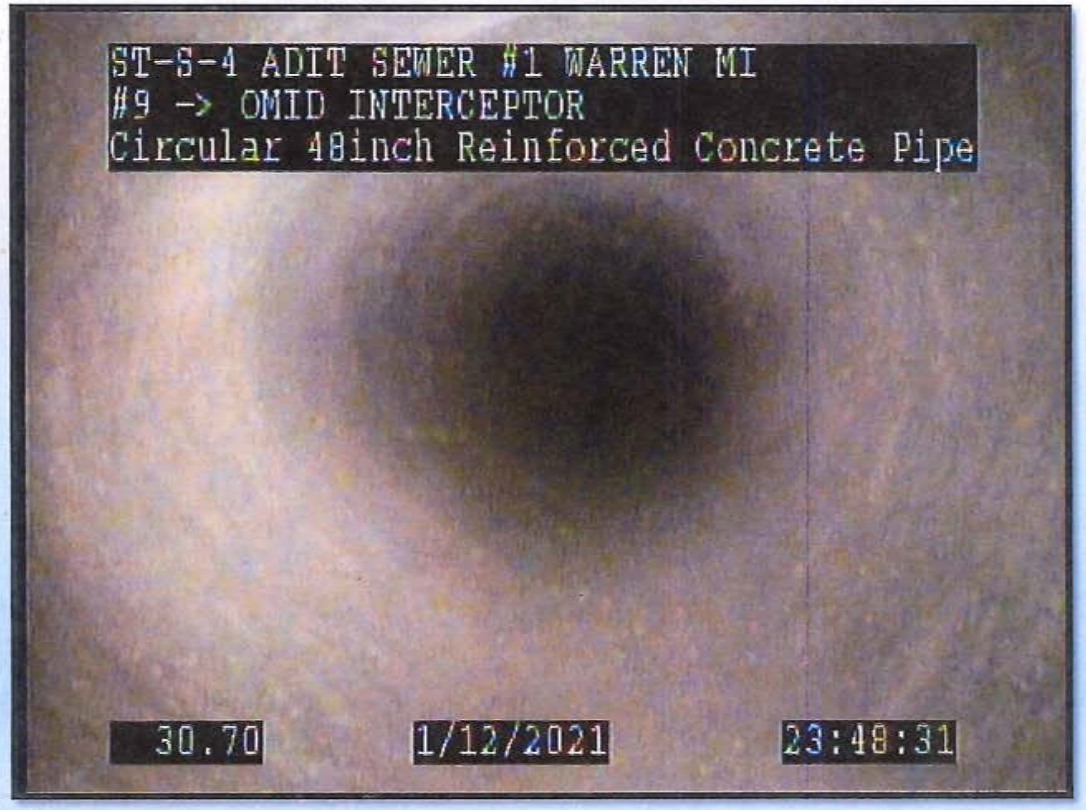
Macomb County Public Works Commissioner



Drop Shaft Rehabilitation

Candice S. Miller
Macomb County Public Works Commissioner

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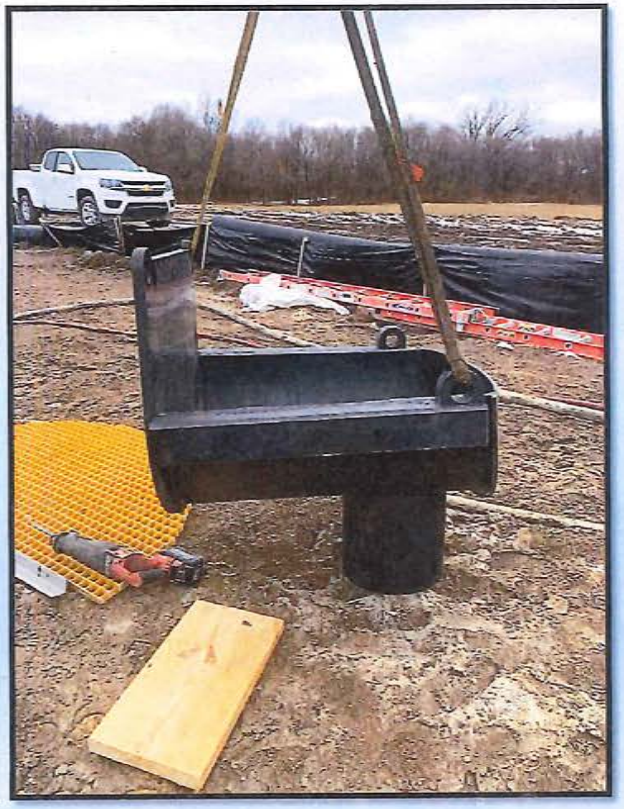

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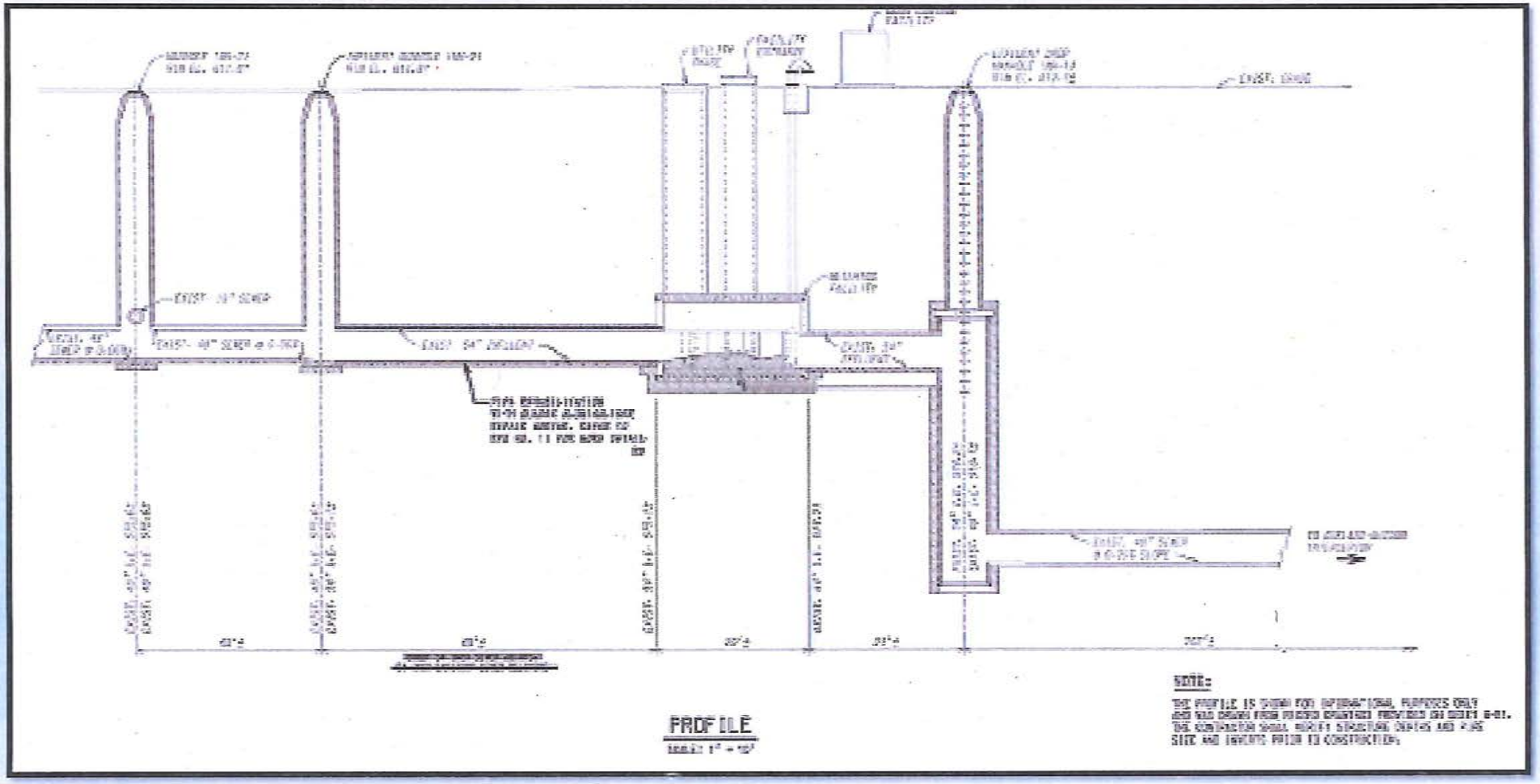

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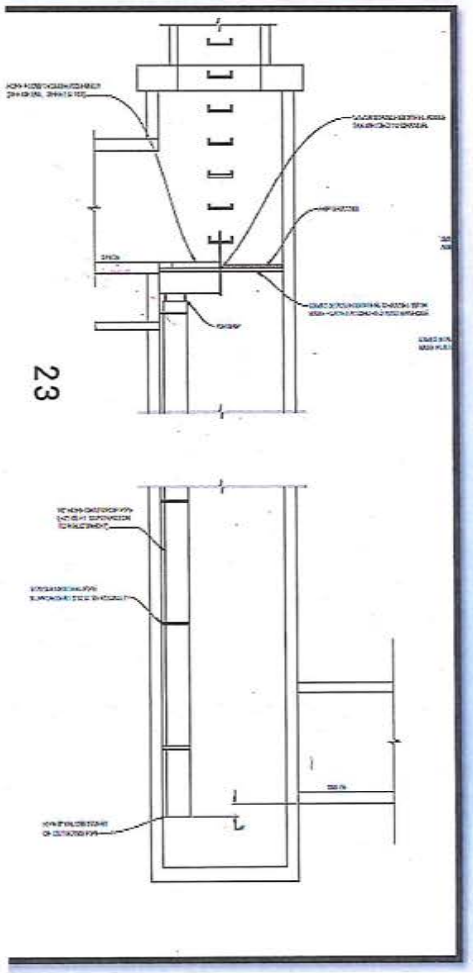
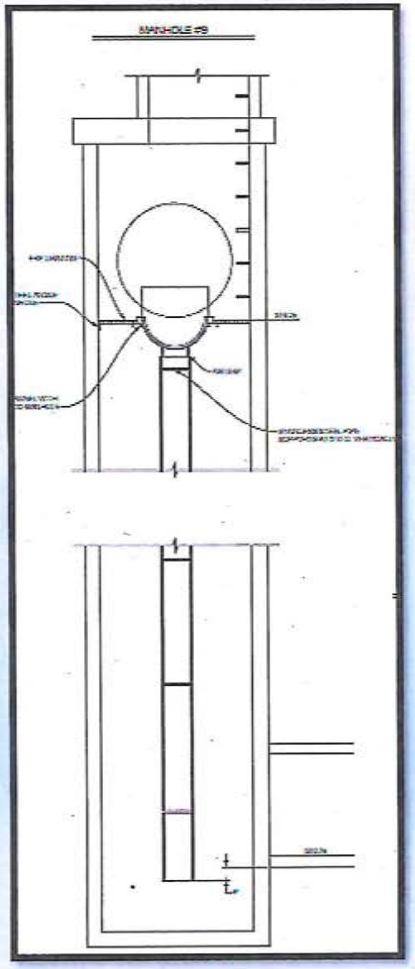
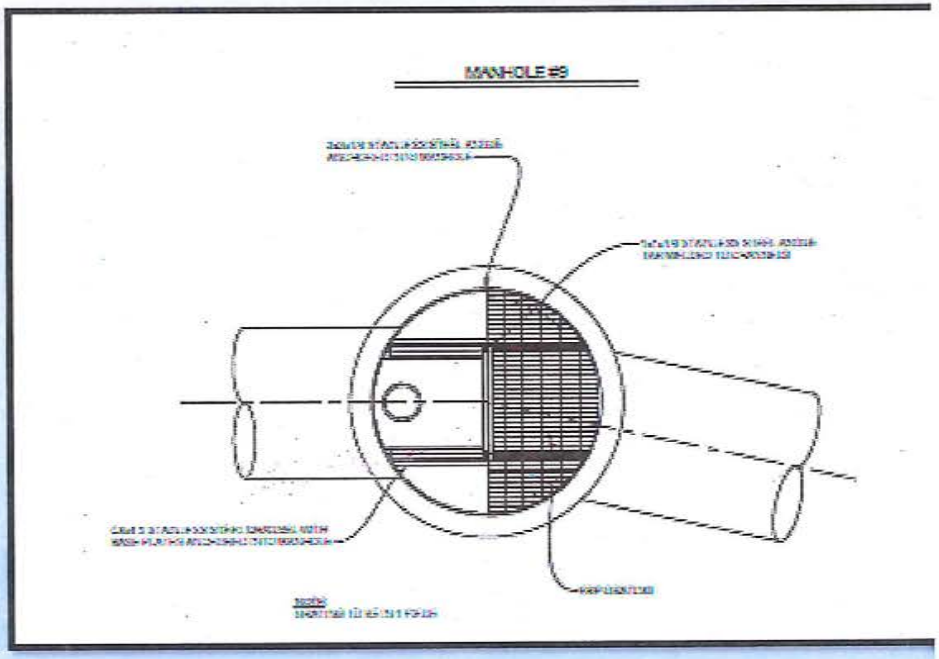






Upcoming Projects

Candice S. Miller
Macomb County Public Works Commissioner

Meter Rehabilitation

- SY-S-1
- SY-S-2
- WA-S-1

Interceptor CCTV Inspection Program

Segment 6 Rehabilitation

Candice S. Miller
Public Works Commissioner
Macomb County

To: Board Members of the Macomb Interceptor Drain Drainage District (MIDDD)

CC: File

From: Vincent Astorino, Operations & Flow Manager

Date: February 3, 2021

Subject: MIDDD Odor & Corrosion Project– Design Recommendation

Macomb County Public Works Office (MCPWO), on behalf of the MIDDD, has coordinated a competitive request for proposals for the design of the MIDDD Odor & Corrosion project.

In 2018, the MIDDD commissioned a study of the MIDDD system to identify areas within the system to correct odor issues for residents and to identify ways to prolong the useful life of the interceptors and facilities due to the corrosive H2S gases within the sewer system. This study identified 4 distinct areas throughout the MID system and they are as follows:

1. Task 1 – North Gratiot Pump Station
    a. A liquid-phase treatment system is to be installed at the NGI Pump Station. The recommended system shall be a calcium nitrate dosing station. The system will be used to prevent hydrogen sulfide formation in the NGI Force Mains as well as to prevent odors at the discharge point to the gravity portion of the NGI and from the air relief valves along the route of the force mains.
2. Task 2 – Clintondale Pump Station
    a. A vapor-phase treatment system is to be constructed at the Clintondale Pump Station. The recommended system shall be a 7,000 cfm radial activated carbon system. The pump station site is in an industrial/commercial area and therefore the system is to be installed above ground. The carbon system is to treat the air from the existing pump station screening building and the upstream 11-ft diameter Lakeshore Interceptor. Modifications to the screening building and pump station HVAC system will be required.
3. Task 3 – Biofilter Modifications and 21 Mile & Garfield
    a. A vapor-phase treatment system is to be constructed at the corner of Garfield Road and 21 Mile Road at the site of the abandoned pump station. The property is owned by the MIDDD. The recommended system shall be a 15,000 cfm radial activated carbon system. After further review of this, MCPWO is now evaluating the installation of an at grade Biofilter system and incorporating the land around it into a park type setting. This will save on construction, long-term O&M, and life-cycle costs.
    b. As part of the evaluation of the Fraser Biofilter, it was recommended to replace the existing wood media with an engineered carbon media to extend the useful life of that facility and reduce the interval between having to change out that media. The installation of a humidifier

OFFICE LOCATION: 21777 Dunham Road, Clinton Township, Michigan 48036 • Phone: 586-469-5325 • Fax: 586-469-5933
ENGINEERING • Phone: 586-469-5910 • Fax: 586-469-7693 ◇ **SOIL EROSION** • Phone: 586-469-5327 • Fax 586-307-8264

in-line with the air flow to three Biofilter beds is also being proposed to reduce the usage of water usage to keep those beds moist. As part of the Segment 6 work, there will be an addition of an "air jumper" to pull foul air from the intersection of 15 Mile and Garfield. This will reduce the odors that have caused issues over the years within that intersection.

These four areas were listed as part of a request for proposal package that was posted to MITN on November 16, 2020. The proposals were due on January 19, 2021. For this design package, MCPWO received two proposals which were from Jacobs and Tetra Tech.

Once receiving the proposals, MCPWO went through its standard scoring process for design which includes a pure technical evaluation before cost is evaluated. From this evaluation, the technical scoring was as follows which is out of 100 total possible points:

- Jacobs = 93.5
- Tetra Tech = 97

Once the technical packages were reviewed the cost proposals were then opened and below is a summary of those costs along with what has been budgeted for this project.

Task Number	Jacobs	Tetra Tech	Budget
Task 1 – NGI*	$227,841	$224,194	X
Task 2 - CPS	$191,417	$145,618	X
Task 3 – 21 Mile & Garfield	$187,033	$223,957	X
Task 3 - Biofilter	$30,197	$191,240	X
Total	**$636,488**	**$798,950**	**$750,000**

*It should be noted that all work for the NGI project will be paid for using remaining funds from NGI Phase 2 construction project. This project should have been implemented in during the construction of the station. Since that time, MCPWO staff have been able to make significant improvements to reduce H2S gases in the system. This project will handle the remaining H2S that still exists.

After careful review of the technical and cost proposals for both firms, MCPWO is recommending to move forward with Tetra Tech. Some of the reasons for this were that Tetra Tech has brought ideas to the table that were never considered during the study phase. Some of these ideas not only will provide aesthetic improvements to the project but will also lower costs long-term. Another reason is with the proposed project manager for this work. While both project managers appear capable, the edge goes to Tetra Tech due to their vast amount of experience working within the Michigan area. It is extremely important to have a strong project manager as that is one of the keys to ensuring a successful project. One additional factor in scoring was with the cost discrepancy within Task 3 – Biofilter. MCPWO staff does not believe that this design cost with Jacobs will allow for any flexibility during design. Changes are already being considered for this design and with that will come additional cost to the project effectively bringing the costs closer in line with one another.

MCPWO staff is recommending to award the contract to Tetra Tech in the total NTE amount of $798,950 to perform the work associated with the MIDDD Odor & Corrosion Design project.

Attachments: Tetra Tech Proposal Work Plan
Tetra Tech Cost Breakdown
Tetra Tech Supplemental Scope

PROPOSAL FOR

MIDDD
Odor & Corrosion Improvement Project

Submitted to:

Macomb Interceptor Drain Drainage District
21777 Dunham Road
Clinton Township, MI 48036

TETRA TECH

JANUARY 2021

4. Work Plan

5 Work Plan

For 106 years, Tetra Tech and its predecessor companies has been the leader in wastewater treatment for Michigan communities. For this same duration, Tetra Tech has been assisting Michigan municipalities control wastewater odors.

PROJECT UNDERSTANDING

Controlling wastewater odors is perhaps the most difficult problem sewer system owners face. While there are many challenges to solve these problems, the biggest challenge is that citizens have different tolerances for wastewater odors. An odor condition that is imperceptible to one citizen is intolerable to another. Furthermore, the MIDDD system is constructed of sewers that can corrode when exposed to sulfuric acid from the wastewater. The proposed improvements will remove or sequester sulfides from the sewer system which will reduce the production of sulfuric acid.

The Macomb County Public Works office (MCPWO) has long been working to identify and control odors and corrosion from several points on the MIDDD. The most visible of these was a biofilter project installed south of 15 Mile near Garfield in 2014. Studying of various parts of the system occurred into 2020 when a comprehensive report was issued summarizing and proposing odor control treatment measures at four locations in the system. MCPWO is now soliciting for proposals to lead the design and construction efforts for four locations with the MIDDD.

Goals for the project include:

- Extend the useful life of the MIDDD by removing corrosive compounds from the wastewater system
- Reduce the emission of odorous air that negatively impacts some populations along the MIDDD

Each location is unique and we have summarized our understanding and approach to each site within our approach section.

PROJECT APPROACH

We have organized our approach by first discussing our project management approach and follow that with more detailed discussions of our technical approach. A table of Key Technical Steps will also follow.

A. Project Management

Task A Objectives

- ✓ *Develop project management plan*
- ✓ *Develop file-sharing website*
- ✓ *Hold workshops and progress meetings to receive MCPWO input*
- ✓ *Execute/Deliver envisioned project*

Managing the Contract

Tetra Tech has developed a management approach to demonstrate to MCPWO that our team of experienced and qualified professionals has the organizational framework and management structure needed to effectively and efficiently coordinate staff efforts, resources, and procedures for each work phase. Our approach is based on two key

principles: **responsiveness** and **responsibility.** Our mission is to have every task executed efficiently and to provide MCPWO with maximum value. Additionally, our management approach embodies sustainability, quality, safety, and a **true commitment to working with MCPWO** as basic core principles for our daily operations.

Establish Project Team Organization

Our team has a dedicated local management team and a local core design team to provide timeliness, flexibility, and the technical expertise the project will require.

Mr. Brian Rubel, PE, PMP, will serve as the Project Manager to MCPWO. Mr. Rubel is a Vice President with 30 years of experience successfully serving southeastern Michigan clients. He is in charge of Tetra Tech's Midwest Operations with the ability to execute contracts locally, dedicate resources, bring in national level subject matter experts, and create project budgets. Tetra Tech empowers our Vice Presidents and Regional Managers with making local decisions because we understand every client is different; therefore we need to have autonomy to adjust budgets, resources, and contracts accordingly. Mr. Rubel will oversee that MCPWO's needs are met and our team has the necessary resources.

Project Management Plan

A Project Management Plan (PMP) will be developed for this project. Included in this effort is the development and maintenance of a project schedule; preparation of monthly status reports; and communication norms. An electronic and hard copy version of the plan will be submitted to MCPWO at the beginning of the project and updated versions as requested. Our standard PMP includes:

- Basic Project Information
- Project Summary
- "Hot Button" Issue Identification
- Project Team
- Contract Information
- Milestone Schedule for Key Project Deliverables
- QA/QC Plan
- Communication Plan
- Project Standards
- Preliminary Drawing List
- Health and Safety Plan (HASP)
- Project Financial Plan

MCPWO can be confident that Tetra Tech will manage and administer this project with proven project control tools and techniques, high quality assurance, collaboration, flexibility, and excellence. Our TetraLinx E-business suite and on-line project management portal provide up-to-the-minute project management data regarding hours, expenses, and subcontractor fees. We have a proven track record of on-time, within budget project delivery.

We will provide project management services for administration of the project and submit monthly invoices acceptable to MCPWO.

Communication Management

A major component of the PMP will be a Communications Plan, which will support responsive and thorough attention to detail and project progress. This will include a project team and an authority/assignment matrix. The Communications Plan will also include project standards for written and verbal documentation of meetings, telephone calls, e-mail, as well as technology standards.

Our management approach was specifically developed to provide proper communication and coordination among the team and MCPWO staff. Communication within our team will be led from the top down, repeated from the bottom up, and structured to provide a full circle of communication internally and externally.

Coordinating the Design Team

Strict and streamlined procedures for internal coordination between disciplines, subconsultants, and other offices reduces confusion, maximizes deliverable quality, and minimizes potential cost increases and lost time over the length of the project. Tetra Tech is focused on coordination, and as such, will perform our duties as an integrated team with integrated services.

What Our Clients Say About Brian Rubel's Project Management:

"You are right on top of it as always. Of all the Project Managers I have worked with, you are the best."

— Todd Schaedig, PE
City of Warren WWTP Engineer

For each project task level, budgets will be continually monitored by the individual task order project managers, as well as on a monthly basis by the Tetra Tech management team. The PMP provides the controls structure for product delivery to ensure seamless coordination between a multi-disciplined team. Once the project has started, weekly meetings are set up for the production staff to review any coordination issues that need to be addressed. During the design phase, a schedule is set up for external subconsultants, as needed, to receive and upload required information for their project components. It is our standard practice to set up a SharePoint site at the beginning of each project for external subconsultants and internal disciplines to upload and download base files for coordination purposes. Files from SharePoint are copied daily to a central network so that each discipline is viewing the most up-to-date information. Closer to each submittal, extra time is set aside for engineering review of the plans as well as a plan set review by the CADD coordinator. Coordination issues are resolved during this review period reducing review time by the MCPWO, which keeps the project on time and budget.

How the Design Team Will Work and Interact with MCPWO

Communication with MCPWO as well as internally within the Tetra Tech team, will be led by our Project Manager, Mr. Rubel. He will be the point of contact for MCPWO with regards to coordination and delivery of this contract, as well as the lead contact internally within our team. Tetra Tech's Michigan design center makes our entire design team available to MCPWO in person or through virtual media such as the Microsoft Teams platform.

Project Websites. A project website or SharePoint site, accessible to all project team members, is a valuable tool for project coordination. DropBox is yet another easy-to-use alternative that maybe utilized. The website will make project information such as a project calendar, meeting minutes and other pertinent documents or information available immediately to team members. A website will provide a forum for rapid and secure transfer of data and information between the project team and MCPWO. Access can be restricted to only project team members or can be open to all relevant stakeholders and even the general public depending on the needs of the MCPWO.

Key Technical Steps to Success

LOCATION	KEY STEPS
NORTH GRATIOT	• Obtain additional hydrogen sulfide data • Consider automation of chemical based on sulfide concentrations • Site new chemical building to comply with local zoning requirements
CLINTONDALE	• Use performance-based specification for carbon scrubber design • Consider optional collection from pump station • Consider optional air ionization
GARFIELD	• Use performance-based specifications • Weigh pros/cons of underground vault vs. aboveground unit • Design underground vault to facilitate O&M
FRASER	• Consider vendor interviews to select equipment manufacturers • Obtain additional data prior to finishing design • Consider number of beds needed • Consider provisions to improve winter operations

Project Meetings

Project meetings will be held at least monthly with the MCPWO. Tetra Tech will prepare meeting minutes for all meetings with MCPWO. Our goal is to provide draft copies of the minutes to MCPWO within two business days of the meeting. We will then prepare final meeting minutes within two business days of receiving comments and suggested edits. The following meetings will foster interaction and open communication between the design team and MCPWO:

- **The Kickoff Meeting** is an important point in the project in which the Tetra Tech team will confirm and clarify the detailed understanding of MCPWO objectives and establish communication channels and methods. Verifying the scope of implementation for achieving the identified goals and reviewing the project work plan will be the key focus of this meeting between the design team and MCPWO.
- **Presentations** will be made to MCPWO Management to provide project updates regarding the direction, schedule, and costs as needed upon request.
- **Project Workshops** will be conducted to enhance communications during planning and detailed design phases. We will submit an agenda that defines workshop goals and describes issues of concern. This approach allows for timely input from all team members as the project progresses, rather than being overwhelmed by a large single document submitted at the end of the project.
- **Submittal Milestone Meetings** will be held to review formal submittals at completion of the Preliminary Design Report and at 30, 60 and 90 percent final design stages.
- **Site Visits** can be scheduled to facilities or locations that have similar aspects to those being considered for projects under this contract. During these visits, MCPWO and consultant staff will have the opportunity to observe process or equipment operation firsthand as well as obtain candid input from O&M personnel regarding the process or equipment performance.

Execute and Deliver the Project

Our goal is to deliver a successful, project that exceeds our clients' expectations and fulfills project objectives. Our team has consistently demonstrated an ability to meet client expectations that require project management as well as technical expertise. As professionals serving many repeat clients, the ability to complete quality work within a timely manner has long been an ingredient in building our strong reputation in the industry.

Some of the specific project controls Tetra Tech uses for schedule, cost, and scope management are described here.

Schedule Controls

Due to Tetra Tech's vast experience with projects under a fixed term or continuing consulting contract, Tetra Tech knows how to successfully manage projects and is experienced in the scheduling requirements, coordination, and organization required to maintain the schedule. Schedules often have overlapping tasks, which utilize various personnel and require experience in coordinating subconsultants, if used, so that multiple critical paths are preserved. Below are some of the controls Tetra Tech uses to management schedule:

- **Computer-Based Project Management.** Our ability to meet the project schedule is based on our periodic meetings with team members. Within these meetings a thorough project and 30-day lookahead schedule is prepared and reviewed with each team member. Each team member pledges their commitment to meet the agreed upon schedule.
- **Close Coordination During Construction.** During the construction phase, Tetra Tech's project manager will identify key items that may affect the schedule, such as critical shop drawings for long lead items. Where such long lead items exist, Tetra Tech will encourage the contractor(s) to submit those critical shop drawings as soon as possible, while Tetra Tech will dedicate and commit the time to returning those shop drawings as soon as possible in advance of the allotted time for contract review. Our field representatives will also continually review work progress and inform the project manager when progress is slipping, either for the entire project, or for individual project components.
- **Engineering Cost Controls.** Tech's PMP also includes the overall budget, the budget for each task, and anticipated billings. The PMP closely coordinates the schedule and the budget so as the project progresses, the project manager can monitor the billings versus the budget. Below are some of the controls Tetra Tech uses to manage engineering costs.
- **Computer-Based Accounting System.** The PMP is enhanced by our computer-based Oracle accounting system, TetraLinx. The TetraLinx system is tied directly to employee timesheets and billing information and is kept up-to-date

on a weekly basis. This electronic system reduces delays in getting budget information to the project manager. Timesheets are entered every Friday and on Monday morning, the project manager receives an automated Project Summary Report in their email showing a snapshot of the budget used since the last invoice and the budget remaining. Tetra Tech also uses a Portfolio Review Workbook, allowing the project manager to have a dashboard of all project performance metrics.

Cost Price Model. Cost control begins with establishing a realistic budget. Tetra Tech has experienced project managers and lead design engineers as well as a vast catalog of similar projects to use as a basis of estimating project budgets. Lead design engineers create the staffing plan and estimate hours per project milestone or deliverable. The project manager then uses our custom Cost Price Model to create the overall pricing plan with all direct and indirect costs, employee billing rates, overhead rates, and multipliers. The Cost Price Model generates the Project Labor Plan and Pricing Plan. This tool follows the project from inception to close out and is updated quarterly for reviews.

Proactive Communication

Controlling costs also requires proactive coordination to get it right the first time and avoid costly redesigns. Engaging the design team with MCPWO and proactively coordinating progress, focusing on inter-discipline coordination, communicating questions, and using experienced staff helps control costs.

Project Manager Portal

Tetra Tech has developed custom Project Management Tools to help control costs from the big picture level to the granular level per hour billed. Each project manager has a PM Portal with a dashboard that shows a quick snapshot of all project performance. Custom reports can be generated ranging from Work Breakdown Structures, Staff Billing Report, Weekly Project Transaction Reports, and Accounts Receivable reports.

Quarterly Project Reviews

Cost control relies on actively monitoring and assessing projects. Tetra Tech requires quarterly reviews of all projects by management called Operations Managers. Large projects get more in-depth reviews and go thru the Project Evaluation & Estimate at Completion (PEEAC) review process. Project Managers update the project Cost Price Model by meeting with the Lead Design Engineer from each discipline and updating their estimates to complete the project versus the schedule and deliverable requirements. The estimate to complete is compared to the remaining budget and corrective actions are implemented if the project is projecting over budget. The project is also evaluated for risks, health and safety, schedule delays, and subcontractor performance issues.

Utilize Technical Oversight

Our team's vast national resources enable us to provide expert technical development and review of the project, and also allows independent oversight. Checking quality at intermediate stages will help avoid time-consuming changes later in the final design.

Construction Cost Controls

Quality Documents

A major factor of Tetra Tech's excellent performance record is the ability to provide thorough and complete documents with which to estimate and control construction costs. One of the lessons learned in the firm's years of experience is that good planning and good quality deliverables are the best insurance for successful completion of a construction project. Because we pay close attention to each detail and make sure that all aspects of the project are covered in the design or plan development, our clients are assured that when projects are released for construction, budgets will be maintained.

Value Engineering

If requested by MCPWO, value engineering (VE) can be used to evaluate ways to reduce the construction cost while still meeting the intent of the design. Using a VE approach allows the team to arrive at the best possible operational system for any project. The VE team members performing the review, all have construction experience directly related to the needs of MCPWO. The VE team further consists of members that have years of general contracting and construction management experience.

Scope Management Controls

Requirements Gathering

To ensure we meet the project schedule, the project manager will meet with the MCPWO Project Manager and begin to develop the scope outline, understand project objectives, and agree on deliverables. Fully understanding the project requirements and capturing them is the best way to control the scope as the project progresses.

Experienced Project Teams

Involving experienced project team members in the scope preparation and project execution brings lessons learned from past projects to benefit MCPWO to help define the project scope and ensure the level of effort is fully understood up front. The experience also pays off as the project progresses because the team is efficient at delivering the scope and knowledgeable about what is expected. If the team members get bogged down at any point or begin

to stray from the intent of the scope, they can recognize it early and course correct.

Defined Scope of Work

The Project Manager will present a clearly defined scope to the MCPWO. Each task and deliverable will be identified and matched up to the task level budget so MCPWO can review and refine the level of effort per task until everyone is on the same page.

Bringing Our Projects to Life with 3D Designs

Tetra Tech sets the industry standard for utilizing a 3D design environment, and 3D design is our standard practice on all projects. Our projects are designed utilizing Autodesk Revit® for structural, architectural, process and mechanical elements and Autodesk Civil 3D for pipelines and site design.

Our Revit and Civil 3D designs greatly improve design and construction efficiency by:

- reducing construction document generation time;
- visually identifying conflicts and consider constructability issues;
- providing for better design and construction change management;
- coordinating the design which is built in a single model shared by all disciplines;
- reflecting design changes automatically throughout the model; and
- creating accurate construction quantities.

By ensuring the highest level of design quality via 3D integration, our designs result in lower construction costs and shorter construction times by reducing errors, reviews, and changes during construction.

Project Close Out

Final closeout for a project involves procedural issues and phase-out administrative procedures, transfer of responsibilities, financial closeout activities, and preparation of appropriate documentation. The purpose of a project closeout effort is to ensure a timely, orderly, and cost-effective project termination. If the closeout is complex and may take substantial time, a closeout plan should be issued prior to full project demobilization. To ensure orderly closeout of a project, the Project Manager should, once all costs are incurred against the project with invoices and contracts are closed—prepare a project closeout report.

The following items should be addressed in the closeout report:

- Technical, scope, cost, and schedule baseline accomplishments
- Financial closeout, including a final cost report with details as required
- Closeout approvals
- Permits, licenses, and/or environmental documentation
- Contract closeout status
- Adjustments to obligations and costs
- Photographic documentation

B. DESIGN APPROACH

Task B Objectives

- ✓ *Establish effective design concepts*
- ✓ *Collect remaining data needed to complete the design*

We have summarized our understanding beginning with services common for all sites (i.e. surveying and geotechnical) followed by specific design ideas by each of the four locations. Following this location discussion is our approach to completing the management tasks as part of the project that apply to all locations such as permitting and opinions of cost.

Common Services

Surveying

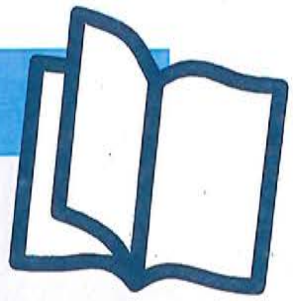
Topographic Survey - The topographic surveys will be conducted under the supervision of a Professional Surveyor, licensed by the State of Michigan. We shall provide topographic survey of the sites as discussed outlined in the RFP. We do not foresee a complete topographic survey of each site, but rather the portions of each site identified for the improvement.

Boundary Surveys -The approximate parcel limits will be shown based on available tax records and site information.

OPEN COMMUNICATION

Tetra Tech believes in open communication during all phases of every project. By dedicating time in the schedule to meet with the County to fully understand the requirements of the project, Tetra Tech will design the correct project in one iteration. Likewise, during permitting, Tetra Tech has an established philosophy of arranging pre-application meetings with all applicable permitting agencies as a means to facilitate a more streamlined permitting review process. We have permitted numerous projects without receiving any requests for additional information based on our commitment to working with the permitting agency and our ability to incorporate their comments into the design before it is finalized.

SUCCESS STORY



For our work in replacing the incinerator scrubber in Warren, MI, Tetra Tech subcontracted with a major equipment supplier for shop drawings ahead of the construction contract. This shortened the construction duration and avoided the general contractor passing a mark-up for this work to the City.

For the following three sites, a PA 132 certified survey shall not be completed, no irons or monumentation shall be set. The boundary lines shown on the surveys shall be used for reference only.

- NGI Pump station – Concordia Boulevard & Gratiot Avenue
- Clintondale Pump Station – Sorrentino Court & Union Lake Road
- Fraser Biofilter - 15 Mile Road, West of Garfield Road

A title search and PA 132 certified survey shall be completed for the vapor phase treatment site located at Garfield Road and 21 Mile Road. It is our understanding that the intent is to construct a new facility on a portion of the property in the Southern quadrant of the intersection. The remainder of said parcel will be split and sold. A certified survey and proposal parcel split drawing shall be completed to assist with the facilitation of this plan. An easement description will be prepared for access to the odor control facility or utility routes accessing the property.

Geotechnical

Geotechnical services will be similar at North Gratiot, Clintondale and Fraser and will consist of the following:

- Prior to commencing field activities, Miss Dig will be contacted to locate underground utilities that may be present near the potential drilling locations.
- Drill two twenty-five-foot-deep soil borings. The borings will be drilled a subcontractor under the full-time observation of an NTH field engineer or geologist. Our personnel will coordinate test boring locations and field operations, determine the type of sampling required, classify subsoil strata in the field, record groundwater levels during and upon completion of drilling, and modify drilling procedures as necessary to adequately define subsoil conditions at the site. As part of the monitoring, standardized drilling and sampling techniques will be followed. We anticipate that soil samples will be obtained using a split-barrel sampler using the Standard Penetration Test Method (SPT) in accordance with ASTM D1586. Odors or signs of discolored soils (if encountered) shall be noted on the soil boring logs. All borings will be monitored with a PID (photoionization detector) and any elevated levels of volatile organic compounds will be noted on the logs.

We will note the depth at which groundwater is encountered during drilling and carry out groundwater level measurements at the completion of drilling of each boring. At the completion of drilling, test borings will be backfilled with bentonite chips and the excavated soil cuttings. Borehole abandonment procedures will be noted on the individual test boring logs. Any excess soil cuttings will be spread over the ground surface near the borings.

- We will perform geotechnical laboratory testing on representative soil samples to measure the physical characteristics of the subsoils encountered. For this project, we anticipate that laboratory testing will consist of determining the moisture content and density of selected samples, together with grain size analyses of granular samples, and unconfined compressive strength of representative cohesive soils.

After the completion of drilling, we will prepare a geotechnical report that summarizes our findings, and presents our evaluations, conclusions, and recommendations for the construction of the proposed equipment foundations including:

- General subsoil conditions at the site including soil stratigraphy and consistency.
- Suitability of the site soils for support of the proposed structures.
- Groundwater conditions and control in construction excavations.
- Requirements for excavation support and stability.
- Allowable soil bearing pressures for site subsoils as appropriate.

- Recommendations for frost penetration and foundation depth.
- Earthwork operations to prepare the site for development, including requirements for fill, backfill, and suitability of on-site soils.
- Other subsurface conditions which may have an impact on the design and construction of proposed facilities.
- We will peer review and comment on technical specifications for excavation and backfill provided by the design team.

At Garfield and 21 Mile, the scope will be the same except the borings will need to extend deeper (40 feet) to account for the depth of proposed vault. Furthermore, this site will require design of temporary earth retention to construct the vault.

Geotechnical Added Value

Though not included in the request for proposal, NTH's is able to provide the following value-added services to support the MCPWO on this project:

- **Subsurface Utility Engineering (SUE).** Conflicts with utility services are common and costly obstacles encountered during the design and construction process. Unknown utility conflicts represent a significant risk during construction and can result in re-design, excessive construction delays, disruptions in residential, industrial, and commercial utility services, as well as safety hazards caused by exposure to flammable products and electrical currents.

SUE is a process that incorporates new and existing technologies to more accurately locate and map underground utilities during the design phase of a project. This can substantially reduce project cost overruns caused by unforeseen construction conflicts with existing utility installations. More than a privatized One-Call service that provides necessary clearances only at particular locations, SUE is an integrated engineering design service developed to locate and map entire utility networks, whether in public rights-of-way or beyond. It provides design professionals with the reliable utility data required for infrastructure renovation and improvement projects. SUE methodology also provides a cost-effective means of updating and consolidating "as-built" utility drawings for the proposed project sites.

North Gratiot Interceptor

Understanding

The North Gratiot Pump Station serves the north-central portion of the MIDDD. The pump station has a lengthy force main and sulfide release at the end of this force main has created odor and pipe corrosion problems. The proposed project will introduce a chemical agent into the force main to prevent bacteria from releasing odorous sulfide compounds. A sketch of the proposed work at the pump station is included below on Exhibit A.

Approach

Chemical Feed Sizing

Oxygen can be found in three different forms in wastewater; dissolved oxygen, nitrate oxygen, and sulfate oxygen. Aerobic bacteria need oxygen to survive and prefer to use the free oxygen first, then move onto the nitrate oxygen if the free oxygen is depleted, and then move onto the sulfate oxygen if the nitrate oxygen is

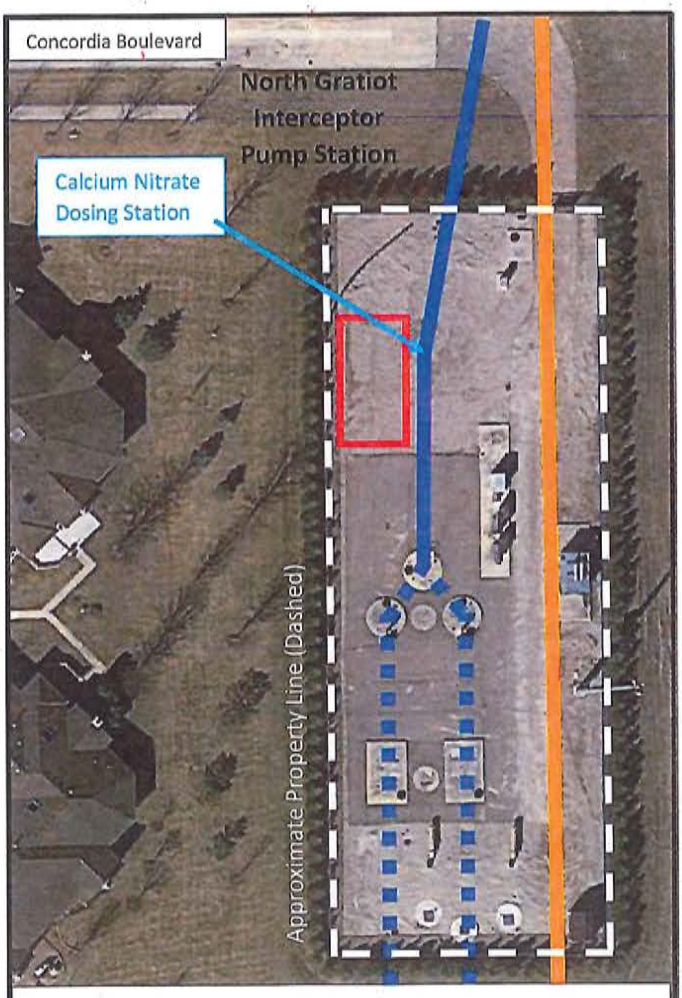


EXHIBIT A - NORTH GRATIOT SITE

depleted. When bacteria consume the oxygen in sulfate compounds, the byproduct is dissolved sulfide which combines with hydrogen ions to form hydrogen sulfide, causing odor and corrosion problems. Wastewater in a collection system typically has little free oxygen or nitrate oxygen but sulfate oxygen is abundant. Adding calcium nitrate to the wastewater provides the nitrate oxygen that the bacteria prefer which prevents the formation of hydrogen sulfide.

A calcium nitrate feed system shall be designed to mitigate odors and corrosion in the North Gratiot Interceptor. The system shall be located at the North Gratiot Pump Station and feed chemical directly into the wet well.

Calcium nitrate dosage is based on sulfide loading, so it is critical to determine the existing sulfide generation in the interceptor. Although the Jacobs study modeled this section of the collection system to predict the sulfide generation, the study only includes one liquid grab sample at the CH-S-1, CH-S-2, and the discharge manhole which is insufficient for design purposes. Therefore, a sampling and monitoring program will be conducted to accurately measure the sulfide generation. Our approach is to conduct a field sampling program which includes three days onsite and liquid sampling and hydrogen sulfide monitoring as described below:

- Liquid Sampling - Collect multiple liquid samples from the North Gratiot PS wet well, CH-S-1, CH-S-2, and the force main discharge manhole. Test each sample for sulfides, pH, oxidation-reduction potential (ORP), and temperature.
- Hydrogen Sulfide Monitoring- Deploy OdaLogs in the North Gratiot PS wet well and the force main discharge manhole for approximately one week to record diurnal hydrogen sulfide concentrations.

The test data obtained from the program will be analyzed and sulfide generation in the interceptor will be calculated. Calculated calcium nitrate dosage requirements will be determined and the system will be sized accordingly. A better design will result if the sampling can be conducted in the summer months when the wastewater temperature is near its peak. The Tetra Tech team can move sampling up to finish design earlier, but that will sacrifice obtaining the best background data for design.

There are many options for controlling the calcium nitrate dosage. For example, the system can be designed to adjust dosage based on the hydrogen sulfide level in the discharge manhole in a near real-time approach or manually adjusted. Dosage control options shall be discussed with the County during design to ensure that the system has all desired capabilities.

Chemical Building

A building will be needed to house the chemical infrastructure. The building will need lighting and heating/ventilation. The electrical equipment should be separated from the chemicals for safety and preserving the life of the electrical equipment. Locating a new building will require petitioning to the local authority and following site development rules such as setback distances.

TYPICAL METERING PUMP

Containment systems will be needed to capture chemical spills. Chemical pumps will be designed to inject the chemical.

The new building likely will need to be designed and constructed to blend in with the neighborhood. West of the site is multifamily residences so using materials and roof lines similar to those structures will help meet the local review.

Chemical Feed Pump

To provide an automated chemical feed system a reliable pump is required. We will evaluate appropriate chemical feed pump alternatives and control to select the best equipment fit for performance and value. For this type of chemical feed application, we will consider three basic types of pump technologies for the proposed delivery and metering function. These include the standard diaphragm metering pump technology as well as peristaltic and progressive cavity pump equipment. Each type of pump technology offers advantages and disadvantages that we will consider with your input to identify the preferred equipment. Usually, the equipment cost is not the deciding factor as the performance and reliability are important factors for the long-term integrity of the process. A comparison of the most typical attributes of the chemical metering pump types that we have previously developed are shown on the table provided on the next page.

Electrical & Instrumentation

We have assumed that electrical service will by supplied be a new DTE secondary source or through spare service capacity on the existing site. A control panel or electrical room will be designed in or adjacent to the chemical building to house a PLC to control the chemical pumps. Flow

Comparative Table for Chemical Metering Pump Types			
PUMP TYPE	PROS	CONS	MAINTENANCE
Diaphragm	• Wide turn down range • Highly accurate flow metering over the range of pump • Internal relief valves for pump protection • Leak detection for diaphragm failure	• Pumps are prone to air binding/vapor lock • Require pulsation dampeners • Require backpressure valves • Cannot pump solids • Most expensive option	• Low maintenance interval • Complicated maintenance procedure
Peristaltic Hose	• Accurate measurement of flow • Pump can be run dry • Off gassing does not affect pump • High suction lift capabilities • Can pump solids • Leak detection for hose failure	• Maintenance based on hose life • Require pulsation dampeners • Require large footprint for installation and will not fit in current area	• Low maintenance interval • Hose replacement simple
Progressive Cavity	• Accurate measurement of flow • High suction lift capabilities • Vertical installation option • Can pump solids • Will fit in current area	• Pump cannot be run dry • Off gassing affects pump	• Low maintenance interval • Seals and packing adjustment required

meters on the pumps will also be needed.

As discussed in the above write-up, telemetry for hydrogen sulfide measurements may be needed and hydrogen sulfide measurements may be connected to the PLC to control pump operation. Telemetry will also be needed to allow remote operators to monitor various instruments that may be installed such as gas alarms, floats, chemical flow, etc.

For this site and other sites, the SCADA protocols will be summarized in a memo format.

Clintondale Pump Station

Understanding

The Clintondale Pump Station serves the northeastern portion of the MIDDD. Testing has isolated that the screening chamber ahead of the pump station releases a large amount of odorous compounds at the station. The proposed project is to construct a radial-flow activated carbon scrubber to treat foul air before it is released.

A site plan of the Clintondale Pump Station and the proposed improvement is shown on Exhibit B.

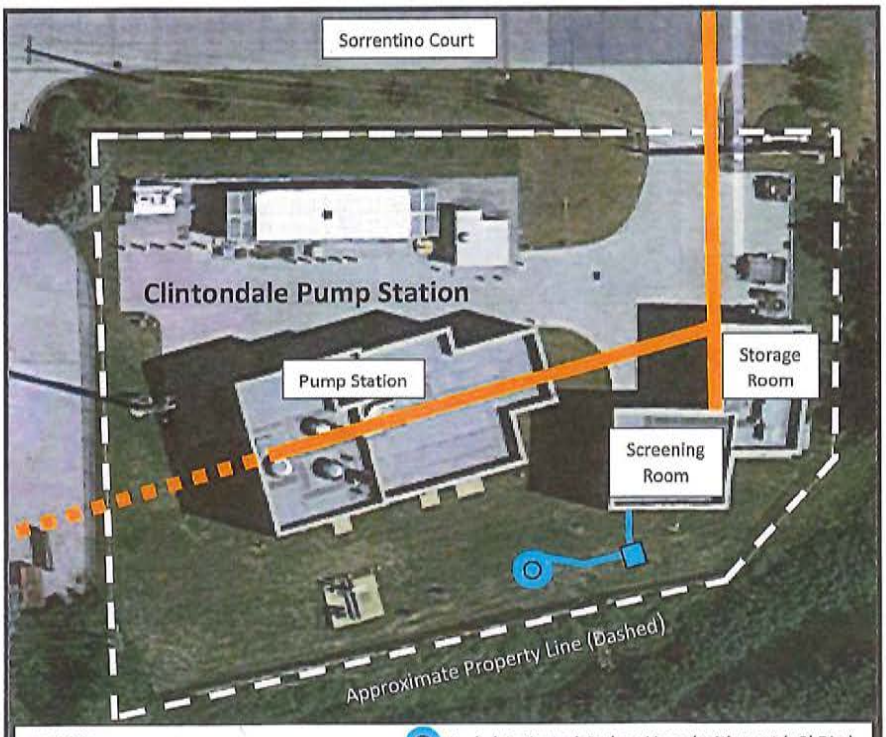


EXHIBIT B - CLINTONDALE PUMPS STATION SITE

Approach

Carbon Unit Sizing

Activated carbon treatment was selected as the best technology fit for the hydrogen sulfide concentration range expected for the Clintondale Pump Station odor control improvements. Based on the testing that that has been performed at this location, we concur with the technology selection. For moderate to low concentration hydrogen sulfide applications where sustained level are less than 10 ppmv, this technology will be the most cost effective, and generally the easiest to operate and maintain.

The radial flow activated carbon contactor will be sized to handle the recommended air rate of 7,000 CFM. The previous studies will serve as the technical basis for the system sizing. For unit size selection, the minimum carbon contactor rating is controlled by the airflow requirement. From that metric, the units can be upsized somewhat for more carbon capacity if desired to increase the run time between carbon changeouts. We will review the available carbon contactor offerings from preferred vendors to determine the best size fit to provide for the most efficient treatment and carbon utilization for the expected odor constituent levels for the site. Based on our evaluation of available process equipment offerings, we will develop the basis of design to establish the baseline reference for parameters related to system performance requirements, range of operation, and other appropriate sizing criteria for the proper application of the carbon treatment technology.

For critical treatment process equipment, Tetra Tech recommends the use of performance-based specifications. We have previously developed these types of specifications for activated carbon equipment and we will utilize this experience as a model for the development of the site-specific requirements for this project. A performance-based specification approach will ensure that the equipment will conform to the requirements of the specific application. The performance specifications will delineate the expected range of operation and associated odor removal requirements as well as the maximum concentration and treatment efficiency at the peak demand for the process.

Fan and Ducts

The proposed fan will be set on a base with a sound enclosure. Ducts will be run across ground and set on stands. The pump station will require an evaluation and likely replacement of makeup air handlers for the screen building and structural evaluation of the impact of the new units on the existing building.

Electrical and Instrumentation

Power will be supplied by the existing service in the screen room or a new DTE service. Alarms on fan operation will be designed and connected to Macomb County's SCADA system. An outdoor control panel will be installed for electrical supply and a PLC.

Added Value - Pump Station Control

Testing has determined that there are low concentrations of foul air in the pump station wet well. However, concentrations can increase when the wet well is pumped down for maintenance.

It would be a modest cost increase to install a duct branch to connect the foul air intake to the wet well. This branch could be equipped with a damper that is normally closed. A sketch of one potential routing showing this branch is provided on Exhibit C.

By adding this branch, the foul air in the wet well could be diverted

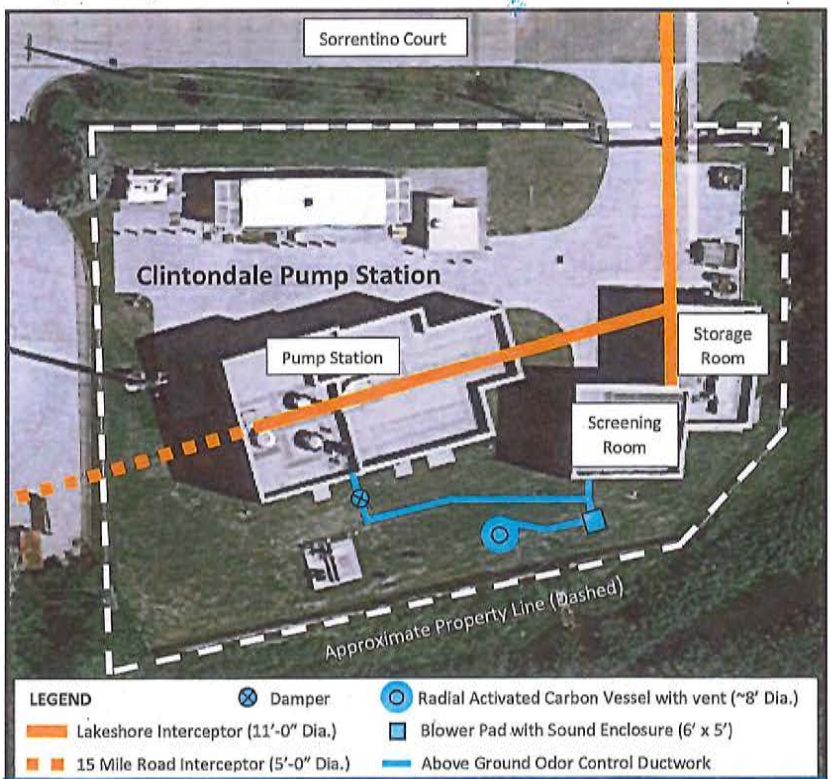


EXHIBIT C - CLINTONDALE PUMP STATION WITH PUMP STATION FOUL AIR TREATMENT

to the scrubber during wet well maintenance. The fan would not need to be increased for this infrequent occurrence and treatment may be less than design conditions, but would be a more desired condition that venting the wet well with no air treatment.

Added Value - Air Ionization

The proposed odor control improvements will involve modifications to the screening building and pump station HVAC system to maintain the indoor air environments and satisfy air exchange requirements for these occupied structures. In general, the ventilation system will typically provide enough air exchange to maintain a working environment that satisfies code requirements, but low-level odor presence may persist within the buildings. One way to significantly improve the indoor air quality would be to consider the introduction of air ionization technology to the odor treatment strategy. We recently implemented this type of approach for the Port Huron WWTP odor treatment improvements program. The air ionization technology could readily be integrated with the HVAC systems so it would provide a good fit to potentially improve indoor air environment and reduce the odor constituent load to the activated carbon system. The ionization technology works to activate oxygen molecules in the air by adding or removing electrons to form ion clusters. Once activated, these oxygen molecules react with odor compounds like hydrogen sulfide to break down the primary constituents of concern.

TYPICAL IONIZATION AIR HANDLING UNIT

With this type of air ionization strategy, the activated carbon would still be provided as a final polishing step, but not the primary odor removal mechanism, so the usage rate and annual cost for carbon would be way lower with this approach. Other potential advantages to consider for an ionized air treatment technology approach include the following:

- Produces a clean air environment inside contaminated areas as opposed to only treating exhaust air
- Low energy consumption
- No chemicals or water required, no storage of hazardous materials and no disposal of hazardous materials or media
- Low O&M costs and daily maintenance activities versus exhaust-only scrubbers
- Reduces corrosion inside buildings
- Fast design to installation
- Safe & healthy working environment; Inhibites molds, bateria and viruses
- Stops corrosion of sensitive electrical componants for instrumentation and PLC based controls.

A typical HVAC supply air side integration of an air ionization approach would include the filter, fan(s) and ion generators housed inside an Air Handling Unit (AHU). Ambient outside air is drawn into the AHU by the fan(s) through the filter and past the heater and ion generators. The ion generators transform the oxygen present in the ambient air to oxygen ions, creating an airstream rich with superoxide ion clusters. These oxygen clusters are sent through the duct system into the building where they oxidize the pollutants on a molecular level to eliminate odors and improve the ambient air quality within the structure.

Alternate Consideration - Fan Enclosure

The traditional way to construct the fan system is to enclose the fan to sequester noise and have exterior electrical panelboards. The fan enclosure is typically tight to the fan making access to the fan difficult. An alternate approach to evaluate is enclosing the fan and controls in a masonry building. This will provide more room to access the fan and simplify the wire connections between the panelboard and the fan. There are disadvantages including the need for lighting, ventilation and planning commission approval of new buildings.

Tetra Tech will review this option with MCPWO staff prior to beginning design.

Garfield Road at 21 Mile Road

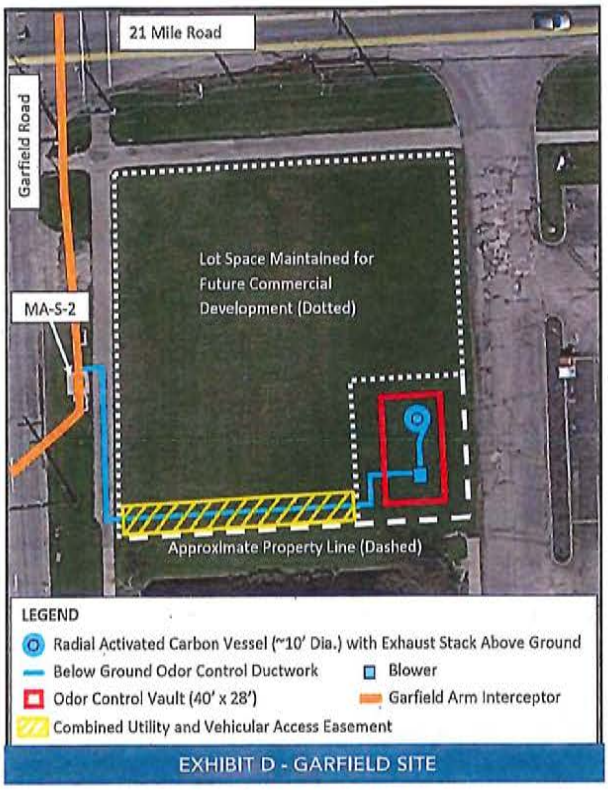
Understanding

The Garfield Interceptor is exhibiting corrosion. Extracting and treating corrosive air is needed to extend the life of the sewer system. The conceived solution is a radial-flow activated carbon treatment system. The proposed solution is to recess the unit 20-feet below grade to conceal it from neighbors. MCPWO also has a goal of dividing the parcel and selling the land not required for the carbon unit. On the next page, Exhibit D illustrates the Garfield Site.

Approach

Carbon Unit Sizing

The activated carbon contactor design will follow a similar approach to that identified for the Clintondale Pump Station odor control improvements. Based on the reported odor constituent concentrations, the



activated carbon technology selection will be the lowest cost approach. The radial flow activated carbon contactor will be sized to handle the recommended air rate of 15,000 CFM. The activated carbon capacity will be selected accordingly to accommodate the anticipated hydrogen sulfide load and removal efficiency requirements.

Our approach will be to specify a performance criteria that the unit needs to obtain. Our approach in Saline was to propose both a percentage hydrogen sulfide removal and a total odor removal. The construction contract will be written to require the equipment provider to obtain an independent testing agency to obtain samples and conduct analyses to demonstrate the equipment's performance at project completion.

Intake Duct

Intake duct will be run underground from either the Garfield Arm Interceptor of a gravity connection located on the east side of the ROW. PVC or FRP would be good material choices due to their resistance to corrosion.

Electrical & Instrumentation

There is an abandoned pump station on this parcel (previously designed by Tetra Tech) and DTE power in the Garfield Road ROW. Power will be run from Garfield to the proposed odor control site or a new DTE drop if the new route is advantageous.

Lighting will be a big concern with an underground vault. Explosion-proof lighting and sufficient density to light the structure for maintenance will be required.

Alarms on fan operation will be designed and connected to Macomb County's SCADA system. An outdoor control panel will be installed for electrical supply and a PLC. If the underground vault option remains, various additional instruments will be needed such as intrusion alarms on hatches and gas detection equipment. MCPWO should also consider streamed video surveillance at this site.

Underground Vault

The proposed project is to construct an underground vault to house a fan and a carbon scrubber. This will be a significant construction project to design shoring, foundation, walls and roofing. Additionally, means to remove large equipment will be required for maintenance including eventual equipment replacement. Means for ingress/egress will be needed for operator access, and lifting equipment will be needed for equipment and materials. Our preliminary thoughts on these features are as follows and are depicted in Exhibit E.

Ventilation

The underground vault will need mechanical ventilation to allow it to be safely occupied. Heating of air should also be considered to condition the interior air. Therefore, a major ventilation system will be needed. Considering the importance of this ventilation system, MCPWO should also consider a generator so ventilation is achieved during a power outage.

Equipment Access

Means to remove the scrubber and appurtenances will need to be provided. The scrubber will be too large for conventional hatches, so the vault roof will be designed to be removable. Lifting points can be cast into the planks to facilitate their removal.

Carbon and other equipment will be periodically removed, replaced, or transported within the structure. The structure should be designed with a crane or monorail to facilitate these operations. Additionally, the underside of the removal planks should have pick points for securing chainfall hoists.

Operator Access

Man access can be provided by stairways or ladders. We recommend installing one of each. The stairway is a safer way to access the vault and allows for materials to be carried. Stairways are generally terminated at-grade with an access shed with locking door. The ladder can serve as a backup means of ingress/egress.

Groundwater/Drainage

To accommodate groundwater infiltration, a sump pump will be needed. Furthermore, the carbon scrubber has a condensation drain that will need to be connected to the sump.

Aesthetics

The completed project should be visually appealing. With most of the site underground, aesthetics will be focused on constructing landscaping to buffer the access drive, access shed, and other hard features.

Site Work

This site will have significant site work needs. Underground utilities needed to reach the site will include electrical ducts, potable water (wash down of vessel), sanitary sewer (drain condensate and vault sump pumps), and likely natural gas (space heaters in vault). Vehicular access to the treatment unit needs to be designed.

The plan referenced in the Jacobs report was to provide vehicular access to the parking lot to the east. However, Tetra Tech believes MCPWO must have rights of access all the way to a public road. It is logical to consider having the vehicular easement along the same route as the utility easements as shown in our site plan.

Surveying

Numerous, specific surveying tasks will be performed for this site. Topographic surveying will be needed for the odor control area and the utility corridors. However, boundary surveys will also be needed to locate the odor control vault close to the property lines, but setback at distances required by local building ordinances. Room also needs to be reserved for MCPWO to mobilize cranes and other equipment to service the odor control scrubber.

An easement may be needed for vehicular access to the equipment. Tetra Tech suggests that MCPWO consider retaining a portion of the site that can be used for the air ducts, gas, and electric service below ground and vehicular access above ground. A 15-foot corridor from west to east along the southern property line may serve this purpose.

Alternate Approach

Tetra Tech feels MCPWO should carefully consider an alternate approach to this odor control site. While we understand that an underground structure provides the best aesthetics, there are significant risks associated with an underground structure.

An underground structure would require significant cost to shore the excavation, construct vault walls, and construct a large-span beam system for the structure's roof. Very large hatches or deck removal would be required to remove the carbon scrubber and/or blower. Additional lighting will be required to illuminate the vault. The groundwater table

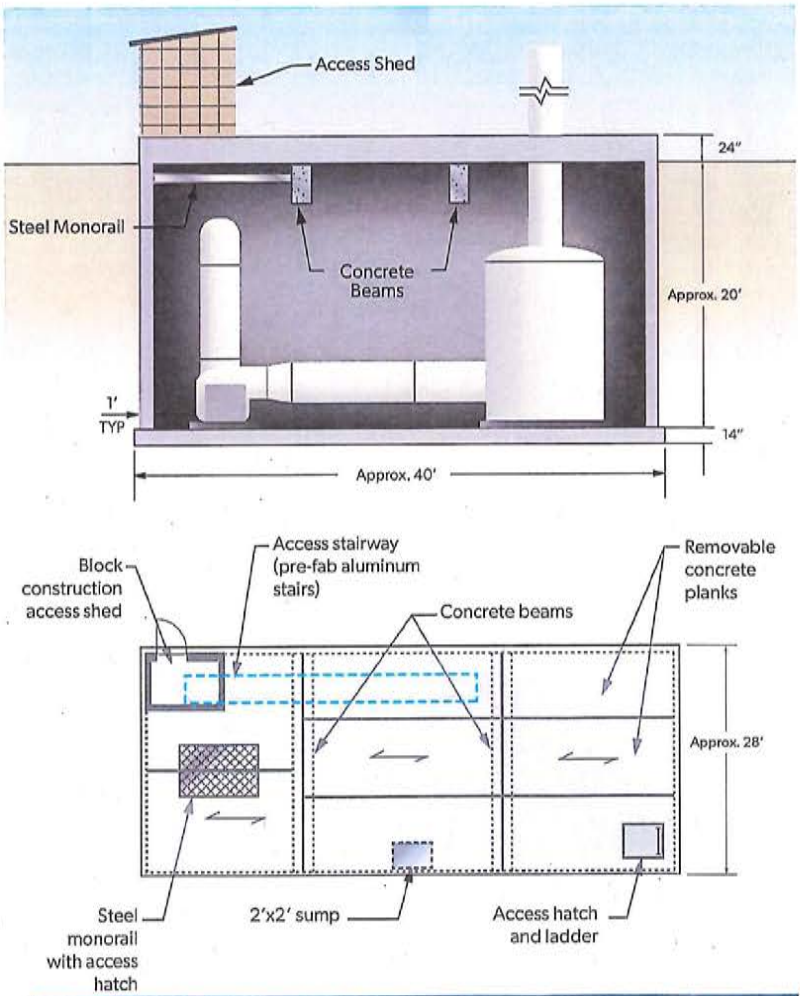


EXHIBIT E - PROPOSED GARFIELD UNDERGROUND VAULT

Garfield at 21 Mile Road Activated Carbon Treatment Unit Configuration Evaluation

CONFIGURATION	PROS	CONS
Belowground	• Acoustics • More marketable adjacent parcel	• More expensive to construct and maintain • Shorter useful life • Risk of ventilation failure creating explosion and other safety hazard • Will not eliminate aesthetics of aboveground vent pipe • Short vent-pipe may not disperse odorous air
Aboveground	• Less expensive • Safer to maintain	• Likely requires a visual screen • Could affect marketability of remaining lot • May require additional setbacks (more space) than inground

likely requires that underdrains and sump pumps be constructed.

We are also concerned that a short vertical scrubber exhaust will cause treated air to remain close to the ground. While the air is treated and the majority of odor abated, it will not be odor-free. A taller stack will more readily mix treated air with ambient air and reduce complaints.

However, our biggest concern with an underground structure is for the safety of the operations staff who will need to enter the structure to periodically observe the unit. Ventilation will be needed to frequently change air for occupancy. Even with designed air changes, the potential remains for hazardous gases to accumulate. The need to keep air changed will necessitate a generator be added to the construction to power the ventilation system.

The alternative we suggest MCPWO consider is to evaluate an aboveground carbon scrubber. Such a structure will be cheaper to construct, safer to operate, and will better disperse the scrubber exhaust into the atmosphere. The total life cycle cost savings to locate the scrubber aboveground could approach $1 million. Fan sound can be attenuated with a sound-dampening enclosure.

We understand this alternative is less aesthetically-pleasing. It may be possible to disguise the structure with landscaping or contain it within a structure. Exhibit F is a rendering of enclosing the structure with landscaping. Exhibit G is a rendering of enclosing the structure with an architectural wall or building. We believe that aboveground construction would allow the system to be more safely operated, would have a longer service life, would cost less, would be more effective in controlling odors, and would still allow the remaining property to be marketed. The table above has been included that briefly compare the alternative approaches.

Yet another option may be to embrace the structure as a place for public art. Tetra Tech took a similar approach in Ann Arbor where a public art contest was held to select art for an elevated water tank. This completed tank is shown in Exhibit H and has been a community asset, not an eyesore. MCPWO could run a public contest or partner with Macomb Township or a local school system to select a design for an aboveground vessel.

EXHIBIT F - RENDERING OF 21ST AND GARFIELD ABOVEGROUND CARBON SCRUBBER WITH VEGETATIVE SCREENING

EXHIBIT G - RENDERING OF 21ST AND GARFIELD ABOVEGROUND CARBON SCRUBBER WITH MASONRY WALL SCREENING

EXHIBIT H - ANN ARBOR TANK ARTWORK IDENTIFIED THROUGH PUBLIC CONTESTS

Fraser Biofilter

Understanding

The Fraser biofilter is located near the intersection of Garfield and 15 Mile Road and treats odorous air from the Romeo and Garfield arms of the MIDDD. The biofilter was constructed in 2014 and uses organic media within three beds to treat the air. The filter has generally been successful but the organic media has reached its design life. A sketch of the biofilter and proposed improvements is shown on Exhibit I provided in the next page.

MCPWO wishes to enhance the filter by installing engineered, inorganic media. At the same time, MCPWO wishes to improve the filter infrastructure by improving the irrigation and drainage. The biofilter will be further improved by constructing walls and covers.

One design objective is to determine if two filters beds should be constructed or three beds should remain.

Approach

Biofiltration is an odor control technology that utilizes biological processes as the treatment mechanism. Biofiltration utilizes naturally occurring microorganisms within the wastewater that adhere on media to oxidize odor and air emission compounds to produce carbon dioxide, water, biomass, and other benign byproducts such as chloride and sulfate. The byproducts are emitted in the outlet air, drained from the biofilter, or consumed by the microorganisms. The biological activity in a biofilter is similar to the activities performed by the microorganisms in activated sludge secondary wastewater treatment processes.

The existing Fraser Biofilter is a 20,000 cfm wood chip media biofilter that treats foul air from the Romeo Arm and Garfield Arm interceptor sewers of the Macomb Interceptor Drain sanitary sewer system. The air plenum of this biofilter appears to utilize perforated piping and gravel which is an older, less efficient approach for air distribution. Additionally, the use of soaker hoses in the media is an older, less efficient method for maintaining moisture in the media. According to the RFP, the existing Fraser Biofilter media has reached the end of its useful life and needs to be replaced. The scope of this design includes the replacement of the organic media with engineered media, the addition of covers, the addition of a humidification chamber, and the addition of a stack (or stacks) to exhaust the treated air. Although not stated in the RFP, it is assumed that the existing biofilter plenum shall be replaced with a new, in-ground concrete structure to provide even air distribution and a good connection surface for the new covers. The fan sheaves shall also be replaced to increase the pressure rating of the fan to account for the increased pressure drop through the new covers and stack(s). It is assumed that the fan will not need to be replaced.

Proper biofilter design starts with good testing data. The Jacobs report included hydrogen sulfide data from early April when the air temperature was still relatively cool. However, the report also recommends that additional testing data is obtained during warm weather as the inlet loadings may increase significantly. Therefore, a warm weather sampling and monitoring program will be conducted to accurately measure the inlet loadings going to the biofilter. The program will include the following:

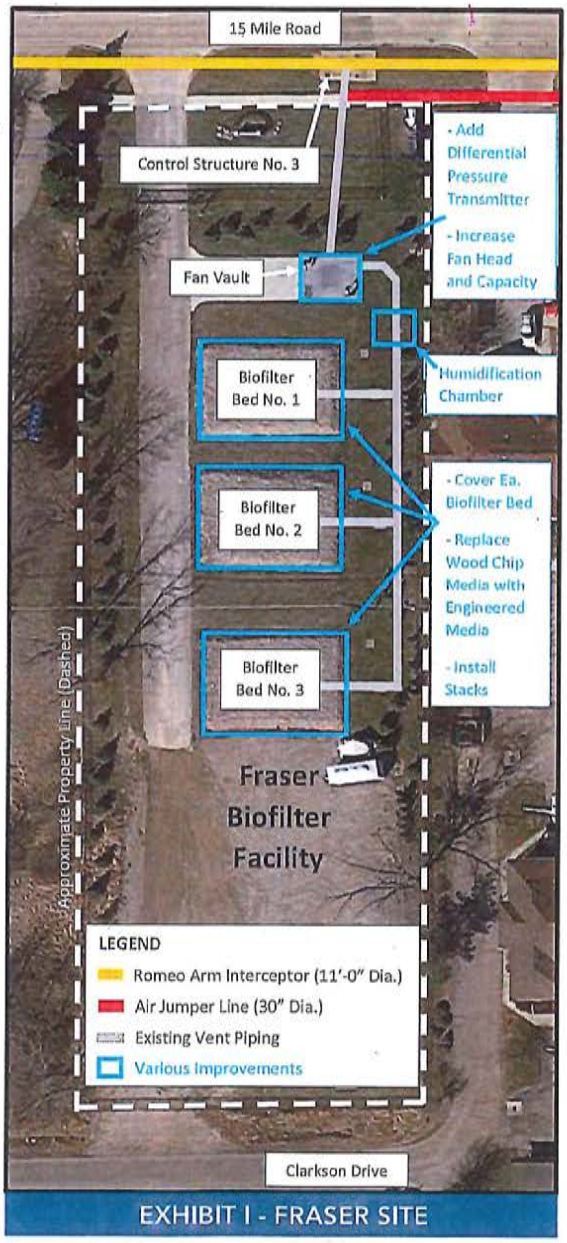


EXHIBIT I - FRASER SITE

- Reduced Sulfur Compound (RSC) Testing- Collect two samples from the biofilter inlet and test for RSCs.
- Hydrogen Sulfide Monitoring- Deploy an OdaLog in the biofilter inlet for approximately one week to record diurnal hydrogen sulfide concentrations.
- Measure airflow and differential pressure across fan.

The test data obtained from the program will be analyzed and inlet loadings calculated for hydrogen sulfide and any significant RSCs. Based on the inlet loadings and required removal efficiencies, an empty bed residence time, media volume, and footprint will be calculated. The biofilter design shall include a new plenum, irrigation system, humidification chamber, and cover system with stack(s).

An additional objective is to determine the number of beds required as MCPWO is desirous to consider reducing the number of beds from three to two. The specification approach for biofilters follows the same approach as the carbon units. Tetra Tech and Webster will use a performance-based approach to specify the biofilters. Such parameters as percent hydrogen-sulfide removal and percent total odor removal will be specified

Added Value - Vendor Interviews

Many clients wish to meet vendors of specialized products and understand the strengths and weaknesses of each manufacturer. The biofilter product may be one MCPWO could consider. By doing this, only vendors who pass MCPWO (and consultant) criteria will be allowed to bid the project. Such approaches generally lead to system operators who are most comfortable with the finished product.

Added Value - Winter Operation

Biological systems work well during warm temperatures but will not be effective should air temperatures drop below freezing. This may not be a concern as odor concentrations are lower in colder temperatures and the public is less active outside during winter.

However, Tetra Tech and Webster provided provisions to heat air in Saline so the bacteria in the biological scrubber would not freeze and the scrubber would perform better through the winter and spring seasons. This heating system was controlled in real time based on observed air temperatures. Depending upon MCPWO's goals and budget, heating the air can be a consideration.

Mechanical Systems

The biggest consideration with mechanical systems is whether the fan will remain functional for a higher air flow rate through changing sheaves. With a fan, as air flow increases, the available pressure supplied decreases. Thus, more air flow can only be achieved with changing fans if the pressure requirements of the fan decrease. In general, an engineered media will have less pressure drop requirements than the existing organic media, so changing the fans to increase air flow may be possible. Detailed calculations will be needed during design to verify if the fan can be reused.

Should a new fan be needed, certainly Tetra Tech possess the skills to design the new, larger fan.

Electrical and Instrumentation

Power will be supplied by the existing DTE service. However, if the fan increases in size, upgrades to this service including the transformer may be required.

Alarms on fan operation will be designed and connected to Macomb County's SCADA system. Such parameters as air temperature and air flow rate should be considered to be added to the system and the telemetry. An outdoor control panel will be installed for electrical supply and to house a PLC.

Department of Environment, Great Lakes, and Energy (EGLE) Coordination

Acquiring early approval of the project from Michigan EGLE may be important for the progress of this project. Our team is experienced at working with the staff at EGLE in both the Warren and the Lansing headquarters. We have built good relationships by delivering consistent and clear information on-time and by being true and fair advisors to our client communities.

As odor control is generally not a regulated condition (only in severe cases), we do not see that EGLE will perform an exhaustive review or require much in-person support. However, we have budgeted for one virtual meeting to present the projects and answer EGLE questions should that be needed.

Management and Reporting

Tetra Tech believes monthly meetings between the consultant and client facilitate communication and are critical to delivering a project on-time while meeting client needs. Meetings will be a critical part of the work plan including delivering agendas a week before the meeting so Tetra Tech and MCPWO are prepared.

The basis of design report will be prepared in draft and final forms. Our approach is to prepare text and figures for the report during the completion of the basis of design so by the time MCPWO sees the final report, it is more a formalization of concepts previously reviewed at progress meetings than a new product. The report will be completed in sufficient detail that the design can be quickly started without repetition.

Cost Opinion

A critical part of the project is preparing cost opinions throughout the project to allow MCPWO to budget and make informed decisions. Our goal for this is to provide a conservative cost opinion so that costs decrease with each subsequent phase. Our approach is to define costs for all major components using quantity takeoffs. However, we will also use contingencies to account for costs that cannot be well defined until future stages.

Comparable projects are always the best way to validate a cost opinion. Tetra Tech is fortunate to have completed projects involving similar elements in Saline and throughout the Midwest and these costs will be invaluable to validate the costs for a project in Macomb County.

C. Final Design

Task C Objectives

- ✓ *Develop biddable and buildable documents*
- ✓ *Obtain agency permits*
- ✓ *Engage MCPWO staff in project's progress*

30/60/90 and 100% Submittals

Detailed drawings and specifications will be developed at these stages and reviewed with Macomb County. This progression allows the county to develop comfort with the current state of the design before proceeding to the next.

Tetra Tech will utilize a Building Information Management (BIM) tool such as Autodesk's Revit to prepare all drawings. The preliminary sketches in this proposal were created in REVIT, which excels as creating 3D design spaces. Presenting the design in 3D allows the County and the public to better visualize the completed work while allowing the designer to better understand conflicts that may be present, reducing construction contract changes. The completed work can be converted to AutoCAD 2017 at the completion of the project for Macomb County's records.

Specifications will be prepared in MasterFormat 2014 as requested.

With this tight contracting market and rapidly increasing prices, Tetra Tech will treat these as more than just a formality. We will involve senior staff in their review including validating costs against recent bids. At key stages, we will solicit input from contractors regarding constructability and costs. Our QA/ QC procedure outlines our approach to reviewing the constructability of our designs and leads to better bids and lower costs for our clients.

Permit Applications

By the time the project is in design, hopefully, MDEQ has already approved the concept. At this point our team will prepare the necessary permit applications and submit them on behalf of your office. Further refinement of the concept and construction sequence will be provided.

Added Value - Air Modeling

Webster Environmental Associates routinely performs air modeling to determine the spatial impacts of odor. May be prudent to conduct modeling of the new discharge at Garfield to understand how the Carbon scrubber discharge will impact adjacent properties. While this air will be treated, it may have a mild odor and that odor will increase as the carbon ages and nears its treatment capacity. In particular, the modeling will assist in determining an optional stack height to control the impact on adjacent parcels.

D. Bidding

Task D Objectives

- ✓ *Obtain fairly-priced bids from qualified contractors*

The RFP outlines such steps as:

- Prebid meeting
- Prepare addenda and clarify questions
- Review the bids, conduct reference checks, and other bidder evaluation
- Conduct a pre-award meeting

These steps follow the approach typically used by Tetra Tech. Given the tight construction market southeastern Michigan is experiencing, we also believe that recruiting contractors may be beneficial for MCPWO so that adequate competition is achieved.

Tetra Tech has developed relationships with all of the large contractors in the area who are qualified to complete this work. These relationships will be invaluable to invite and encourage competent contractors (even before bids are formally advertised) to bid the project.

Tetra Tech endorses the use of contractor prequalification whenever allowed. By only opening bids from prequalified contractors, contractors without the credentials to successfully complete this important project will not bid.

Tetra Tech has found that owner satisfaction with the finished project is much higher when a qualified contractor is used. We would be happy to discuss this concept in more detail should MCPWO be interested.

Added Value - One Contract

We interpret the RFP to request the base proposal to offer three separate bids. However, Tetra Tech

believes that it is advantageous for MCPWO to consider a single bid and construction contract. By having a single contract, there will be numerous cost efficiencies realized in both the construction and engineering contract. It is simply less costly to construct one large project than three/four smaller projects.

We understand that MCPWO needs to account for project costs in three separate accounts. MCPWO could achieve this by establishing three contract divisions within one contract so both engineering and construction costs are accounted for by location.

E. Construction Administration

Task E Objectives

- ✓ *Administer the construction contract*
- ✓ *Ensure contractor completes work in accordance with contract documents*
- ✓ *Educate and engage public during construction*
- ✓ *Commission systems and train operators*
- ✓ *Update MCPWO's asset database*

The RFP outlines such steps as:

- Pre-construction meeting
- Submittal review
- RFI review
- Pay application review
- Construction progress meetings
- Staking
- Construction observation
- Record drawings
- Close-out

The County as proposed approach is in line with Tetra Tech's standard approach.

We have a proven track record of working with clients to determine a role for construction professionals that fit the client's needs. Some examples include:

- Providing experienced engineering and construction professionals to represent clients as expert witnesses on their behalf
- Quickly responding to RFI's and thoroughly, but fairly, reviewing change order requests.
- Using laptops to reference record drawings useful to the project
- Conducting post construction review meetings with client staff to identify and document issues discovered during construction that lead directly to improved design documents/construction procedures
- Meeting with commercial businesses and private homeowners in affected areas to educate, inform, and discuss project issues such as access, safety, etc.
- Preparing newsletters, press releases, and letters for the public and businesses that may be affected by the construction activities

Daily construction observation is performed by a resident project representative. Some responsibilities include:

- Observe/Monitor contractor's installation methods and operations to ensure conformance with contract requirements/ approved submittals
- Liaison between the contractor and the public
- Review shop drawings to verify materials on site are correct per specifications
- Coordinate material testing and survey staking
- Perform quality checks on staking/ cut sheets
- Observe and maintain settlement instrumentation at adjacent properties
- Monitor material testing and assure that they are completed in accordance to standards
- Review contractor's proposed costs for changes in work.

Training

Training can take many forms and durations. During design, Tetra Tech will work with MCPWO staff to identify the type and amount of training needed. Tetra Tech's general approach to training can be expressed by the following principles:

- Involve the design team during construction to ensure a smooth transition during start-up
- Train staff and operators in the odor control system prior to commissioning
- Continue to support MCPWO after commissioning as the operators become comfortable with the system

Material Testing

Our team brings the ability to provide independent material testing to the project. Such materials as concrete, backfill, and paving materials should be tested. Furthermore, proper soil compaction will be needed and our team can perform QA/QC services on compaction.

Public Engagement During Construction

Community meetings prior to construction are a good strategy although none of the proposed projects will have great impact on the public. We will work with MCPWO during the construction services scoping to determine the number and approach to engaging the public during construction.

Interactive Multi-Media O&M Manuals

Tetra Tech has excelled at preparing O&M manuals that go beyond a three-ring binder. This project will involve complex structures and complex procedures to maintain them. The use of video modules to

document the O&M and pass these practices on to the next generation of O&M workers is ideal.

Tetra Tech has worked with equipment vendors and sewer service specialists to complete interactive O&Ms on past projects. We have also prepared bids to pass the requirements for multi-media O&Ms onto the contractor to include in their bids. We can discuss the pros and cons of each approach with MCPWO if this service is desired.

Updating Asset Database

For this project, once under construction, we propose to update not only NEXGEN, but the GIS database and the MCPWO's CIP Plan with the new assets.

We will begin by working with your GIS Technician to incorporate the as-built survey assets into GIS and add the needed attribute information.

We will develop a hierarchy list of the assets in accordance with NEXGEN asset hierarchy and asset class list, including using the appropriate naming convention for each asset. If an asset class does not currently exist in NEXGEN for a certain piece of equipment (such as control structures), we will work with your office to develop the asset class and associated attribute guidelines. For each asset, we will then input the information into NEXGEN including the attribute information and installation dates and costs.

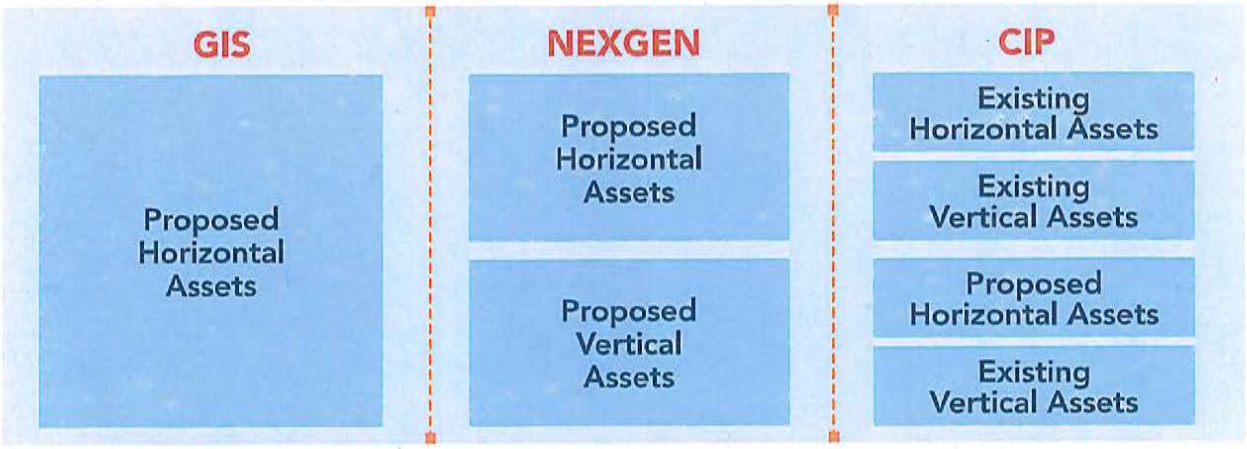
TETRA TECH'S MOST RECENT ODOR CONTROL PROJECT AWARD

Using the equipment shop drawing and manufacturer's guidelines, we will work with your office to develop a preventative maintenance program that fits into your staff's schedule.

Finally, we will work with your office to add the assets into the MCPWO's 20-year CIP. The new assets will require some major maintenance/ rehabilitation/upgrade over the next 20 years that must be included in the long-term CIP. These will be based on manufacturer's recommendations as well as our knowledge of the existing system and its operation. For instance, carbon replacement will be a significant cost and should be periodically budgeted.

PLC and SCADA Screen Programming

MCPWO has a preferred vendor for PLC and SCADA programming. Tetra Tech will establish an allowance for the cost of this work and specify the use of MCPWO's vendor within the construction contract.



Quality Control Process

All deliverables created by Tetra Tech initiated through this contract including work plans, designs, etc., will go through a rigorous Quality Assurance Program. Rest assured that Tetra Tech deliverables and work produces and adheres to the corporate Quality Practices Manual (QPM), which describes Tetra Tech's quality program policy and requirements for all our consulting, engineering, and construction services. The purpose of the QPM is to define basic quality assurance and control requirements that will guide, as applicable, all Tetra Tech programs and projects during planning, implementation, work product preparation, and field activities supported by Tetra Tech.

The QPM describes:

1. Tetra Tech quality program organization, including the roles and responsibilities of Tetra Tech and all affiliate business units in implementing this QPM;
2. Basic quality management system requirements to be addressed by all affiliate business units and described in business unit or program-specific quality management plans; and
3. Basic quality assurance and control requirements applicable to environmental data collection, work product preparation, engineering design and construction support, and construction services; to be addressed within all programs and projects supported by Tetra Tech.

The Tetra Tech QPM will also be used as the basis for developing more detailed program or project specific quality assurance and control plans and to describe Tetra Tech's fundamental requirements for ensuring quality service and product performance for Chapaton RTB Canal Upgrade project.

Consensus standard American National Standards Institute/ American Society for Quality (ANSI/ ASQ) E4-2004, "Quality Systems for Environmental Data and Technology Programs," provides the basis for the quality standards related to environmental programs addressed in the QPM. The ANSI/ASQ E4 standard combines various federal agency Quality Assurance/ Quality Control (QA/QC) requirements to make a uniform and consistent set of QA/QC requirements to manage the quality of environmental programs. The Tetra Tech quality program also embraces the quality management principles outlined in International Standard ISO 9000. The effective implementation of the QA/QC requirements of the QPM, coupled with business-unit specific plans and project-specific Quality Assurance Project Plans (QAPPs), will ensure the quality of our environmental and engineering programs. Tetra Tech's Quality Program emphasizes continual improvement by planning, doing, checking and acting throughout all phases of the project.

Quality Assurance / Quality Control

The Tetra Tech's QA/QC program is applied on all projects to ensure a solution that meets or exceeds our clients' needs. Our goal is to provide deliverables that are technically sound, high quality, cost-effective, and tailored to specific project objectives. The QA/QC program consists of two distinct, but interdependent components, as described as follows.

Quality Assurance

Quality Assurance (QA) is a process used to ensure we understand the project from the client's perspective

and that their goals and objectives have been met. QA representatives consist of individuals not directly involved in the project who provide an independent perspective. Each team has a checklist or questionnaire to document the results, which are then shared with the Project Manager and entire Project Team for possible implementation. This provides a means to continually identify opportunities for improvement. Components of the QA process are:

- Client Satisfaction Process (CSP) Interview: The CSP representative meets with the client at the beginning of the project to establish measurables and periodic milestones to evaluate our performance against these measurables. The representative also performs follow-up CSP interviews with the client at the mid-point and project completion to confirm that we met or exceeded their expectations for the project.
- Report Enhancement Process (REP): The REP representative reviews the report outline and draft report. This review compares the client's objectives with our approach to ensure clarity and thoroughness. The focus is clarity, completeness, and appropriateness.
- Key Concept Review (KCR): The KCR representative reviews design drawings and specifications to confirm the lead discipline concepts. They look for alternatives that may not have been considered or for potential innovative solutions to enhance the project.
- Constructability Review (CR): The CR differs from the KCR in that the reviewer will look specifically for cost-avoidance opportunities to ensure that the design (e.g., details on the drawings) promotes the most cost-effective construction operations.

Quality Control

- Quality Control (QC) consists of detailed checking procedures and is performed by experienced professionals who are familiar with the client's standards and practices. Components of the QC process are:
- Calculations: We review all calculations to ensure proper application of design criteria and technical standards and to verify the mathematical correctness of the results.
- Checklists: We use checklists during the reviews to ensure proper application of city, state, and federal design criteria and standards.
- Report Consistency: All report documents developed are reviewed for consistency of format, appearance, and standards.
- Construction Documents: We check construction plans and specifications for correctness, completeness, consistency, constructability, and conformance with the standards of our clients.

Tetra Tech's project manager will lead and coordinate this multi-disciplined team through each phase of every project by utilizing superior, world-class project management. In general, each project will have the following Project Management phases:

- Study Phase
- Design Phase
- Bidding Phase and
- Contract Administration Phase

5. Contract Deliverables

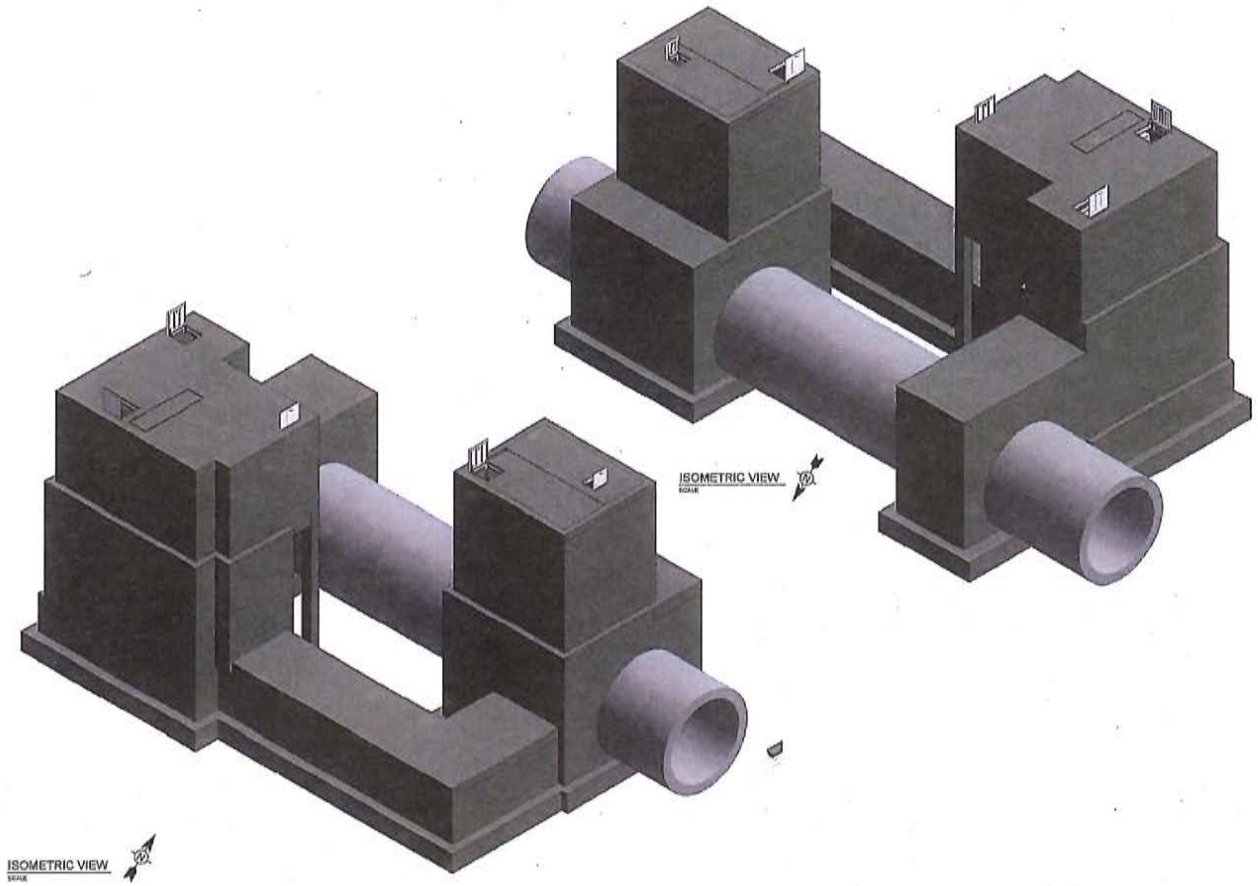
MACOMB COUNTY 1818 MICHIGAN

TETRA TECH

Contract Deliverables

Tetra Tech's service culminates in the production of various documents. The below list contains the deliverables expected for this project.

- Basis of Design and EGLE permit application
- Geotechnical data
- Survey documents as specified (topography for portions of all sites, and title and easement data for Garfield)
- 30%, 60%, 90%, and bid documents (including addenda)
- Cost opinions at 60% and 90%
- Construction contract submitted list
- SCADA operation protocol memos
- Meeting minutes
- Bid document addenda
- Bid tabulation
- Agenda for meeting with low bidder and recommendation letters



Price Proposal

Macomb MIDDD Odor Control

Submitted to: MCPWO 2/2/21
Scope and Fee Negotiation

Contract Type: T&M

Labor Plan
29 Resource

Total Fee 798,950
0
Total Fee 798,950

Project Phases / Tasks	Total Labor Hrs	Project Manager 2 (Mitch Hall)	Sr Project Manager (Brian Hoke)	Sr Engineer 1 (Roger Kalman)	Bill Folsom (Bill Folsom)	Aimee Kilby (Aimee Kilby)	Vicki Melling (Vicki Melling)	Cindy Watson (Cindy Watson)	Anna Lena Jansen (ana)	Jeff Johnston (Jeff Johnston)	Eric Gastings (Eric Gastings)	Sr Engineer 1 (Jason Nuhrig)	Structural	Structural	Structural	CAD	Site	QA/QC	Mech QA/QC	Elect QA/QC	QA/QC	Arch	CAD	LA	Webster	Webster	WTA	WTA	MTH	MTH	MTH	Labor	Subs	Travel	Mat'ls & Equip	ODCs	Task Pricing Totals
	4,554	82	174	335	158	180	170	48	152	278	372	28	100	156	232	152	48	20	12	38	124	300	156	692	322	66	50	54	48	112	785,420	13,530	-	-	-	798,950
1 North Gratiot Interceptor	1,315	34	68	79	28	24	20	16	24	138	76	8	24	44	80	30	16	8	3	28	80	100	-	278	44	-	10	21	-	40	223,004	3,150	-	-	-	224,154
Design	1,281	34	66	68	24	24	18	16	24	130	72	8	24	44	80	28	16	8	3	28	80	100	-	264	44	-	10	21	-	40	214,721	3,190	-	-	-	217,901
Basis of Design	126		2					6			16													72	28						22,656					22,656
Project Management	72		32	24							16																				15,216					15,216
Progress Meetings	72		16	16	10	2		8		4	16																				13,760					13,760
Planning commission submittals/coordination	32		32	8							16																				6,227					6,227
EGLE Permitting	32										8					4															1,680					1,680
Foundation/Structures (specs, calcs, dwgs)	309												24	44	80													33		40	27,162	3,150				30,312
Architectural	200																				20	80	200								24,237					24,237
Electrical/Instrumentation	54				18	22	16																								7,224					7,224
Survey	20																										10	10			4,627					4,627
Process design	254			24					16															150	24						31,456					31,456
Mechanical design	268	24								104																					27,228					27,228
Civil/Site	30								6							24															4,261					4,261
Quality reviews	43		6									8						16	1	1	8										10,551					10,551
Bidding	33	-	2	3	6	-	2	-	-	-	8	-	-	-	-	2	-	-	-	-	-	-	-	24	-	-	-	-	-	-	6,293	-	-	-	-	6,293
RFI/Addenda	21		2	4	4		2				8					2								24							4,066					4,066
Evaluate and Recommend	1			1																											227					227
2 Clintondale Pump Station	917	24	60	121	38	52	62	16	96	58	172	4	16	24	32	30	16	4	3	2	12	-	-	-	-	12	12	11	16	24	142,758	2,860	-	-	-	145,618
Design	894	24	58	116	34	52	60	16	96	54	168	4	16	24	32	28	16	4	3	2	12	-	-	-	-	12	12	11	16	24	138,895	2,860	-	-	-	141,695
Basis of Design	46	4	2	16				8			16																				7,556					7,556
Project Management	72		32	16				8			16																				14,080					14,080
Progress Meetings	48		16	2	10	2				4	8																				9,033					9,033
EGLE Permitting	32										8					4															1,637					1,637
Survey	24																									12	12				3,726					3,726
Foundation/Structures (specs, calcs, dwgs)	233												16	24	32													11	16	24	19,712	2,860				22,571
Architectural	32																				32										3,585					3,585
Electrical/Instrumentation	104				24	50	60																								16,612					16,612
Civil/Site	40							16								24															5,891					5,891
Process design	264			68				20			120							4													37,467					37,467
Mechanical design	22	2								50																					7,287					7,287
Air Ionization	28	12		16																											5,564					5,564
Quality reviews	32		6									4						12	4	2	2										7,972					7,972
Bidding	23	-	2	3	6	-	2	-	-	6	4	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3,923	-	-	-	-	3,923
RFI/Addenda	22		2	4	4		2			4	4					2															3,716					3,716
Evaluate and Recommend	1			1																											207					207
3 Garfield Road and Fraser Biofilter	2,322	24	146	141	92	104	88	16	32	82	124	16	60	88	120	92	11	8	6	8	32	-	156	414	276	54	28	22	32	48	421,659	7,480	-	-	-	429,139
Garfield Road Design	1,196	12	84	69	42	52	40	8	16	34	64	8	40	48	60	60	8	4	3	4	16	-	156	40	228	42	26	11	16	24	219,237	4,620	-	-	-	223,857
Design	1,196	12	84	69	42	52	40	8	16	34	64	8	40	48	60	60	8	4	3	4	16	-	156	40	228	42	26	11	16	24	219,237	4,620	-	-	-	223,857
Basis of Design	24		4	2							12												24	40	24						18,644					18,644
Project Management	72		32	16				8			16																				14,080					14,080
Progress Meetings	56		16	12	10	2				4	12																				11,176					11,176
Planning commission submittals/coordination	32		8	2							16																				3,579					3,579
EGLE Permitting	12										8					4															1,637					1,637
Foundation/Structures (specs, calcs, dwgs)	175												24	40	60													33	24	24	24,904	4,620				29,524
Architectural	20																				4	16									3,291					3,291
Electrical/Instrumentation	112				32	50	40																								16,612					16,612
Survey	32																									28	16				4,961					4,961
Process alternatives	36		16	16		2							16	8																	11,589					11,589
Civil/Site	212								16							56							148								29,871					29,871
Process design	-																																			
Mechanical design	282	12								26															234	26					67,565					67,565
Quality reviews	21		2									2						8	2	2											7,426					7,426
Fraser Biofilter Design	1,049	12	58	72	42	52	40	8	16	40	52	8	20	40	60	28	8	4	3	4	16	-	-	350	48	12	32	11	16	24	180,380	2,860	-	-	-	191,240
Design	1,049	12	58	72	42	52	40	8	16	40	52	8	20	40	60	28	8	4	3	4	16	-	-	350	48	12	32	11	16	24	180,380	2,860	-	-	-	191,240
Basis of Design	134		2	8							32													70	22						23,618					23,618
Project Management	80		32	32				8			8																				15,520					15,520
Progress Meetings	56		16	16	10	2				4	8																				11,405					11,405
Planning commission submittals/coordination	32		8	8							16																				5,579					5,579
EGLE Permitting	12										8					4															1,637					1,637
Foundation/Structures (specs, calcs, dwgs)	175												20	40	60													33	16	24	29,259	2,860				32,119
Electrical/Instrumentation	120				32	50	40																								16,612					16,612
Survey	24																									32	12				3,726					3,726
Civil/Site	32							8								24															4,264					4,264
Process design	320			4				8																280	24						42,328					42,328
Mechanical design	48	12								24																					6,521					6,521
Quality reviews	18											8						2	2	2											4,662					4,662
Architectural	20																				4	24									3,291					3,291
Bidding	77	-	4	9	3	-	3	-	-	8	8	-	-	-	-	4	-	-	-	-	-	-	-	34	4	-	-	-	-	-	13,941	-	-	-	-	13,941
RFI/Addenda	76		4	8	3		3			8	8					4								34	4						13,745					13,745
Evaluate and Recommend	1			1																											197					197
Totals	4,554	82	174	335	158	180	170	48	152	278	372	28	100	156	232	152	48	20	12	38	124	300	156	692	322	66	50	54	48	112	785,420	13,530	-	-	-	798,950

Funding Source	Apportionment	Manager	Vendor	Amount	Invoice Detail	Project Summary	Project Balance
Macomb Interceptor Drain	Chapter 20 Chesterfield – 7.2499% Clinton – 21.2506% Fraser – 4.0512% Harrison – 6.4207% Lenox – 1.0638% Macomb – 13.9606% New Haven – .8226% Shelby – 9.9057% Sterling Heights – 30.9081% Utica – 1.5918% Washington – 2.7751%						
Administration		Downing	Anderson, Eckstein & Westrick	$ 19,557.55	Invoice #129446 - 1.12.21	Dropshaft & Connecting Sewer Rehab	$ 72,089.95
		Downing	CH2M Hill Engineers, Inc.	$ 53,366.24	Invoice #707997CH021 - 1.8.21	Odor & Corrosion Study - Sterling Heights 50%	$ 51.48
		Manning	County of Macomb	$ 224,551.85	Invoice #AR200890 - 11.12.20	3rd Quarter Personnel and Operating Expenses	
		Astorino	DTE Energy	$ 1,082.07	Invoice #R44ZF-WO49R - 1.4.21	Monthly Electric - 12.3.20 - 12.30.20	
		Astorino	Fishbeck	$ 915.00	Invoice #397584 - 12.29.20	As-Needed Engineering Services through 12.25.20	$ 82,625.88
		Astorino	Fishbeck	$ 975.00	Invoice #3797580 - 12.29.20	GLWA Assistance through 12.25.20	$ 21,739.37
		Astorino	Fishbeck	$ 6,117.56	Invoice #398215 - 1.27.21	Wastewater Master Plan through 1.22.21	$ 450,406.83
		Downing	FK Engineering Associates	$ 90,054.00	Invoice #20-152-002 - 1.11.21	Romeo Arm - Segment 5	$ 2,303,939.52
		Downing	FK Engineering Associates	$ 19,979.65	Invoice #20-058-008 - 1.11.21	Segment 6 Rehabilitation Design	$ 45,153.03
		Astorino	FK Engineering Associates	$ 3,500.00	Invoice #20-042-04 - 1.9.21	Sewer Rehab Analysis	$ 24,500.00
		Downing	Inland Waters	$ 217,895.49	Invoice #WO18330 Est 4 - 1.5.21	Dropshaft & Connecting Sewer Rehab	$ 563,311.25
		Baker	KHVPF, PLC	$ 2,025.00	Invoice #45906 - 1.1.21	General Matters through December 2020 - OMID	
		Manning	Macomb County Treasurer	$ 26,861.00	Invoice #19497-Downing	2020 Ford Truck - Reimburse to Equipment Fund	
		Manning	Macomb County Treasurer	$ 26,243.00	Invoice #80781-Lumma	2020 Ford Truck - Reimburse to Equipment Fund	
		Astorino	METCO Consulting Services	$ 4,503.01	Invoice #1717-19 - 1.5.21	Flow Control Services	$ 114,019.51
		Downing	Tom's Auto Glass	$ 755.00	Invoice #89336 - 11.5.20	Truck 20-467 Tool Box/Lights - Downing	
		Sucharski	Verizon	$ 652.69	Invoice #98676854565- 11.23.20	Monthly Cell - 10.24.20 - 11.23.20	
		Sucharski	Verizon	$ 1,127.93	Invoice #98676854565- 11.23.20	Monthly Cell - 10.24.20 - 11.23.20 (Equipment Fund)	
		Sucharski	Verizon	$ 909.17	Invoice #9869806264 - 12.23.20	Monthly Cell - 11.24.20 - 12.23.20	
		Sucharski	Verizon	$ 1,206.03	Invoice #9869806264 - 12.23.20	Monthly Cell - 11.24.20 - 12.23.20 (Equipment Fund)	
Clintondale P.S.		Astorino	Clinton Township Treasurer	$ 2,367.33	Invoice #21-005 - 12.29.20	Monthly Water & Sewer - 11.24.20 - 12.22.20	
		Astorino	DTE Energy	$ 25,099.95	Invoice #R4VXR-Y88FL - 1.4.21	Monthly Electric - 12.2.20 - 1.4.21	
Meters		Astorino	Aquasight	$ 30,995.00	Invoice #000611-1.4.21	On Boarding Fee (5 of 6)	$ 119,172.00
		Astorino	DTE Energy	$ 550.00	Invoice #R2BYQ-7N8JN - 12.22.20	Monthly Electric - 10.22.20 - 11.20.20	
		Astorino	DTE Energy	$ 541.18	Invoice #R5W9G-CGT57 - 1.22.21	Monthly Electric - 11.21.20 - 12.22.20	
NGI		Astorino	Abel Electronics	$ 9,245.01	Invoice #121221 - 1.22.21	Camera System Upgrades	$ 20,996.52
		Astorino	CH2M Hill Engineers, Inc.	$ 1,579.59	Invoice #704078CH0004R - 1.7.21	H2S Sampling	$ 20,996.52
OMID		Downing	Oakland County	$ 4,257,665.09	Invoice #SDS0007490-DEC	December Sewer	
SEMSD		Astorino	Fishbeck	$ 2,843.00	Invoice #398214 - 1.27.21	Wastewater Master Plan through 1.22.21	$ 75,968.60
SRF		Downing	Oscar Renda Contracting	$ 283,950.00	Invoice #WO19024, Est #4 - 1.7.21	Segment 5 Lining	$ 25,707,565.00
		Downing	Oscar Renda Contracting	$ 1,281,825.00	Invoice #WO19024, Est #4 - 1.7.21	Segment 5 Lining	$ 24,283,315.00
			Total	$ 6,598,938.39			

Budget to Actual
MIDDD
As of Jan 31, 2021 = 58%

DESCRIPTION	2021 FINAL BUDGET	ENCUMBERED	ACTUAL	REMAINING BUDGET	PCT UTILIZED
REVENUE ACCOUNTS					
GLWA-OMID	47,262,993		27,574,472	19,688,521	58.3%
OMID O&M	3,828,987		2,233,576	1,595,411	58.3%
Settlement	100,000		12,500,000	(12,400,000)	12500.0%
EGLE Testing Grant	-		359,318	-	0.0%
SRF 5659-03			2,505,992	-	9.6%
Reimbursements	225,000		101,846	123,154	45.3%
PY Revenue-Fund Balance	8,388,627			8,388,627	0.0%
Washington Twp Meter Project	47,475			47,475	0.0%
Reimb-Local Communities	13,548,089		5,645,037	7,903,052	41.7%
Interest	250,000		29,634	220,366	11.9%
Total Revenue Accounts	73,651,171	-	50,949,875	25,566,606	69.2%
EXPENSE ACCOUNTS					
GLWA-OMID	47,262,993		27,574,472	19,688,521	58.3%
OMID O&M	3,828,987		2,233,576	1,595,411	58.3%
Public Works Wastewater Disposal Division	1,942,127		306,780	1,635,347	15.8%
Office Operations/Insurance	309,925		144,554	165,371	46.6%
SCADA	268,889		28,940	239,949	10.8%
Engineering					
Meter Dye Testing 2 year contract new this year	100,000		25,300	74,700	25.3%
Data Review-Aquasight	250,000		61,990	188,010	24.8%
Replenish reserve from CPS refunding	618,680			618,680	0.0%
Design Odor and Corrosion	750,000		3,420	746,580	0.5%
Construction Project for Odor and Control	1,000,000			1,000,000	0.0%
SY-S-1,SY-S-2, WA-S-1 Construction Admin	250,000		38,808	211,192	15.5%
FKE Rehab analysis phase 2	84,000		14,000	70,000	16.7%
Seg 5 Construction	1,150,000		131,548	1,018,452	11.4%
Seg 5 Lining SRF($26 Million)	-		2,963,192	-	11.4%
Phase II Grouting	3,825,000		1,196,625	2,628,375	31.3%
GLWA Assistance	40,000		4,875	35,125	12.2%
Drop Shaft	-		1,018,726	(1,018,726)	100.0%
As Needed FTCH	75,000		3,861	71,139	5.1%
As Needed FK Engineering	75,000		6,898	68,102	9.2%
As Needed Wade Trim	75,000		237	74,763	0.3%
As Needed Metco	125,000		14,879	110,121	11.9%
As Needed Applied Science	25,000			25,000	0.0%
As Needed Odor and Corrosion	75,000		53,366	21,634	71.2%
Seg 5 Engineering Design	374,557		373,945	612	99.8%
Contribution to Segment 5/Grouting	1,450,000		717,270	732,730	49.5%
15 Mile Inter Design East of Garfield (Segment 6)/Const Admin	1,500,000		311,993	1,188,007	20.8%
SY-S-1 & SY-S-2 Meter Design/Rehab	1,134,070			1,134,070	0.0%
Level Sensors/Pressure/H2S-Meters	250,000			250,000	0.0%
Wastewater Master Plan/Contract Capacity	400,000		44,219	355,781	11.1%
EGLE Testing Grant	-		330,304	-	0.0%
Washington Township meter	500,000			500,000	0.0%
Legal Services	250,000		12,961	237,039	5.2%
Clintondale PS O&M	639,500		167,459	472,041	26.2%
NGI O&M	230,000		72,430	157,570	31.5%
Meters O&M	253,470		146,792	106,678	57.9%
CS-3 O&M	226,000			226,000	0.0%
Biofilter O&M	22,500		8,804	13,696	39.1%
Contribution Life Cycle Reserve	171,700			171,700	0.0%
Interceptor O&M	1,900,000		7,715	1,892,285	0.4%
Stormwater Pump Stations	234,250		136,646	97,604	58.3%
Sewage Disposal Charges - Mt. Clemens	200,000		74,857	125,143	37.4%
Debt Service - Revenue Bonds	1,784,523		1,040,972	743,551	58.3%
Total Expense Accounts	73,651,171	-	39,272,414	37,672,253	53.3%

	O&M Balance 6/30/2020	O&M	Total 1/31/2021
Cash - Operating	24,226,346	11,677,461	35,903,807
Accounts Receivable			0
Assets			0
Liabilities			0
Revenues		50,949,875	50,949,875
Expenditures		39,272,414	39,272,414
			0
Equity*	24,226,346		35,903,807

Detail of 2020 Equity*

Projected reserve at 6/30/2020	6,818,887
Projected Engineering Reserve	12,920,000
Projected Sinkhole Surplus	3,656,059
Life Cycle Reserve	831,400