

DATE: AUGUST 1, 2011 CLERK: MARY BETH BAILEY

MASSILLON CITY COUNCIL
CITY OF MASSILLON, OHIO
GLENN E. GAMBER, PRESIDENT

COUNCIL CHAMBERS

LEGISLATIVE DEPARTMENT

ORDINANCE NO. 91 - 2011

BY: ENVIRONMENTAL COMMITTEE

TITLE: AN ORDINANCE authorizing the Director of Public Service and Safety of the City of Massillon, Ohio, to enter into a contract with CTI Environmental, Inc. for professional services for Roughing Filter Odor Control Analysis, Phosphorous Removal, and a Facility Plan Update at the Wastewater Treatment Plant, and declaring an emergency.

NOW, THEREFORE, BE IT ORDAINED BY THE COUNCIL OF THE CITY OF MASSILLON, STATE OF OHIO, THAT:

Section 1:

The Council of the City of Massillon, Ohio, is hereby authorized and directed to enter into a contract with CTI Environmental, Inc., for professional services for Roughing Filter Odor Control Analysis Phosphorous Removal, and a Facility Plan Update at the Wastewater Treatment Plant.

Section 2:

The Director of Public Service and Safety of the City of Massillon, Ohio, is hereby authorized and directed to enter into a contract with CTI Environmental, Inc. for professional services for Roughing Filter Odor Control Analysis Phosphorous Removal, and a Facility Plan Update at the Wastewater Treatment Plant. The City was issued a new NPDES Permit effective March 1, 2011 by OEPA and the Facility Plan Update is the first step the City must take in meeting the new requirements in the permit. The cost for the proposed services are not to exceed One Hundred Nine Thousand Five Hundred Dollars (\$109,500.00) which will be paid from the WWTP services and contracts fund.

Section 3:

This Ordinance is hereby declared to be an emergency measure necessary for the immediate preservation of the health, safety, and welfare of the community, and for the additional reason that it is necessary to have this facility plan update completed to meet the first step requirements of the NPDES permit at the Massillon Wastewater Treatment Plant and then to resolve it. Provided it receives the affirmative vote of two-thirds of the elected members to Council, it shall take effect and be in force immediately upon its passage and approval by the Mayor. Otherwise, it shall take effect and be in force from and after the earliest period allowed by law.

PASSED IN COUNCIL THIS 10th DAY OF September 2011

APPROVED: Mary Beth Bailey Glenn E. Gamber
MARY BETH BAILEY, CLERK OF COUNCIL GLENN E. GAMBER, PRESIDENT

APPROVED: September 8, 2011 Francis H. Cicchinelli, Jr.
FRANCIS H. CICCHINELLI, JR., MAYOR

I hereby certify that the foregoing ordinance is a true copy of the original, as passed by the Council of the City of Massillon, Ohio, and approved as noted thereon:

Mary Beth Bailey
Clerk of Council

Date 9/10/11



CTI Engineers, Inc.
101 Central Plaza South
Suite 400
Canton, Ohio 44702
Phone 330.455.7733
Fax 330.313.2282
www.ctiengr.com

June 30, 2011

Mr. Keith A. Dylewski, P.E., P.S.
City Engineer
City of Massillon
151 Lincoln Way East
Massillon, Ohio 44646

Subject: Professional Engineering Services Proposal – City of Massillon
WWTP
Roughing Filter Odor Control Analysis, Phosphorous Removal, and
Facility Plan Update
CTI Proposal No. EP10068

Dear Mr. Dylewski:

In response to our meeting on June 24, 2011, and our previous proposal, CTI Engineers is submitting a revised proposal to provide engineering services for the analysis and preliminary design of odor control alternatives for the existing roughing filters, the analysis and preliminary design of phosphorous removal facilities and to prepare a Facility Plan Update. The Facility Plan Update is the first step the City must take in meeting the new requirements of its NPDES discharge permit which requires that detail plans be prepared for system improvements for phosphorous removal no later than September 1, 2012, and status reports every six months along the way.

ROUGHING FILTER ODOR CONTROL ANALYSIS

The roughing filters consist of six (6) octagonal filters (25 ft. H by 28 ft. W) which treat the effluent from the primary clarifiers before it is discharged into the three(3) aeration tanks. The filters are located in three pairs over the three tanks. The primary effluent flow is pumped to the top of the filters and is distributed equally to the three filter pairs. As the warm wastewater trickles down the filter media to the aeration tanks it warms the air within the filters and creates an updraft which is visible as a cloud during cold weather.

The roughing filters were constructed during the 1973 WWTP expansion primarily to supplement the plant's activated sludge treatment capacity and "pretreat" wastewater which was high in BOD₅ largely due to discharges from the

Superior Provision Company a local meat processor. It has been reported that Superior contributed financially to the construction of the roughing filters.

When Superior suspended operations, the BOD₅ influent load to the plant decreased, the filters were no longer required, and were taken offline in 1987. As industrial operations expanded the aeration tank treatment capacity was reached and the need for the roughing filters was again realized. They were placed back in service in March, 1999.

When the WWTP was expanded in 2002 -2004 the roughing filters were again incorporated into the design as they can remove as much as 80 % of the carbonaceous BOD₅ while the aeration tanks are being used to remove the remaining carbonaceous BOD₅ and for nitrification. This eliminated the need to add additional aeration tank capacity and reduced the construction cost of the expansion.

Since 2005, the industrial loading to the WWTP has increased significantly through the addition of new industries and the expansion of existing ones. The plant is once again nearing its organic capacity and the current makeup of high strength industrial wastes appear to be contributing to odor emissions primarily from the roughing filters.

Capturing and treating emissions for the existing roughing filter is not an easy task as they require from 18,000 to 36,000 CFM of natural drafting air to support their operation. This volume of air would have to be captured by constructing covers and then adding a treatment system to treat the captured air. The existing roughing filter exterior structure was not designed to support covers or the associated wind loads and will require further structural analysis and possibly the design of additional support mechanisms.

An opinion of the cost of construction to cover the roughing filters and the first and second stage screw pumps and to collect and add facilities to treat the air was approximately \$3,500,000 in 2006.

Another option to eliminate the roughing filter odors would be to replace the roughing filters with an MBBR BOD roughing reactor which is essentially a submerged roughing filter without any return sludge or backwashing requirements. This would eliminate the second stage screw pumps, the roughing filters and the excessive emissions currently produced by them. The MBBR BOD roughing reactor would be two parallel process trains each approximately 37L x 60 W x 14 SWD which could possibly be located in the process train between the first stage screw and the aeration tanks. The total reactor tank volume would be a little over one half the size of one of the three (3) existing aeration tanks.

During the 2002-2004 WWTP expansion, considerations were incorporated for the addition of a fourth aeration tank on the opposite side of the plant drive and a

blind flange was provided in the main aeration tank header piping to facilitate the addition of additional aeration piping to the tank.

Further evaluation and an analysis of the plant hydraulic profile will be needed to make a final determination of its feasibility. Existing excess blower capacity if available may be utilized to minimize or eliminate the cost of providing additional blowers.

The City has received a new NPDES permit which includes a requirement to design and construct phosphorous removal facilities. The impact this may have on any WWTP secondary process changes should also be considered at this time as well as the anticipated requirement for total nitrogen removal in future permit cycles so an efficient and effective system can be designed at this time.

TOTAL PHOSPHORUS OBJECTIVES & PROJECT APPROACH

For this portion of the project, CTI will be assisted by Obrien & Gere Engineers, Inc. (OB&G) who have developed specific competence in this area through work on nutrient removal projects in the Chesapeake Bay region. CTI has formed a strategic alliance with OB&G to pursue nutrient removal projects in Ohio and are currently beginning work on nutrient removal projects in Sebring and Salem. Greg McCue attended a nutrient removal workshop held last December in Canton which was a joint effort by CTI and OB&G. We've attached resumes of OB&G personnel who are expected to be assisting with the project.

The existing City of Massillon WWTP is an advanced secondary biological treatment plant with anaerobic solids digestion and solids dewatering with a design capacity of 15.8 MGD. Unit processes include: Screening, Grit Removal, Equalization, Preaeration, Primary Clarification, Roughing Filters, Activated Sludge, Final Clarification, Tertiary Filtration, High River Stage Effluent Pumping, Return Activated Sludge (RAS) & Waste Activated Sludge (WAS) Pumping, Ultraviolet Effluent Disinfection, Sledge Blending, Gravity Belt Thickening, Anaerobic Digestion, Belt Filter Press Dewatering, and Sludge Cake Storage Pad.

The Massillon WWTP averages an influent total phosphorous (TP) level of approximately 3 mg/L. In the 2011 NPDES Permit issued by OEPA, it is required that the WWTP reduce TP to 1.0 mg/L in the final effluent no later than March 1, 2016.

The primary objectives of this TP Removal Study are to:

- Identify a cost-effective approach to meet an effluent TP limit of 1.0 mg/L
- Evaluate potential alternative approaches to optimize nutrient removal including a coagulant chemical feed system and biological phosphorus removal (BPR),

- Evaluate an alternative plant configuration to achieve BPR,
- Identify other improvements to plant facilities and operation related to the alternative BPR approach and considering the effects of removing the roughing filters to eliminate odors,
- Identify the effect various alternatives will have on other plant processes such as solids handling operations, tertiary filter operations, UV disinfection, etc.,
- Issue a Biological Treatment Technical Memorandum (with a proposed biological mass balance / basis of design) that identifies and preliminarily screens various treatment options, including combinations of fixed-film and suspended growth activated sludge alternatives that would achieve TP removal and overall nutrient balance (optimization of existing infrastructure to meet pending treatment requirements). The memo and engineering analysis will preliminarily assess the cost impacts of meeting the TP limit and accommodating a given influent TP loading condition.

The issue of solids handling, however, may be directly related to the issue of TP removal – in particular, liquid sludge holding, thickening, and stabilization. The solids handling systems are critical to TP removal in order to not adversely impact the liquid treatment performance (overload and/or recycle strengths) and to remove the nutrients from the WWTP (stored in waste sludge, and not allowed to return to the liquid treatment side of the plant). It is often a holistic approach to nutrients and solids management.

While compiling historical and current operating data, discuss operational settings and decision-making practices with O&M staff during a site visit in order to prepare the initial treatment process model to evaluate the existing configuration and the preliminarily recommended biological treatment system.

Several pieces of information are necessary to create a reliable process model of the wastewater treatment facility. These include primary effluent characterization, return flow characterization, measurement of some kinetic rates within the current process, and process-related historical data. Parameters associated with screened influent and recycle flow characterization often include: COD (total, filtered, fine-filtered), BOD₅ and CBOD₅ (total and filtered), TSS and VSS, TKN, Ammonia-N, Nitrate-N, Total P and Orthophosphate, Alkalinity (as CaCO₃), pH, temperature, and Dissolved Oxygen (and can also include Acetate, Calcium, Magnesium, etc.). In addition, for example when Ammonia conversion is a point of interest, kinetic rate measurements are made by sampling ammonia (and, often, nitrate and DO levels) at different points along the activated sludge system.

As noted above, it is assumed that the WWTP collects enough of this information to provide a meaningful and useful initial process model, and no supplemental sampling campaign will be conducted. Engineering judgment and/or default values may need to be applied if plant information is not available for this initial

work, given the level of influent TP, history of plant operating conditions, and degree of TP removal to meet the proposed NPDES Permit limit.

Ammonia, Nitrate, DO, and Ortho-P profiling of the existing biological treatment system may be requested.

SCOPE OF SERVICES

Responsibilities of CTI Engineers, Inc. (CTI):

ROUGHING FILTER ODOR CONTROL ANALYSIS

- I. The scope of the odor control study consists of the following tasks:
 - A. Orientation. Review previous construction documents, and the effectiveness of the existing odor control systems . Review previous odor control evaluations, available air quality data, and identify feasible odor control processes.
 - B. Alternative Analysis. Perform an analysis of replacing the existing roughing filters with an MBBR reactor with nutrient removal capabilities when coupled with the existing activated sludge process. Evaluate replacing the existing screw pumps with alternative methods for pumping primary effluent.
 - C. Perform analysis and preliminary design to retrofit or replace the existing carbon type odor control units located in the Grit Disposal room and the Sludge Blending/Solids Handling Buildings with alternative odor control systems which can also treat for mercaptans.
 - D. Report. A report shall be generated that will provide the details of the analyses and preliminary design along with conclusions and recommendations. Five copies shall be provided.
 - E. Meetings with Owner. A kick-off meeting and presentation meeting shall be provided to present the results of the study.

TP REMOVAL

- A. The study scope of services includes:
 1. Review of WWTP operational data (available influent, in-plant, and effluent performance data)
 2. Site visit/Kickoff meeting / Process workshop at the Massillon WWTP
 - a. Discussion of existing conditions and operational settings, as well as current and future operating scenarios
 - b. Review of potential wastewater treatment options
 3. Data Compilation - Compile the electronic data made available

4. Assess use of coagulant feed for polishing TP to the 1 mg/L limit if needed.
5. Initial Treatment Process Modeling
 - a. Confirm use of BioWin or GPS-X with the discussion of existing and potential biological treatment configurations, available data, needs, and future applications
 - b. Calibrate the model to existing plant performance for a specific time period (e.g., cold-weather operation) and then validate with plant data from a different period of time (e.g., warm-weather operation)
 - c. Run the model for existing conditions and the preliminarily recommended the biological treatment system
6. Preliminary assessment of an allowable TP influent loading condition
7. Chemical and Biological Treatment Alternatives Technical Memorandum, and associated process modeling and planning-level engineering analysis, along with preliminary cost budget for the impacted systems.

Discussions will include a review of permit requirements (current and potential future limitations which may include a BNR-level Total Nitrogen goal or limit), operational preferences, and parameters of concern for plant performance and critical unit processes. Modeling will include forward-flow liquid treatment systems, major solids handling systems, and significant plant recycles. Modeling software (licensing) would not be provided to the City of Massillon as part of the scope of services. The Technical Memorandum may include recommendations for further data gathering to enhance the model in a future (preliminary engineering / final design) task – for example, winter-time cold-weather data related to prospective nitrogen and/or phosphorus removal.

FACILITY PLAN UPDATE

The Scope of Services includes reviewing and updating the existing City of Massillon WWTP Facility Plan as follows:

- Incorporate results of the Roughing Filter Odor Control Analysis, and the Phosphorous Removal Study
- Projected future domestic and industrial wastewater flows and pollutant loadings
- Project anticipated future NPDES permit nutrient removal requirements

- Assess current WWTP process units performance including the tertiary treatment process, which requires that a detail study be performed by March 1, 2012 which includes an evaluation of the effectiveness of new pretreatment systems being installed by local industrial dischargers.
- Prepare recommendations for improvements

Responsibilities of City of Massillon (CLIENT):

- I. The CLIENT will be responsible to:
 - A. Provide all criteria and full information as to its requirements for the project.
 - B. Upon identification by CTI and approval by the CLIENT of the necessity and scope of information required, furnish CTI with data, reports, surveys, and other materials required for this project.
 - C. Provide access to the project site and make all provisions for CTI to enter upon public and private lands as required for CTI to perform its services under this Agreement.
 - D. Examine all studies, reports, sketches, opinions of the construction costs, specifications, drawings, proposals, and other documents presented by CTI to the CLIENT, and render in writing the CLIENT's decisions pertaining thereto within a reasonable time so as not to delay the services of CTI.
 - E. Give prompt written notice to CTI whenever the CLIENT observes or otherwise becomes aware of any defect in the project.
 - F. Furnish to CTI, prior to execution of this Agreement, a copy of any design and construction standards the CLIENT shall require CTI to follow in performing its services under this Agreement.
 - G. Requests For Information (RFIs). In order to complete this task, the City of Massillon will provide copies of:
 1. Current and proposed permits
 2. Last 5 years of MORs and operating data (electronic format)
 3. Current (4-week) sampling program data
 4. Summary of any documents and/or industrial pretreatment permit(s) related to current and future WWTP loadings

COMPENSATION

CTI proposed to perform the preceding Scope of Services for a cost plus not-to-exceed fee of One Hundred Nine Thousand Five Hundred Dollars (\$109,500.00).

We appreciate the opportunity to submit this proposal and look forward to working with you on this project. If you have any questions or desire any changes in the proposed scope of services, please do not hesitate to call.

Sincerely,

A handwritten signature in black ink, reading "William A. Dorman". The signature is fluid and cursive, with the first name "William" being the most prominent.

William A. Dorman, P.E.
President

cc: Tony Ulrich