



Qualifications for

Town of Ledyard, Connecticut
Water Pollution Control Authority Engineering Services
Upgrade of the Wastewater Treatment Facility

Submitted to

TOWN OF LEDYARD, CONNECTICUT

February 12, 2015



FUSS & O'NEILL



February 12, 2015

Mayor John Rodolico
Town of Ledyard
741 Colonel Ledyard Highway
Ledyard, CT 06339

Re: Request for Qualifications – Bid # 2015-09 – WPCF Engineering Services
Managing the WPCF Upgrade Project to Achieve Maximum Benefit for Ledyard

Dear Mayor Rodolico:

Getting the most for your money in a major wastewater treatment facility upgrade project is a significant challenge. Fuss & O'Neill is committed to work with Ledyard to make your project a resounding success—both technically and financially—just as we have done for many other Connecticut communities in recent years.

We will help Ledyard achieve maximum benefit by using a multi-faceted approach. First, we will provide a project manager—Mr. Jeff McDonald—who is a recognized regional expert in Sequencing Batch Reactors (SBRs), which of course is the biological treatment process featured at your facility. His knowledge of SBRs will provide flawless guidance to the team, resulting in an accurate evaluation of the facility and alternative actions.

We next will use a collaborative process to develop (with the input of your staff) a list of recommended improvements, which will be categorized based upon criticality and other factors. This list will then be further analyzed for opportunities to implement certain discrete components via alternative or non-traditional approaches. This is detailed in Section 2 (Project Approach). As the project elements move into the design and construction phases, we will use cost models and on-going budget management tools to proactively manage overall project expenditures.

Our approach has many benefits for Ledyard. We will provide you with a seasoned experienced project team, led by an expert in SBR technology (see Section 4 for details on our team) who will be developing and managing your project. Ledyard staff will be involved in the collaborative development of the upgrade recommendations. Our approach also allows you to implement some of the components directly yourself, thus saving money by reducing engineering costs and contractor mark-up and profit costs. We have used this approach with several other municipalities, including a project currently underway in Plainfield, with great success.

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Mayor Rodolico, Request for Qualifications – Bid # 2015-09

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We have visited the site several times over the past 18 months and have developed a detailed understanding of the general needs of the facility. The needs generally include:

- Upgrades to the headwork's
- Upgrades to the SBRs
- Upgrades to the sludge handling equipment
- Upgrades to the SCADA system

A variety of engineering expertise is required for successfully implementing these needs. We have the needed specialists in-house and on-staff, which provides great value to Ledyard. Our project team is also experienced in alternatives for project delivery, from conventional design-bid-build to streamlining project delivery working with pre-qualified contractors and owner purchase of equipment. This experience will serve to manage costs to meet your budget.

Thank you for your consideration. We look forward to the opportunity of an interview to present our ideas for providing Ledyard with long-term engineering support. If you have any questions, please feel free to contact me at 860-646-2469, ext. 5275, or at vlloyd@fando.com.

Sincerely,

Virgil J. Lloyd, P.E.
Senior Vice President

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Section 1 Project Understanding

Keys to Success:

- Ensure that improvements will be within the existing budget thru accurate capital and operational cost models
- Establish line items for each expenditure, and manage the costs against budget on a monthly basis
- Maintain a contingency line item in the budget, of decreasing value through the construction phase
- Use innovative construction delivery methods as appropriate

The Town of Ledyard is preparing to purchase and install equipment, design and bid physical improvements and generally upgrade its Wastewater Treatment Facility. The project includes the following improvements:

- Upgrades to the Headwork's, including a new fine screen
- Sequencing Batch Reactor (SBR) equipment upgrades
- Sludge Handling Equipment upgrades
- Instrumentation upgrades and related improvements

The project is being pursued in general conformance with a recently completed Wastewater Facilities Study. Portions of the Ledyard Wastewater Treatment Facility date back to the original plant constructed in 1962, including the aerated grit chamber with a manually cleaned coarse bar rack, comminutors, and influent lift station. This pump station discharged to a package-type Dorr-Oliver treatment plant featuring clarigester and trickling filters. This original package plant is discontinued but still remains on-site. The original aerated grit chamber remains in service. The abandoned system needs to be removed.

As reported in the Facility Plan, the facility was upgraded and expanded in 1997 to 0.26 MGD with the addition of mechanical screening, new influent lift pumps, Sequencing Batch Reactors (SBRs) with fine bubble diffused aeration, effluent flow equalization, automatic backwash sand filtration, and ultraviolet (UV) light disinfection, septage receiving area, a rotary drum thickener for sludge processing, and a cascade structure for post aerating the final effluent discharging to the brook. The facility is currently permitted for 0.26 MGD under the federal National Pollutant Discharge Elimination System (NPDES) Permit CT0101681. Final effluent disposal is to seepage beds or alternately to Seth Williams Brook.



Needs replacement and
new headworks

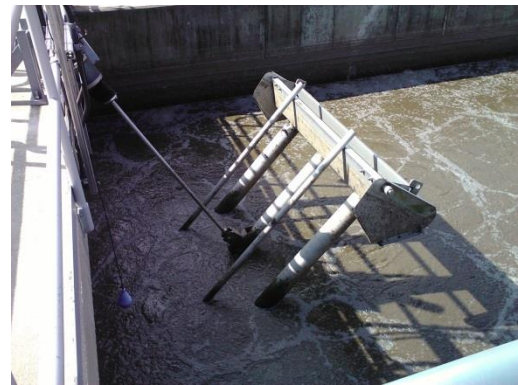
The operating staff manages the facility to consistently produce high quality effluent, and although the facility was not designed for nitrogen reduction, adjustments to the treatment process enable the facility to achieve denitrification. However, many facility components are at or nearing the end of their useful

life and are greatly in need of repair or replacement. Improvements identified in the facility plan as well as during our conversations with plant staff include:

- Upgrade outdated SCADA and SBR control systems
- Replace influent and effluent auto-samplers
- Replace SBR decanter actuators
- Upgrade headwork's:
 - Demolish existing grit chamber, screen and comminutor structures and associated equipment
 - Install new mechanical bar screen, manual bar rack, screenings wash press, influent flow meter and aerated grit chamber
- Replace influent lift pumps
- Replace aeration system membranes
- Replace existing PD blowers with VFD equipped blowers for energy efficiency
- Install DO and ORP monitoring systems for better process control in the SBRs and increased energy efficiency
- Install submersible mixer in the thickened sludge holding tank and investigate tank geometry for improvements to promote better mixing of tank contents
- Demolish abandoned clarigesters and other unused tanks and structures at the site for liability/safety considerations
- Replace rotary drum thickener and polymer feed system

It has been observed that the concrete SBR tanks show signs of deterioration. A structural evaluation of the SBR tanks has been recommended, however this work was not completed and not itemized in the proposed capital improvements.

The Estimated Construction Cost for Building, Equipment, and Instrumentation is \$1,000,000. Allowances for Design Engineering, Project Management, Bonding, and Contingency are \$ 300,000 for an overall Total Project Cost of \$1,300,000, which was approved by the Town voters.



Actuator needs replacement

A key to success will be the development of capital and operational cost models for accurate life cycle cost analysis. This will ensure that selected alternatives for any improvement will be implementable, either within existing budget constraints, or phased in over time.

Section 2 - Project Approach

Project Approach

An initial kick-off meeting will be held with Ledyard Town staff to introduce the design and construction services team. At this meeting we will discuss and confirm plant operational parameters, and overall capital concerns and constraints. In advance of the kick-off meeting, available data on the facility will be reviewed, including the Engineering Facilities Plan, and record drawings for the wastewater treatment facility.

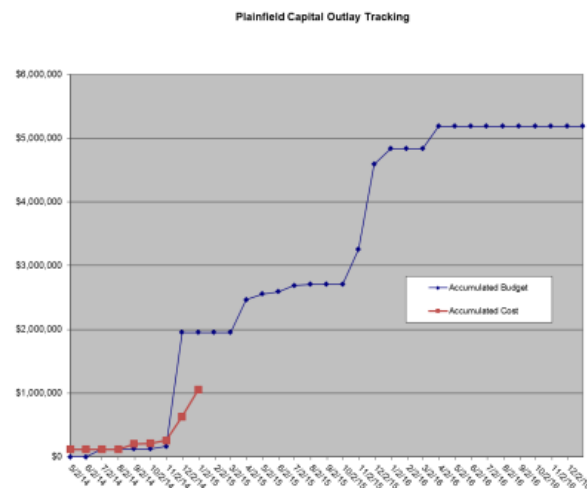
A key to our approach will be the development of capital and operational cost models for accurate life cycle cost analysis. The selected alternatives for any improvement must be implementable, either within existing budget constraints, or phased in over time. This is the approach we recently implemented for a similar treatment facility upgrade project in Plainfield, which also has a tight budget and needs to maximize the project costs.

Fuss & O'Neill is also uniquely qualified to work within budgetary constraints. Facility Upgrades in Plainfield and Shelton are being performed within adopted Capital Improvement Budgets. Plainfield voters approved a \$5.5 million capital bond to upgrade two wastewater plants, which eliminated the need for a previously proposed \$33 million upgrade.

Refurbishment Alternatives

A workshop will be held with Ledyard Town staff to review conceptual alternatives, including review of “mini drawings”, to identify plant operational concerns and explore options, review preliminary construction sequence to maintain process operations, and to discuss comments and recommendations. Using preliminary design criteria, the following information will be developed as appropriate to perform a technical and cost benefit evaluation of selected alternatives developed for upgrade:

- Narrative description
- Preliminary design criteria and process schematics
- Advantages and disadvantages
- Environmental impacts
- Spatial requirements
- Constructability
- Permitting issues
- Preliminary opinion of costs (both Capital and O&M)
- Procurement Options

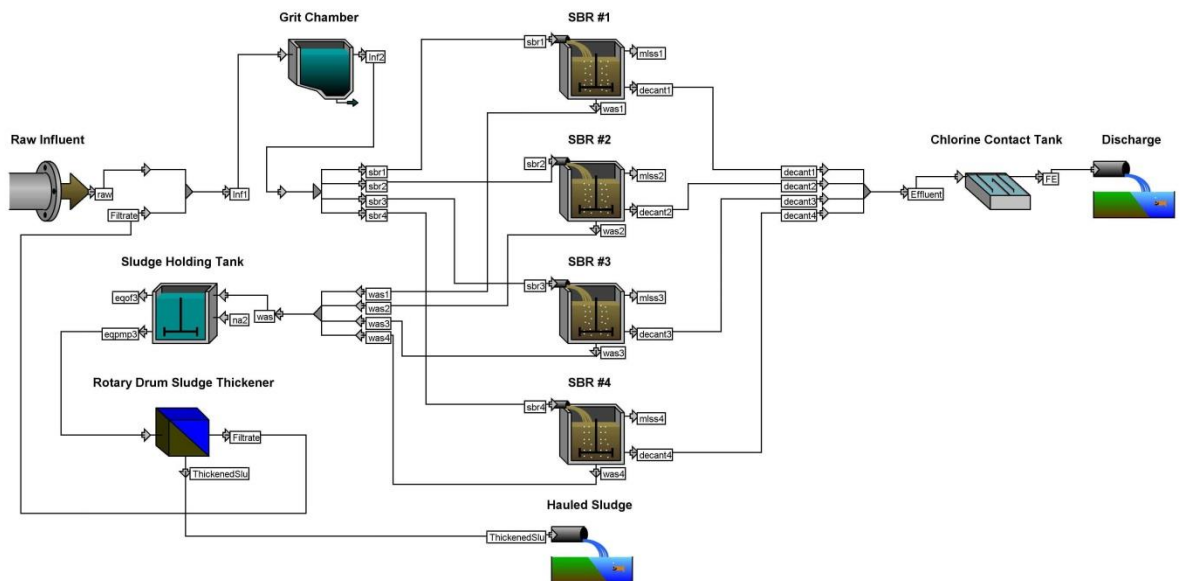


Cash flow budget management tool
Plainfield, CT

Process Evaluation

Preserving the existing facility's ability to provide cost effective treatment is a critical consideration. Fuss & O'Neill will assist in evaluating these alternatives using process modeling techniques developed specifically for SBR evaluations. Our proposed Project Manager, Jeff McDonald, P.E., has experience with eight SBR facilities and is one of the most qualified process engineers in the region in analyzing facilities with this process.

The process model developed for Shelton is presented below. As a result of the implementation of the improvements we identified during our evaluation, the process is now vastly improved, to the extent that instead of buying nitrogen credits as previously, for 2014 they will be selling approximately \$66,000 in N credits. See Section 3 for more detail on the Shelton project.



Schematic Diagram of SBR Process Model developed for Shelton, CT

Planning Approach for Cost Savings

Special attention will be made to review the option of retaining the existing headwork's concrete structure for a new screen and foundation for a protective enclosure. This could significantly reduce the project cost compared to a new foundation structure. We utilized this approach in Plainfield, Putnam and Groton and realized significant cost savings, to the extent that other critical improvements were included in the project scope, and not deleted due to insufficient budget.

Implementation Strategies to Reduce Cost

The next step will be to formulate a procurement strategy for the various items of work. For example, all of the work can be completed in a single design-bid build project, or the work can be further broken down in to smaller projects. This may provide a more phased approach to the work, which will allow for focused cost control and identify areas for savings. For example the SCADA instrumentation may be better performed by a specialized Integrator Contractor than as a subcontractor in a larger project. The

influent and effluent samplers can be directly purchased by the Town, and installed with local contractors.

This approach provides Ledyard with a systematic review of the wastewater infrastructure in a workshop setting with input of the WPCF staff, resulting in the creation of a comprehensive Capital Improvement Program. The portions of the work that can be directly contracted or implemented by the Town will be identified, and will result in identifiable cost savings.

Fuss & O'Neill will also bring innovative ideas to the table for consideration by the Town. Ideas such as:

- Operating the SBR's as Intermittent Cycle Extended Aeration (ICEAS) or as true batch treatment
- Upgrading the diffusers
- Adding nutrient analyzers should groundwater become (or is identified) an issue
- Investigating energy efficiency funding sources (for example Shelton received \$135,000 in energy efficiency grants, effectively getting one of the three new turbo blowers for free)

There are other examples at the facility of implementing innovative ideas that we have successfully brought to other facilities, which we would welcome to discuss with Ledyard.

General Approach for Engineering Services

From decades of successfully providing on-call engineering services to many municipalities, we have identified **five critical elements to successfully providing these services.**

1. **Act as an extension of the Town's staff.** Our philosophy is to treat Ledyard WPCA problems as our own, and continuously keep a step ahead of issues that could impact your town.
2. **Provide flexibility to respond to immediate needs.** We understand the need for flexibility to respond to sometimes urgent needs during these assignments.
3. **Provide expertise on a range of topics.** We have assembled a diverse and technically skilled team of experts that will be available to address your issues and offer optimal results.
4. **Think creatively to develop "out-of-the-box" solutions.** Our team can provide collaborative, innovative, multi-disciplinary solutions.
5. **Maintain strong communications with you throughout assignments.** Virgil Lloyd, our Principal-in-Charge, will serve as the corporate point person on this project, accountable to you. He will work closely with you and our Project Manager throughout the project.

Our Management Approach Focuses On Serving You

Fuss & O'Neill uses the strong project manager model, and requires a strong role from our principals in our projects. Our Project Manager, Jeffrey McDonald, will lead the identified task managers for this project who possess the necessary technical skills and experience to manage this project effectively. Together they will work with you to define the scope of work for specific assignments. The project manager and task managers will then be responsible to:

Fuss & O'Neill uses the strong project manager model.

- Build the best team for the particular project
- Plan the scope-of-work in detail and communicate the project plan to you and the project team
- Coordinate with regulatory agencies and ensure that their requirements are understood
- Maintain quality control
- Maintain budget control
- Keep you informed throughout the project

Client Communications

Client communications are critical to ensuring that we meet your overall needs, and consist of emails, telephone conversations, and face-to-face meetings. These would also include planned activities as well as responding to urgent issues as they arise. Planned communications would consist of the following:

- **Periodic team meetings.** The frequency of these meetings would be dependent on ongoing activities but would likely occur once a month. The purpose of these meetings will be to review issues or concerns that need to be communicated regarding assignments.
- **Workshops** will be used where appropriate to provide a dynamic forum for building technical, management, and regulatory consensus and making informed decisions quickly. Our experience has been that these workshops replace scores of individual meetings and avoid the continuing follow-up contacts that involve multiple individuals.



Quality Control

The goal of our QA/QC program is to produce projects that maximize client satisfaction and minimize costs by building into each project consistency, completeness, constructability, clarity, and cost-effectiveness. We utilize in-house technical experts to review designs and reports while they are in draft form prior to being forwarded to our clients. Depending on the size of the project, this third party can also participate in reviews at various critical steps of the project. Task managers are responsible for developing QA/QC plans as part of their work plans.

Section 3 – Relevant Experience

A cornerstone of our wastewater practice is providing on-call engineering services to municipal clients like Ledyard. The table below is presented to present how our experience specifically matches up with your needs. Please see the following pages for detailed project descriptions, and how they relate to your project.

Relevant Experience Summary

	Groton	Putnam	Shelton	Lebanon	Bolton-Lakes	Tolland	Chester	Plainfield
1 Plant Design Services	•	•	•					•
2 Sewer Design Services				•	•	•	•	
3 Pump Station Design Services		•		•	•	•	•	•
4 Engineering and Construction Support Services	•	•	•	•	•	•	•	•
5 Environmental Compliance Support Services	•	•						•
6 Instrumentation & Control Implementation, Maintenance & Field Services	•	•	•	•		•	•	•
7 Operation and Capital Improvements Plans, Assist with Rates	•	•	•			•	•	•
8 Review/Update WPCA Standards, Regulations, Best Practices				•	•		•	•
9 Develop an Asset Management Program, including development of a CMMS		•	•					
10 Prepare Engineering Reports	•	•	•	•	•	•	•	•
11 Develop and Produce Complete Detailed And Biddable Plans and Specifications	•	•	•	•	•	•	•	•
12 Prepare Construction Cost Estimates	•	•	•	•	•	•	•	•
13 Review and Evaluate Specific Products or Equipment Information	•	•	•	•	•	•	•	•
14 Assist WPCA in Reviewing Construction Flows for Proposed Developments	•	•	•					•
15 Assist in Development of Facility Record Drawings	•	•	•	•	•	•	•	•
16 Any Other Services Related to WPCA CIP or Emergency Construction	•	•	•					
17 Provide General Consultation Services on Technical Issues Related to Collection System		•	•			•	•	•
18 Provide Operational Assistance and Advice Related to Operation of the WPCF	•	•	•	•	•	•	•	•
19 Develop a Sanitary Sewer System GIS as an Asset Management System	•		•					
20 Energy Use Improvements	•	•	•					•
21 Inflow and Infiltration Studies	•	•	•					•
22 Facility Planning	•	•	•	•	•	•	•	•

City of Shelton, CT: WPCA On-Call Engineering Services

Sample Project 1: WPCF Process Optimization

The treatment plant in Shelton was upgraded in 2006 to an SBR treatment process with jet aeration. Discrepancies in design criteria from actual conditions, coupled with changes made during construction, resulted in a facility that was difficult to operate. Among other issues, the operators constantly struggled to meet permit requirements for nitrogen reduction. Within four years of commissioning, the original three rotary lobe blowers experienced catastrophic failure, and the plant staff realized that premature failure of the replacement blowers was imminent.

Fuss & O'Neill was hired in 2010 for on-call services; one of the first assignments was to optimize process operations. Results identified several design and construction issues, which cumulatively compounded into significant process impairment.

Since the WPCA had limited funds, we developed several alternate improvement scenarios of phased improvements, which we presented and reviewed in a series of workshops with the Town. We designed and oversaw the construction of an Aeration Improvement Project, which was one of the feature components of the overall improvement plan. **We replaced the unreliable blower packages with three energy efficient turbo blowers** which:

- Increased the aeration capacity of the treatment process
- Restored equipment reliability
- Eliminated the source of neighborhood noise complaints

The project also added aeration capacity to the sludge holding tank (a converted digester), which addressed a severe odor issue. In addition, **50% of the cost of the turbo blowers was paid for with grant money from the State Energy Efficiency Fund. Our approach reduced the treatment plant's electric bill by over 20%, while correcting a host of operational issues.**

Relevance to Ledyard Treatment Facility:

- Optimized process for low level nitrogen removal
- Operator collaboration to optimize and prioritize upgrade needs
- CTDEEP liaison and compliance

Infiltration /Inflow:

- Innovative flow monitoring approach featuring small metersheds
- I/I metering data analysis to create standardized 1-inch rainfall event for all metersheds



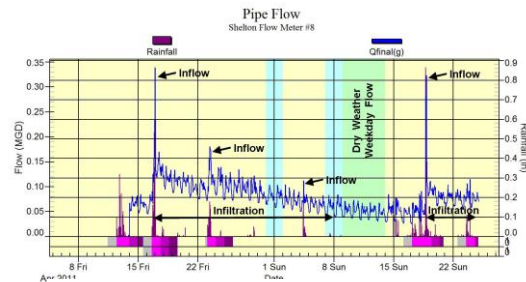
Turbo Blowers, Shelton, CT

Sample Project 2: Infiltration/Inflow Analysis (Flow Monitoring Program)

Fuss & O'Neill utilized an innovative approach to locate and quantify excessive infiltration and inflow in Shelton's collection system. This project was funded with a planning grant from the CTDEEP Clean Water Fund with a 55% planning grant.

Our approach featured a temporary flow monitoring program which utilized very small metershed areas. While this approach utilized more flow meters than is traditionally used by other consultants, it allowed for quantifying the infiltration and inflow components to an extremely accurate and localized level. This approach resulted in cost savings in the field investigation phase because the Town knew which areas needed investigation for inflow and which needed investigation for infiltration.

We established meter basins based on pipe types and ages to divide the collection system into small discrete metersheds as small as 5,000 linear feet of gravity pipe per meter. Data was analyzed with proprietary software to calculate the percentage of rainfall entering the sewer system during recorded storm events. We then modeled Infiltration and Inflow (I/I) quantities using theoretical design storms.



Flow meter data analysis graphic
from engineering report, Shelton, CT

- Our team installed 25 flow meters and 3 rain gauges in 94 miles of sanitary sewers
- Our approach featuring small metersheds resulted in prioritizing subsequent investigations and rehab within 4 of the 25 meter basins
- Future expenses were reduced by identifying small targeted areas for follow-up
- Study results isolated excessive I/I within only 8.8% of the sewer system. This was achieved by using multiple small metersheds and appropriate analysis of the flow and rainfall data.

Sample Project 3: Review of Development Proposals

In recent years, development activity in Shelton has increased causing capacity concerns with several interceptors for WPCA. We developed a hydraulic model of the interceptor system, and in conjunction with the WPCA, allocated flows and capacity to each area. When a development proposal is received, we perform the following for the WPCA:

- Review the application for flow projections
- Perform a capacity analysis, and compare to model and established allocations
- Review the application for compliance with WPCA standards and procedures (details, etc.)
- Compile an engineering report of our findings, and make recommendations whether or not the system can accommodate the proposed connection

A unique feature of the review process includes Fuss & O'Neill preparing an estimate of the cost of the engineering review, which the WPCA then incorporates into the application fee upon acceptance of the application. Thus the applicant reimburses the WPCA (in advance) for the cost of our evaluation of the proposed connection.

Town of Plainfield, CT: Upgrade of the Village WPCF & North WPCF

Sample Project 1: WPCF Facilities Planning, WPCF Upgrade with Intermittent Cycle Aeration Process

A recent facility plan prepared by another consultant recommended the consolidation of the Town's two treatment plants into one facility, by converting the Village WPCF into a pump station, and then pumping the wastewater through a 5-mile long force main. This approach was way beyond the means of the community, with a cost estimate of over \$40 million, plus many environmental challenges. We were retained to assist with developing a solution that met the regulatory requirements while maintaining affordability for a small town with limited means.

Our senior staff evaluated the facilities' historical performance, and then developed a prioritization of needs for each facility. Through a collaborative process with the Town, we developed a more affordable approach. This optimization program identified near-term and longer-term needs.

The optimization program consists of the following:

- Retrofitting both plants by salvaging existing concrete work, thus eliminating the need for the costly new centralized wastewater treatment facility, including the pump station and 5-mile long force main through sensitive environmental resources
- Design work for the first phase is presently ongoing. The first phase includes optimizing the existing process for low level nitrogen removal by replacing mechanical aeration with fine bubble diffusers, and providing anoxic mixing for intermittent aeration cycles
- Biological and chemical addition is planned to achieve phosphorus removal to 0.5 mg/l
- Other improvements underway include upgrade of the solids dewatering equipment, and mechanical upgrades to replace aging equipment

Relevance to Ledyard

- Finalized facility planning
- Comprehensive life-cycle capital outlay planning
- Process optimization for nitrogen removal with cyclical aeration
- CTDEEP liaison and compliance



Pilot testing of rotary drum thickener, North Plant

Sample Project 2: Village WPCF Assessment of Rapid Infiltration Basins

As a part of the investigations into re-utilization of process components at the Village Plant in Plainfield, the existing Rapid Infiltration Basins were analyzed both for hydraulic capacity and for potential effluent polishing for phosphorus removal. This examination was conducted in parallel with a full scale pilot on the use of Poly-aluminum Chloride (PAC) for phosphorus removal. The analysis found that although the basins had significant hydraulic capacity, the residuals within the filter beds, dating back to the 1920's, contained elevated levels of phosphorus. This determined that planning should proceed for future tertiary filters as flows require.

Relevance to Ledyard

- Full scale pilot for phosphorus removal
- Capacity analysis on Rapid Infiltration Basins

Sample Project 3: Construction Administration, WPCF Upgrade and Demolition Projects

Projects have been defined and bid packages issued for various phases of the Plainfield WPCF upgrades, including direct purchase of influent fine screens for both North and Village Plants. A directive from CTDEEP to repair chlorination facilities led to the demolition of existing block baffle walls and replacement with cast-in-concrete construction. A hazardous partially buried concrete dosing tank, dating back to the 1920's, was also completed.

Relevance to Ledyard

- Encouraged the use of local contractors
- Fast track construction of priority projects
- CTDEEP liaison and compliance

Key elements to fast track the work included:

- Projects prioritized by need and readiness to proceed
- A Prequalification process that encouraged the use of local contractors
- Performance based Contract Bid Documents
- Construction Administration provided by Fuss & O'Neill
- Coordination of approvals of all elements with CTDEEP



Plainfield WPCF demolition

Putnam, CT: On-Call Wastewater Engineering Services

Sample Project 1: WPCF Facilities Planning & WPCF Upgrade

The Town of Putnam WPCF had not experienced an upgrade since the facility was initially constructed in the mid-1970s. Besides updating the aged equipment, the facility needed to incorporate low level nitrogen and phosphorus removal. The challenge was increased by the Town experiencing very difficult financial conditions.

Chief features of the Facilities Plan are:

- Thorough review of the liquid and solids streams
- Evaluated all buildings, performed a space-needs analysis
- Developed approaches to achieve the project goals of:
 - Nitrogen removal to the 3-5 mg/l
 - Phosphorus removal to 0.5 mg/l without filtration
 - Recommendation of new clarification facilities
 - Recommendation of new preliminary treatment

In order to keep the cost manageable to Putnam, which is an economically distressed community, we optimized reuse of existing facilities with innovative approaches. The overall program cost was \$18.8 million. Construction was substantially completed in January 2014.

A new Headwork's with influent fine screen was constructed using a pre-engineered upper structure as a cost saving measure. Existing aeration tanks were retrofitted to provide a primary anoxic stage, followed by a primary aerobic stage, a secondary anoxic stage, and finally a secondary aerobic stage to provide year-round nitrification. Air produced by positive displacement blowers is distributed through fine bubble diffusers for the aerobic zones, and hyperbolic mixers are installed in each of the anoxic zones. The chief features of the upgrade included:

- 4 stage Anoxic-Aerobic-Anoxic-Aerobic treatment process utilizing parabolic mixers
- Two new 75-foot diameter secondary clarifiers with full-width scum skimmers
- New preliminary treatment building with grit removal and fine screening
- Replacement of the original primary clarifier mechanisms
- New belt filter press, new odor control for the sludge handling building, new UV disinfection

As part of our start-up support services, we implemented a predictive maintenance program for the facility, and entered PMs for all new equipment into a computerized maintenance and management system (CMMS). Fuss & O'Neill maintenance engineers worked with the staff to train them on the proper performance of the maintenance activities as well as the use of the CMMS.

Relevance to Ledyard

- Comprehensive facility plan evaluation of WPCF
- Process modifications for nitrogen removal
- New Headwork's Fine Screen
- Reuse of existing infrastructure to reduce overall project cost
- Predictive maintenance program for new equipment
- CTDEEP liaison and compliance



Headwork's Screen
Putnam, CT

Sample Project 2: Pump Stations Evaluation and Upgrade Design

Putnam has 10 pump stations in their collection system, with the oldest dating back to the 1960s, and the newest in the mid-1990s. All of the facilities were essentially original equipment, and had many obsolete components. Maintenance was difficult due to the lack of standardization. We performed a comprehensive evaluation of each station for the following:

- Standardization of new Pumps and related piping systems
- Electrical and power systems, including energy efficiencies
- HVAC, buildings/structural/roof systems, site security, telemetry and controls

The overall program consists of \$4 million in improvements; construction is to begin in 2015.

Town of Suffield, CT: On-call SCADA Support

From 2010 to 2013 we provided SCADA support services to the Suffield WPCF on an on-call basis. While most of these assignments were of a generally routine basis, we demonstrated rapid responsiveness and a high degree of expertise for a particular assignment in October 2011. During the October snow storm, 'Storm Alfred', a power surge damaged the SCADA control PLC at the WPCF, rendering it inoperable. We received a call from the superintendent and were onsite within 24 hours to start the recovery efforts. In order to reestablish communication between the SCADA PC and the various PLCs, the SCADA system was reprogrammed to eliminate the serial connections and operate on an Ethernet network. By migrating to this system, the SCADA system has benefited with faster performance, readily available hardware components, and higher reliability since the legacy failure connections.

Relevance to Ledyard

- Emergency assistance with getting plant back on-line after damage to PLCs from Storm Alfred in October 2011
- Onsite within 24 hours and had plant running

Town of Groton, CT: Wastewater On-Call Engineering Services

Sample Project 1: WPCF Facilities Planning, WPCF Upgrade with IFAS Process

The Town of Groton needed to upgrade their WPCF to increase capacity by 50% (from 5 MGD to 7.5 MGD), and provide for low level nitrogen treatment, within a budget of \$20.9 million approved by the voters. An additional challenge was that the site is constrained by wetlands, leaving little space within the existing footprint. We developed an innovative approach that met the project goals within the existing footprint. This approach:

- Minimized the additional tankage required
- Utilized an IFAS process (Integrated Fixed Film Activated Sludge, a floating media that supplements the biology with attached growth bacteria)
- Reduced the required clarification capacity, as a result of the additional bacteria being retained in the aeration tanks with the IFAS media
- Allowed for two smaller rectangular clarifiers which fit within existing footprint without encroaching on wetlands

Relevance to Ledyard

- Facility evaluation focusing on both obsolete equipment and process upgrades
- Post construction optimization of treatment process
- CTDEEP Clean Water Fund grant and loans
- Innovative approach using IFAS process resulted in significant cost savings
- Low level nitrogen removal
- Less than 3% change orders

Sample Project 2: WPCF On-Call Services, SCADA On-Call Services

Under our on-call contracts, we are providing (on an ongoing basis) planning, design and construction services for a variety of needs at the WPCF and with the SCADA system. Recent assignments include:

WPCF On-Call, sample assignments:

- Replacement of the secondary clarifier mechanism in clarifier no. 2 (unit no. 1 is programmed for future). New unit features full-width scum collection
- Replacement of two gravity thickener mechanisms, and related electrical/structural components
- Installation of generator, aboveground fuel storage and fuel piping for Second Service and existing emergency generator
- Planning study of upgrade needs for effluent pump station (\$5.5 million)
- Repair leaks at three (3) pump stations below sea level to protect electrical components against groundwater infiltration
- Analysis of plant capacity to determine potential for regional septage receiving facility



Post-IFAS upgrade aerial view
Groton, CT

Relevance to Ledyard

- Mission PS controllers & integration into SCADA
- Broad range of SCADA support

SCADA On-Call, sample assignments:

- Optimization of aeration control system
- Integration of DO, nitrate, and ammonia analyzers into SCADA
- Mission Controls system modifications at 16 pump stations
- Flow pacing of chlorination system
- Data highway upgrade
- Process recovery after catastrophic power loss
- Debugging of chronic PLC issues from power voltage spikes

Sample Project 3: DH+ Network Repairs

Fuss & O'Neill was retained by the Town of Groton to repair a malfunctioning segment in the WPCF control system fiber optic network. One channel of the two-channel redundant loop network used to convey data throughout the facility stopped working, eliminating the redundancy in the control system network. An investigation by Fuss & O'Neill and NIC Systems Corp. determined that the cause of the failure was a broken fiber within the signal cable and there were no spares available. Fuss & O'Neill and its subcontractors installed a new fiber optic cable with spares, new breakout boxes and patch cables to fully restore the system's redundancy and system operations.

Relevance to Ledyard

- Fast track procurement with local contractors
- Broad range of SCADA support

Sample Project 4: Effluent Chlorination Control

Fuss & O'Neill was retained to correct deficiencies in the effluent chlorination controls at the Town of Groton's WPCF. Plant operators reported high and low chlorine residual concentrations in the WPCF effluent, and had been called in to respond to low concentration alarms on the weekends.

The plant has a minimum year-round effluent chlorine concentration permit limit of 0.2 mg/L. Fuss & O'Neill redesigned the control scheme for the effluent chlorination controls, and, in conjunction with Aaron Associates of Connecticut, implemented the improvements while the plant remained in operation. The operators now report much more flexibility to control the effluent chlorine concentrations and have not been called in to respond to low concentration alarms.

Relevance to Ledyard

- Customized Instrumentation and Control Modifications
- Added process control flexibility



Screen-shot of SCADA display with modified hypochlorite control logic

Town of Lebanon, CT: Low Pressure Sewer Extension Project

When Lebanon completed the planning phase of this project, they decided that a different consultant was needed for design and construction phases, and hired Fuss & O'Neill. The previous engineer had underestimated the project costs, and the town had already gone to referendum with that amount and could not go back for more funding. This situation required Fuss & O'Neill to work with the town to find ways to complete the work while remaining within budget. Project features:

- Budgetary shortfall prior to F&O involvement required innovative approach to keep construction within budget
- Approximately 27,500 feet of low pressure sewer force mains, and 25,000 of service connections
- Over 300 grinder pumps, pump station upgrade
- Need for chemical odor control due to long detention times
- Coordination with private parties to site individual pump stations
- Upgrade of submersible pump station and controls
- Inland Wetlands and DEEP Permitting



Grinder pump completed installation

Relevant to Ledyard

- Sewer extension project located around lakefront setting with PS upgrade
- Extensive use of grinder pumps with follow up support services
- Odor control system provided in pump station due to long detention times in force main
- GIS mapping & record drawings

Section 4 – Staff Resources, Qualifications & Firm Overview

Management Team

The team we propose to use for Ledyard has extensive experience and expertise in all the areas included in the scope of work defined by the RFQ. A brief summary of our Management Team and Task Leaders is presented below. Our project team is presented graphically in the Organizational Chart found later in this section. Detailed resumes of all proposed staff are also included later in this section.



Virgil J. Lloyd, PE
Principal in Charge/ QA

Virgil Lloyd is a CT Professional Engineer with over 35 years' experience in wastewater engineering. He specializes in Wastewater Engineering and excels at working

collaboratively with his clients to develop and implement practical and affordable solutions to complex wastewater collection, treatment and I/I rehab challenges. Mr. Lloyd is a Senior Vice

President and partner with Fuss & O'Neill. He holds a Bachelor's Degree in Civil Engineering and a Master's Degree in Environmental Engineering. He is currently the Co-Chair of the State PA12-155 Phosphorus Non-Point Source Workgroup, and is a senior member of the Executive Committee of the New England Water Environment Association (NEWEA). He is also on the Board of Directors of the CT Water Pollution Abatement Association.

Virgil's depth of experience in planning, design and construction of wastewater facilities and I/I abatement, along with his knowledge of CTDEEP requirements, the Clean Water Fund process and his existing relationships with staff, will provide critical leadership.



Jeffrey McDonald, PE
Project Manager

Jeffrey McDonald has 37 years of experience in the design of water and wastewater treatment facilities with an emphasis on low-level nutrient removal. He has successfully implemented many treatment facility

upgrade projects from planning through start-up, and his

experience includes maximizing the existing tankage and components to develop affordable solutions.

Jeff has extensive experience in the design and analysis of SBR's. He performed the critical evaluation of the SBR's in Shelton, which resulted in process improvements leading to a \$66,000 nitrogen credit for calendar 2014, a turnaround from previous years.

Jeff is one of the most experienced SBR process engineers in New England, with the design, analysis and construction of over six SBR facilities to his credit. Several of his projects have been recognized for Engineering Excellence by the ACEC.

He recently led the project team in Putnam, CT with implementation of an \$18.8 million WPCF Upgrade project. He is currently leading the design team for the upgrades of the two wastewater facilities in Plainfield, which features creative implementation to reduce costs. Jeff has also designed and has construction/start-up experience with **over six SBR's throughout New England.**

Task Leaders



Jason Tang, PhD, PE
Process Engineering

Mr. Tang is a Senior Project Engineer and has experiences and proven skills in water and wastewater systems, infrastructure engineering, civil engineering and process engineering, with a focus on planning, designing and evaluating wastewater collection, pumping, treatment and reuse systems. He is currently the lead Project Engineer for the upgrade projects at the two Plainfield treatment facilities.

Dr. Tang has worked on wastewater facility upgrade projects for municipalities and private sector clients, as well as international projects for the US Agency for International Development (USAID) and the US Army Corps of Engineers.



Dana Frye, PE
SCADA, Controls & Instrumentation

Mr. Frye is a Senior Project Manager with Fuss & O'Neill. He has over 20 years' experience with instrumentation and controls system engineering. His background features a variety of municipal projects including water treatment facilities, water pollution control facilities, and water and sewage pumping stations, and in industrial air quality control systems for coal-fired electric generation facilities.

Dana is one of the leading municipal wastewater process control and instrumentation engineers in the northeast. His expertise includes design, construction services, field-troubleshooting, startup and project management.



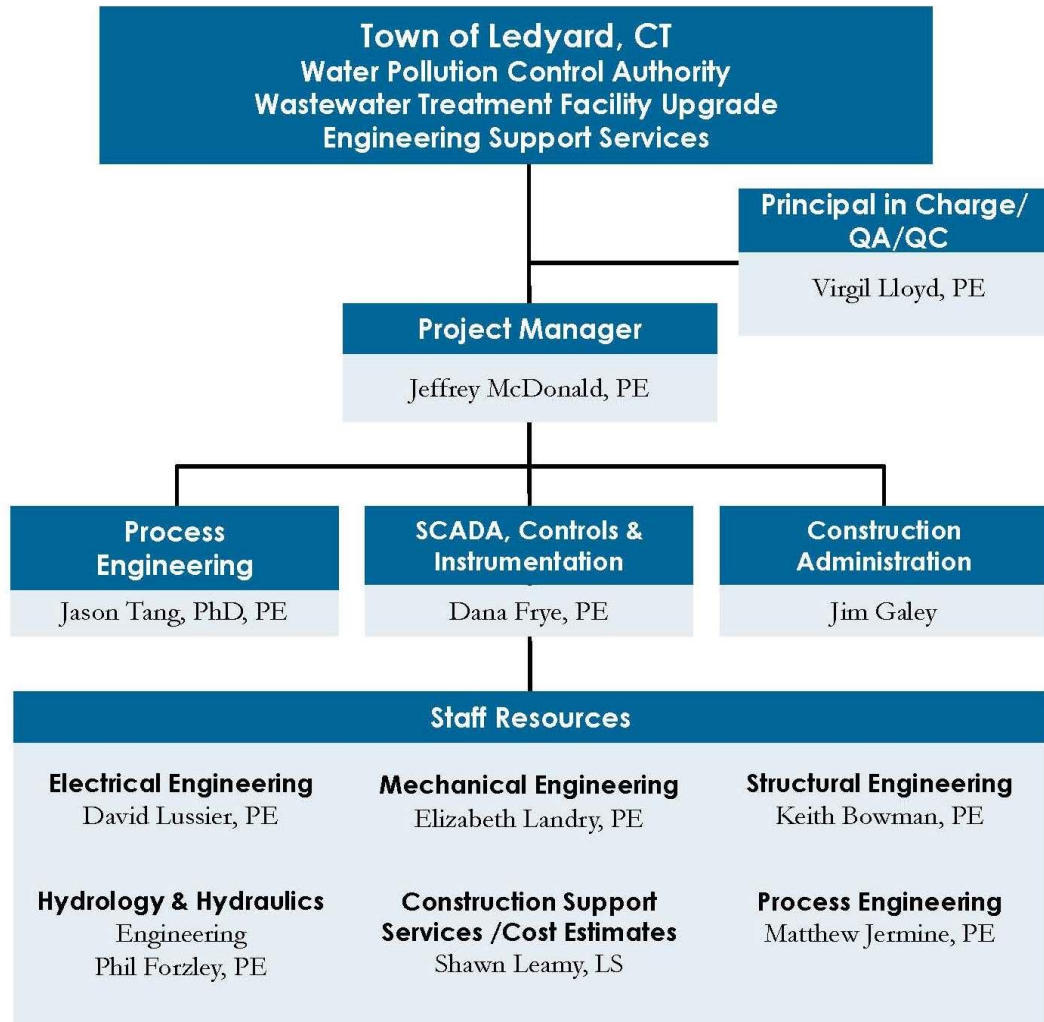
Jim Galey
Construction Administration

Mr. Galey has worked in the design/build discipline of the construction industry for over 30 years. He has extensive experience on both Private and Public projects as well as joint ventures between the two. He has worked as an Owner, Developer, and General Contractor over the course of his career on commercial, industrial, and municipal projects. His proven track record demonstrates the ability to conceive, support, and facilitate diverse and complex projects and successfully bring them to fruition. Fiscal set up and administration, as well as project productivity and problem resolution are strengths that he has demonstrated throughout his project history.

As President of Fuss & O'Neill Design Build Services, LLC, Jim brings an alternative project delivery approach for consideration by Ledyard.

Jim's experience with the designers at Fuss & O'Neill and his extensive team of independent pre-qualified subcontractors, allows him to assemble project teams which excel at delivering projects on a design/build basis.

Organization Chart



MBE/WBE Participation

We understand that Ledyard may likely choose to not pursue funding through the CTDEEP Clean Water Fund (as is the case with our project in Plainfield). There are schedule and cost advantages to such an approach. However, to keep Ledyard's options open, be advised that Fuss & O'Neill has an excellent record of complying with the goals of the Clean Water Fund with respect to the participation of minority and women owned businesses. We have worked with many such firms in the past and have developed excellent working relationships with their managers and staff.

Should circumstances change and Ledyard decides to explore such funding, we are poised to develop a team that will meet the funding program requirements, thus keeping Ledyard's options open.



Virgil J. Lloyd, PE **Senior Vice President**

Virgil J. Lloyd, PE
Principal In Charge

Mr. Lloyd has over 35 years of experience in wastewater systems engineering, serving municipalities, state agencies and private clients. He excels in guiding clients through complicated wastewater management challenges, from planning through implementation.

Education

BS, Civil Engineering - 1979
University of Connecticut
MS, Environmental Engineering - 1987
University of New Haven

Licenses & Registrations

Professional Engineer CT
Professional Engineer NH
Professional Engineer MA
Professional Engineer ME
Professional Engineer RI

Professional Affiliations

Water Environment Federation
New England Water Environmental Association

13 years with Fuss & O'Neill
36 years Professional Experience

Putnam, CT – Project Director for planning and design of wastewater treatment plant upgrade at 2 MGD facility. Project planning included the evaluation of disk filtration for phosphorus removal. Improvements included low level nitrogen removal utilizing a four-stage Bardenpho process as well as phosphorus removal to 0.7 mg/L via chemical precipitation. Other improvements included replacing the mechanical aerators with fine bubble diffusers and positive displacement blowers, the installation of UV disinfection to replace the sodium hypochlorite disinfection system, major headworks upgrades, and extensive equipment rehabilitation. Total project cost of \$19 million.

Groton, CT - Project Director for design of wastewater treatment plant upgrade. Project provided for increase of design flow from 5.0 to 7.5 mgd and low level nitrogen removal. Project is first large-scale application of IFAS (integrated fixed film activated sludge) process in New England. Design also incorporated MLE process for denitrification, as well as ancillary improvements. Overall project cost \$22 million.

Shelton, CT – Project Director for evaluation of treatment process deficiencies at the WPCF. Obtained significant energy efficiency grant funding from U.I. Co. for the installation of 3 turbo blowers. Augmented the SCADA system with 6 ORP and 2 ammonia/nitrate sensors utilizing 75% DEEP grant funding. Additionally, performed a temporary flow monitoring study of 95 miles of gravity sewer pipe with 25 flow meters. Ranked watersheds based upon I/I volume vs. tributary area and developed a strategy to target a pilot area to validate SSES and rehabilitation suitability prior to rolling out a Citywide rehabilitation program.

West Haven, CT - Project Engineer for the final design of WPCF improvements. Project included design of new aerated grit chamber, new septage receiving facility, odor control system for inlet works area, replacement of sludge collection mechanisms in the primary tanks, upgrade primary solids pumps, additional waste solids blending capability, addition of staff locker facilities, and control building floor space reallocation.

Groton, CT - At the Water Pollution Control Facility, Project Director for design of replacement of grit collection & conveyance equipment. Incorporated various improvements in system including provision of grease fittings at easily assessable common manifold to facilitate maintenance.

Avon, CT - Project Director for Facilities Planning Study Update. Project utilized GIS to analyze data sources to identify wastewater disposal needs for the 20-year planning horizon. A neighborhood by neighborhood approach was used. Project developed complete collection system GIS mapping. On-site wastewater management areas were defined, and potential sites for community wastewater disposal solutions were evaluated.

Derby, CT - Project Engineer for the final design of WPCF improvements. Work scope included nitrogen reduction process additions using MLE process, new raw sewage pumps and controls, primary and secondary settling tank mechanical improvements, and administration building upgrades including new laboratory and office spaces.

Ansonia, CT - Project Manager for the Sewer System Evaluation Survey (SSES). The project was divided into a Phase I (infiltration sources, completed 6/00) and Phase II (inflow sources, completed 8/01). The program included Private Inflow Incentive Disconnection Program and lateral rehabilitation. The Study provided a detailed cost-effectiveness analysis per USEPA protocols, and included development of a \$5 million cost-effective rehabilitation program utilizing no-dig and conventional measures.

Woodbridge, CT - Project Manager for preparation of combined I/I-SSES project, including initial investigations through final design. Flow monitoring data analysis identified infiltration as primary extraneous flow component. Performed cost-effectiveness analysis and developed rehabilitation program. Rehabilitation techniques specified included cured-in-place pipe lining (CIPP), joint testing and grout sealing, no-dig point repairs, open-cut pipe replacement, and lateral rehabilitation. Overall program cost of \$700,000.

Salisbury, CT – Capacity Analysis of WPCF – Project Director for performance of “desktop” study of WPCF to identify the capacity of the various processes and systems, and comparison to recognized design guidelines. Completed data on all facility pressure and made recommendation for performance of an I/I Analysis.

Litchfield, CT - As subconsultant, Project Manager for final design of nitrogen removal process (BNR) at 1.0 mgd treatment facility. Utilized BioWin software to model MLE process. Sized anoxic and aerobic zones, designed ceramic disk air diffusion system, specified recirculation and recycle pumps, anoxic zone mixers, and miscellaneous tank modifications. Coordinated design with CTDEP.

Plymouth, CT - As subconsultant, Project Manager for peer review of Effluent Nitrogen Reduction Study. Value engineering review resulted in significant capital cost savings of proposed nitrogen removal process by performing a re-analysis of the projection methodology of design flows and loadings. Major reduction of flows and loadings reduced tank volume requirements and aeration capacity.



Jeffrey M. McDonald, PE

Associate

Mr. McDonald has 37 years of experience in the design of water and wastewater treatment facilities. His experience includes process design of municipal and industrial water and wastewater treatment facilities and bio-solids facilities involving assessments, evaluations, and preliminary/final design for upgrades, as well as for new facilities.

Education

BS, Civil Engineering - 1976
University of Vermont
MS, Environmental Engineering - 2011
Worcester Polytechnic Institute

Licenses & Registrations

Professional Engineer VT
Professional Engineer NY

Professional Affiliations

American Water Works Association
American Society of Civil Engineers
Water Environment Federation

Awards

2008 ACEC Engineering Excellence
City of Burlington Anaerobic
Digester Upgrade

1998 ACEC Engineering Excellence
Village of Derby Center Slow Sand
Water Treatment Facility

Presentations

Improving Process Performance for
a Four Stage Bardenpho Process.
NEWEA 2014 Annual Conference

Improving Process Control for a
Sequencing Batch Reactor
Wastewater Treatment Facility.
NEWEA 2013 Annual Conference

Treating High Strength Wastewater
at Saputo Cheese. NEWEA Annual
Conference, 2009

Design and Start-Up of an ATAD.
NEWEA Spring Meeting, 2003

Plainfield, CT – Project Manager for the upgrade of two wastewater plants; the North Plant to 1.08 MGD and the Village Plant to 0.707 MGD. Both facilities will include new influent fine screening, and optimizing the existing process for low level nitrogen removal by replacing mechanical aeration with fine bubble diffusers, and providing anoxic mixing for intermittent aeration cycles.

Windsor, VT – Performed an independent peer review of a facility planning report, to verify code interpretations, validate flood plain requirements, offer cost effective alternatives as options, and prioritize improvements and development of a capital improvement plan with defined user costs. Completed Step I Planning and Step II final Design for Dewatering and Digester System Upgrades. Project currently into Step III Construction Phase.

Putnam, CT – Project Director for the upgrade of a 2.3 MGD WPCF to include BOD and nutrient removal, including 4 stage Bardenpho Process, UV disinfection, sludge dewatering, odor control and full SCADA system. Project included an odor control study in order to evaluate nuisance odors. Analysis found that treating the Gravity Thickener odor after containment with a carbon adsorber was the most cost effective option for treating foul air from the gravity thickener and sludge handling operations.

Shelton, CT - Project Director for the evaluation and assessment of the physical aspects of the existing Water Pollution Control Facility (WPCF), and to assess the Sequencing Batch Reactor (SBR)/Biological Treatment Process to optimize process control. Facility is now undergoing an upgrade to expand the aeration system to increase treatment capacity. Completed a characterization assessment and corrective action consisted of a new 500 cfm Odor Control Unit, and conversion of sludge storage to an aerobic process, reducing nutrient loadings to the WPCF.

IBM, VT - Designed the first SBR in the State of Vermont. Performed preliminary investigations, piloting, final design, and construction and startup services for new Biological Wastewater Treatment Plant (BWTP) to treat sanitary, cafeteria and high strength organic waste streams using sequential batch reactor technologies in an enclosed facility. Facility design completed in 3 months.

Stowe, VT – Wastewater Reclamation Facility final design of 1.0 MGD facility featuring four cell sequential batch reactors, solids contact clarification for phosphorus removal, cloth disc media filtration, UV disinfection, and regional septage receiving. Project is designed to meet

State of California Wastewater Reclamation Criteria (CWRC) and features EPA Class A sludge Stabilization using the ATAD process with dewatering by centrifuge equipment. Odor control system design consisted of 2 systems in series; a multi-stage chemical scrubber followed by dual carbon adsorption units. Treatment processes constructed with fiberglass covers.

Charlotte County, FL – Designed upgrade to the Charlotte County Utilities Rotonda Wastewater Reclamation Facility. Upgrade included new plant headwork's with rotary screens, flow equalization, disc filters, a new chlorine contact tank, two new sludge tanks and new RAS/WAS pumping station.

Fire District No. 1, Shelburne, VT - Final design and construction phase services for upgrade of existing 280,000 gpd secondary level treatment plant to 440,000 gpd SBR with tertiary cloth disc filtration and UV disinfection.

Fire District No. 2, Shelburne, VT - Final design and construction phase services for upgrade of existing 450,000 gpd secondary plant to 660,000 gpd to achieve phosphorus reduction and serve as regional septage treatment facility and provide year round nitrification by converting to an SBR. Facility has tertiary cloth disc filtration and centrifuge dewatering.

Patterson Hamlet, NY - Provided facilities planning, final design and construction engineering services to create a new 0.1 MGD facility incorporating Sequential Batch Reactors, sand filtration and membrane tertiary treatment to comply with NYCDEP Watershed Rules and Regulations.

Putnam National WWTP, Carmel, NY - Provided facilities planning, final design and construction engineering services to replace existing failed on-site system and create a new 0.01 MGD facility incorporating the MBR Process, sand filtration, tertiary membrane treatment and UV disinfection to comply with NYCDEP Watershed Rules and Regulations.

Wyeth Pharmaceuticals, Chazy, NY - Performed plant optimization study for phosphorus removal and designed conversion of 0.1 MGD SBR facility to MBR Process. Facility utilizes ozone disinfection and reuses reclaimed wastewater for lawn irrigation.

Barre, VT – Completed Preliminary, design and construction phase engineering for a net metering site using an in-line turbine. The Nelson Street Hydro project uses an in-line turbine instead of a pressure reducing valve to generate electrical power. This project has multiple contracts, grants, and loans. The overall project funding is coming from two sources: VT Clean Energy Development Fund and VT Green Reserve.

Waterbury, VT – Completed pilot testing of the Disc filter process on an aerated lagoon facility to demonstrate viability for tertiary treatment and to determine if the Disc filter could consistently achieve total phosphorous levels less than 0.5 mg/L for future regulations or upset conditions.



Zhijian Tang, PhD, PE

Senior Project Engineer

Mr. Tang is a Senior Project Engineer and has experiences and proven skills in water/wastewater systems, infrastructure engineering, civil engineering and process engineering, with a focus on planning, designing and evaluating water treatment/distribution/storage systems and wastewater collection/pumping/treatment and reuse systems. He has been contributing to local projects for private sectors and municipalities, as well as international projects for the US Agency for International Development (USAID) and the US Army Corps of Engineers (USACE), etc.

Education

BS, Environmental Science - 1993
East China Normal University
MS, Environmental Science and
Engineering - 2000
Sichuan University
PhD, Environmental Engineering -
2003
University of Central Florida

Licenses & Registrations

Professional Engineer NH

Professional Affiliations

New England Water Env Assoc
Water Environment Federation

2 years with Fuss & O'Neill
22 years Professional
Experience

WASTEWATER TREATMENT

Mr. Tang has worked in a wide variety of wastewater projects. Experiences include the design of sewer collection system, pump stations, and conventional/advanced treatment plants, etc. Representative projects include:

Plainfield, CT: Lead wastewater engineer for Village Plant upgrade, including headworks, aeration tank, secondary clarifier and chlorine contact tank upgrade and rehabilitation. Responsible for process design, BioWin/GPS-X treatment process modeling, biological and chemical phosphorus removal, nitrogen removal, DEEP submittal, bid assistance, construction administration/services, etc. Conducted sludge disposal/treatment investigation and developed staffing plan for both Village Plant and North Plant.

Putnam, CT: Senior project engineer to provide construction services for plant upgrade, O&M manual development, plant water system upgrade, plant performance evaluation, and technical assistance for the water pollution control facility.

Shelton, CT: Senior project engineer for sewer pipe replacement by Cured-In-Place Pipe (CIPP), plant water pump station replacement, plant pretreatment study, odor control study and permit renewal.

Groton, CT: Senior project engineer for gravity thickener upgrade, chemical dosing system design and septage receiving evaluation.

South Shore YMCA, Hanover, MA: Lead wastewater engineer for preparing the permit plan and designing a wastewater treatment plant, and. Responsible for the design, construction service, and startup of pump stations, membrane bio-reactor WWTP, and leaching field, etc.

NAVFAC Europe/Africa/Southwest Asia, Camp Lemonnier, Djibouti: Lead water/wastewater engineer for designing packaged wastewater treatment plant, providing water/sewer service to containerized living units and military BEQ. Responsible for proposal assistance, extended aeration wastewater treatment plant design, site water/sewer service design and construction service.

USACE MED, F-16 Bed Down Survey (BDS), Balad Air Base and Al Asad Air Base, Iraq: Lead civil and wastewater engineer for a BDS to identify the facilities and infrastructure, associated cost and construction schedule; and preparation of D/B RFP documents for bed down of 18 F-16 aircraft. Responsible for evaluating sewer system, and retrofitting sewer collection system and sewage treatment plant.

USACE MED, Infrastructure Improvements, Bagram Airfield, Afghanistan: Lead wastewater engineer for packaged wastewater treatment plant design and providing sewer service to facilities.

WATER

USAID, Liberia Municipal Water Project, Liberia: Project engineer for the development of plans and design for water supply and sanitation improvements in the cities of Robertsport, Voinjama and Sanniquellie. Responsible for water treatment facility design and site planning.

USACE MED, F-16 Bed Down Survey (BDS), Balad Air Base and Al Asad Air Base, Iraq: Lead civil and water engineer for a BDS to identify the facilities and infrastructure, associated cost and construction schedule; and preparation of D/B RFP documents for bed down of 18 F-16 aircraft. Responsible for evaluating the existing water system, designing water treatment plant (RO system) and water distribution system (with WaterCAD modeling).

US Department of State (DoS), Basrah, Iraq: As part of a D/B team, Lead water engineer for the development of containerized housing units with overhead coverage protection and all related site infrastructure to accommodate US diplomatic personnel. Responsible for evaluating raw water quality; conducting water treatment system (RO membrane system) design.

USACE MED, Water and Wastewater Plan, City of Kandahar, Afghanistan: Project engineer and lead water engineer for the development of a master plan for a wastewater treatment system, and contract documents for a water treatment system. Responsible for evaluating existing system, preparing technical memorandum for a water treatment system, and provided recommendations for retrofitting the existing facility; preparing training presentation material for water master plan, water distribution modeling (EPANET).

Tampa/Orlando, FL: Graduate research assist for a large-scale pilot pipe distribution system study of water quality changes resulting from single sources (surface water, ground water or saline water) to blended source waters in old distribution pipe systems made of various pipe materials. Projected funded by Tampa Water and AWWA Research Foundation.



Dana G Frye, PE

Senior Project Manager

Mr. Frye is a Senior Project Manager in our Providence office. He has 20 years' experience as an instrumentation and controls system engineer for a variety of municipal projects including water treatment facilities, water pollution control facilities, and water and sewage pumping stations, and in industrial air quality control systems for coal-fired electric generation facilities. His experience includes design, construction services, field-troubleshooting, startup and project management. The following highlights some of his experience related to you needs.

Education

BS, Chemical Engineering - 1990
University of Massachusetts
MS, Chemical Engineering - 1993
University of Virginia

Licenses & Registrations

Professional Engineer MA
Professional Engineer MA

1 years with Fuss & O'Neill
20 years Professional
Experience

WPCF Process Automation Improvements, Cytec, Wallingford, CT:

Lead instrumentation/control systems engineer responsible for conceptual design of the WPCF process automation improvements.

Water Pollution Control Facility Nutrient Removal Upgrades,

Cranston, RI: Lead instrumentation/control systems engineer responsible for the design of the instrumentation and control system Phase I and Phase II upgrades at the water pollution control facility.

Woonsocket Regional Wastewater Treatment Facility Upgrade,

Woonsocket, RI: Lead instrumentation/control systems engineer responsible for the preliminary design of the instrumentation and control system upgrades at the wastewater treatment facility.

Water Pollution Control Facility Upgrade, The Mattabassett District, Cromwell, CT:

Control systems engineer assisting with the control system design for the primary treatment facilities portion of the upgrade. Design work included loop drawings and control loop descriptions. Also performed internal QA/QC check of the process, electrical and instrumentation designs for many of the other plant treatment processes.

Hockanum River Water Pollution Control Facilities Comprehensive Upgrades, Manchester, CT:

Control systems engineer responsible for the design of the control systems for the solids processing part of the comprehensive upgrades, as well as some portions of the liquids process train. Design work has included loop drawings and control loop descriptions.

Wastewater Treatment Plant Tertiary Treatment Upgrade,

Smithfield, RI: Lead control systems engineer responsible for producing contract plans and specifications for the control system portion of the upgrade. Work included upgrading the existing plant distributed control system and integrating third-party instrumentation and controls.

Department of Public Works, Wastewater Treatment Plant Upgrades, Milford, CT:

Lead control systems engineer for the upgrade of the control systems at the Housatonic wastewater treatment plant and the Beaver Brook wastewater treatment plant. Designed an upgrade of the existing

control systems at both plants to incorporate existing and new instrumentation and controls.

Wastewater Treatment Facility, Kingston, MA: Lead control systems engineer for the 6-MGD wastewater treatment facility and Jones River and Rocky Nook Wastewater Pumping Stations. Selected and specified plant instrumentation, and designed and specified the hardware and software for the plant's PC/PLC-based control system, and designed communications interfaces with two remote pump stations. Designed the I&C system for the remote pump stations and provided engineering services during construction.

Wastewater Treatment Facility Upgrade, Scituate, MA: Control systems engineer for the 5-MGD wastewater treatment facility upgrade project. Specified plant instrumentation, specified control system hardware and software, and designed the plant's PC/PLC-based control system. Incorporated existing plant I&C into the new design and provided related coordination during plant construction and commissioning.

Wastewater Treatment Facility Ultraviolet Disinfection System, Northbridge, MA: Control systems engineer responsible for specifying flow instrumentation, specifying control panel hardware, and for designing an interface to the plant's existing control system. Provided engineering services during construction.

Wastewater Treatment Facility, Northbridge, MA: Lead control systems engineer responsible for the design of a personal computer and programmable logic controller (PC/PLC) based control system for the 5-MGD wastewater treatment facility. Developed contract drawings and contract specifications for the control system hardware and software and field instruments, and provided engineering services during construction.

Water Pollution Control Plant Improvements, West Haven, CT: Lead control systems engineer responsible for the design of a level monitoring system for the improved sludge storage system at the water pollution control plant. Developed contract drawings and contract specifications for the system hardware and field instruments.

Water Pollution Control Plant Ultraviolet Disinfection System, Waterbury, CT: Lead control systems engineer responsible for specifying flow instrumentation, specifying control panel hardware, and for designing an interface to the plant's existing control system. Provided engineering services during construction.

Wastewater Treatment Plant Modifications, Grafton, MA: Lead control systems engineer responsible for the designing a control system upgrade for the wastewater treatment plant. Developed contract drawings and contract specifications for the control system hardware and software and field instruments and provided engineering services during construction.



James P. Galey **President**

Mr. Galey has worked in the design/build discipline of the construction industry for over 30 years. He has extensive experience on both Private and Public projects as well as joint ventures between the two. He has worked as an Owner, Developer, and General Contractor over the course of his career on commercial, industrial, and residential projects. His proven track record demonstrates the ability to conceive, support, and facilitate diverse and complex projects and successfully bring them to fruition. Fiscal set up and administration, as well as project productivity and problem resolution are strengths that he has demonstrated throughout his project history. As President of Fuss & O'Neill Design Build Services, LLC, he has direct access and control of the professional resources available at Fuss & O'Neill, Inc. in addition to an extensive team of pre qualified subcontractors. These relationships are aligned with his working experience and integrated into a strong teaming approach to Design Build construction.

Education

BS, Natural Resource Management -
1978
University of Connecticut

15 years with Fuss & O'Neill
30 years Professional
Experience

Coventry DPW Facility, Coventry, CT: Design, permitting, and construction of multi faceted \$3.2 million dollar complex. Includes complete CID site development, 22,000 square foot main building, 1,700 square foot salt storage building and cold storage facility. Energy efficiency and operating economics were considered and included throughout the project.

Oakwood Soccer Complex, Portland, CT: Design, permitting, and construction of \$1.8 million dollar private premier outdoor soccer complex. Twenty two acre site was laid out to include up to four outdoor fields and associated parking and amenities. Two artificial turf tournament fields have been constructed. Infrastructure utilities included domestic water, stormwater management system, field drainage, and power and lighting for the fields and parking areas. DOT improvements to State road were also required and completed. Project construction was fast tracked and completed in under 90 days from start of work.

Sherwood Falls Condominiums, Kensington, CT: Brownfield redevelopment site included design, permitting and site work. The site work included the management of 10,000 cubic yards of contaminated soil. The site includes a riverside park area that was enhanced through construction of a 22' high structural retaining walls to accommodate river access and provide area for onsite relocation of much of the polluted soil found on the property. FODBS served as the development coordinator for The Corporation for Independent Living from the concept stage of the project through remediation and site development for the value of \$3.2million.

Kenyon Falls, Coventry, CT: Redevelopment of a historic contaminated site. The intended reuse of the site was from manufacturing to residential and required extensive environmental remediation of the site. A combined workplan was developed to provide for most of the contaminated soil to be managed onsite and avoid the expense of off site disposal. The project is

comprised of 36 condominium units with associated infrastructure, including a sewer pump station to connect the site to the Town sewer system. The value of the site related construction and remediation was \$1.3 million.

Target Store, Manchester, CT: FODBS has designed, permitted, and constructed improvements to the commercial facility to correct drainage issues that were flooding the retail store. There was also an 800' long 20' high blasted rock face that was deteriorating and required stabilization to protect the building and the people around it. The parking areas had severe structural failures that were the result of poor initial construction. FODBS developed a pavement repair system that corrected the failing asphalt areas throughout the facility. Services were also provided to update fire vehicle access and provide egress for the entire perimeter of the store. The work plan was designed and implemented to enable the store to remain fully open throughout construction if the improvements.

ACME Industries, Bridgeport, CT: Publically traded industrial company owned a contaminated manufacturing site. The Owners had structured a sale of the property and needed to remediate the site prior to transfer of title. FODBS was hired to develop a cost effective approach to mitigate the pollution and satisfy the DEP regulations associated with sale of such properties. In conjunction with Fuss and O'Neill environmental specialists, a plan was developed and implemented that included use of multiple remediation solutions. This approach proved to be cost effective and allowed an expeditious remediation of the site to be completed and the transaction to move forward. The cost of the remediation was held to under \$900,000 which was less than the amount originally earmarked.



David N Lussier

Senior Electrical Engineer

Mr. Lussier serves as a Project Electrical Engineer on various engineering projects located throughout the United States and overseas. He is responsible for electrical design, estimating, specifications, field observations and coordination and building conditional surveys. His background includes both construction as a licensed electrician and design of lighting, power, electrical distribution, communications, controls, and alarm systems for commercial, industrial, educational, treatment plants and pump stations, and government and military facilities.

His communications design experience includes telecommunications and data specific cabling systems for telephone, data processing, personal computers, PBX, LANS, and other office equipment. Other communication system designs included SCADA (Supervisory Control and Data Acquisition) intercommunication, fire alarm, security, card access and other client specific type systems.

Education

BS, Civil Engineering - 1977
Roger Williams University

Licenses & Registrations

Professional Affiliations

3 years with Fuss & O'Neill
36 years Professional Experience

BIOMASS

Foster Glocester Middle School, North Scituate, RI: Responsible for the electrical design and specifications of lighting, fire alarm, power distribution, and communication systems for the new school. Also included was the design of a 0.9 MW (3.2 MMBTU/HR) wood chip Bio-Mass Boiler for supplemental heating of the school. Responsible for construction administration, including attending construction meetings, shop drawing review and construction observations.

Foster Glocester High School, North Scituate, RI: Involved with the preliminary electrical design and specifications of lighting, fire alarm, power distribution, and communication systems for the new school. Also included was the design of a 1.9 MW (6.4 MMBTU/HR) wood chip Bio-Mass Boiler for supplemental heating of the school. Responsible for construction administration, including attending construction meetings, shop drawing review, construction observations and commissioning of the lighting control system.

Fort Kamehameha WWTP, Pearl Harbor, HI: As part of the Battleship Pier project, the wastewater treatment plant was renovated to provide additional capacity, involving power distribution, control and instrumentation for the new clarifier including site investigation, production of contract drawings, specifications, and cost estimates.

Rhode Island Solid Waste Management Corporation, Central Landfill Expansion, Johnston, RI: Electrical design of the meter vault construction of the leachate collection system including electric power and instrumentation wiring to the remote vault location, as well as electric, lighting and instrumentation within the vault. Prepared drawings, specifications, cost estimate and provide construction observation and start-up commissioning.

Warwick Sewage Treatment Plant Modifications, Warwick, RI:

Involved with the modifications to the power distribution, control and instrumentation systems, and prepared specifications and estimates for this upgrade project.

Norwalk Sewage Treatment Plant Additions, Norwalk, CT: Involved with electrical design efforts associated with the installation of a belt filter press, including construction observation.

Stratford Sewage Treatment Plant Additions, Stratford, CT: Involved with the electrical design efforts associated with the installation of a new belt filter press.

Plainfield Sewage Treatment Plant Additions to Dewatering Building, Plainfield, CT: Responsible for the design of the electrical part of the dewatering building, including power distribution, lighting, fire alarm, controls and instrumentation, and construction observation.

Plymouth Sewage Treatment Plant Expansion, Plymouth, CT:

Involved with the design of the electrical systems, including power distribution, fire alarm, controls and instrumentation



Elizabeth Yang Landry, PE

Senior Mechanical Engineer

Mrs. Landry is a Senior Mechanical Engineer in our Manchester, Connecticut office. She has experience in various disciplinary areas of Engineering, including design and construction administration of heating, ventilation, and air-conditioning systems, plumbing and fire suppression systems, and energy conservation for commercial and industrial facilities. She has also has experience in facility engineering projects including manufacturing process and safety management, wastewater treatment, and arc flash hazard analysis. The following highlights some of his experience related to your needs.

Education

BS, Engineering Science - 2005
Smith College
ME, Engineering - 2010
University of Hartford

Licenses & Registrations

Engineer In Training MA
Professional Engineer CT

Professional Affiliations

10 years with Fuss & O'Neill
10 years Professional
Experience

Heating, Ventilation and Air Conditioning

Danbury, CT: Lead project mechanical engineer for design and construction administration services. The project included removal and replacement of the existing deaerator and associated equipment, and installation of a backup generator at the Central Heating Plant on a university campus. The new deaerator system was designed to accommodate both the existing and the future boiler plant configuration. The system includes a deaerator tank, pumps, piping, insulation, controls, and associated electrical work.

Danbury, CT: Lead project mechanical engineer for design and construction administration services. The project included replacement of the existing boilers with high efficiency boilers at the Central Heating Plant on a university campus. Made modifications to the breeching. Provided boiler controls that interfaced with the existing Johnson Energy management control systems. Specified energy meters which will monitor the flow of the domestic hot water and steam distribution systems.

Storrs, CT: Project mechanical engineer that assisted in the design of a new steam distribution system for a university. Worked on pipe stress analysis using CAEPIPE software. Assisted in producing piping plan and elevation drawings for construction. Responsible for the construction administration and on-site inspections.

Connecticut State Universities: Project mechanical engineer that worked on cogeneration feasibility studies. Researched and compared fuel cell manufacturers. Analyzed thermal data for cogeneration.

Coventry, CT: Lead project mechanical engineer responsible for the design of the space heating, hot water radiant heating, ventilation, air conditioning, and plumbing systems for the new public works facility.

Coventry, CT: Lead project mechanical engineer responsible for the design of the space heating, hot water radiant heating and ice melt, ventilation, air conditioning, and plumbing for the new fire station.

Farmington, CT: Lead project mechanical engineer provided design and construction administration services, and also acted as the Department of Public Works (DPW) representative during the construction phase and oversaw project closeout. The project scope included the removal of existing boilers and boiler feed unit, installation of new boilers, boiler feed unit, steam-fed hot water heaters, and associated piping, electrical and controls. It also included a new chiller, chilled water pumps, and associated piping, electrical and controls at a state building.

Middletown, CT: Lead project mechanical engineer responsible for the design of the heating, ventilation, air conditioning, and plumbing for the new commercial building.

Hartford, CT: Project mechanical engineer for design services. The project included upgrade of the heating, ventilation and cooling systems in the emergency operations center. Performed field work to document existing conditions and locate new equipment. Performed code research based on existing conditions and proposed design concepts.

Hartford, CT: Project mechanical engineer for construction administration services including work required to repair five (5) existing 50 ton and larger air handling units and appurtenances at a state lab. Reviewed submittals and shop drawings. Conducted regular inspections and construction meetings.



Keith A. Bowman, PE

Associate

Mr. Bowman manages our Structural Department. Through his career, he has been a valuable team member completing a wide range of structural engineering projects working with architects, other engineers and facility owners. These projects have included historic renovations, educational and public safety facilities, commercial buildings, peer reviews, and construction inspections. His principal strengths are his abilities to manage large, multi-disciplinary projects and work through complex structural problems to develop innovative and cost effective solutions.

Education

AS, Architecture Engineering - 1990
Wentworth Institute of Tech
BS, Civil Engineering - 1994
University of Connecticut

Licenses & Registrations

Professional Engineer CT

Professional Affiliations

Cons Institute

10 years with Fuss & O'Neill
22 years Professional
Experience

WASTEWATER TREATMENT

Mr. Bowman manages a broad spectrum of design and investigative projects for Fuss & O'Neill's structural department. Representative projects include:

Groton, CT: Lead structural engineer for upgrades to the Groton Water Pollution Control Facility. The upgrades included new Secondary Clarifiers, a new Sludge Pump Station, a new Influent Screening Building, a new Hypochlorite Storage Building, and expansion of the Aeration Tanks, Blower Building, and Chlorine Contact Tank.

Storrs, CT: Lead structural engineer for the design of repairs to two Secondary Clarifiers at the University of Connecticut. The repairs consisted of removing about 8,000 square feet of failed grout from the bottoms of the two clarifiers and replacing it with a long lasting polymer modified grout and epoxy coating system.

Putnam, CT: Lead structural engineer preparing conceptual and preliminary design documents for upgrades to the Putnam Water Pollution Control Facility. The upgrades include a new Administration Building, improvements to the Headworks Building, disinfection upgrades, a new Secondary Clarifiers, a new Filter Building and a new Blower Building. Structural repairs and modifications of several additional buildings and structures are also part of the project.

Windsor Locks, CT: Lead structural engineer for upgrades and an addition to an existing wastewater treatment plant at a large industrial facility. The new addition included a 2,800 square foot pre-engineered metal building and a new cooling tower. The upgrades included a new high pressure steam line and replacement of several tanks and other process equipment inside the existing building.

Windsor, VT: Lead structural engineer for the design of facility improvements including repairs of the clarifiers and primary digester.

Biddeford, ME: Project Manager and lead structural engineer for a facility condition assessment and design of improvements including an inspection and re-coating of the sludge holding tanks and the sludge handling building.

Groton, CT: Lead structural engineer for the design of repairs to two clarifiers at the Groton Water Pollution Control Facility. The repairs consisted of removing about 5,700 square feet of failed grout from the bottoms of the two clarifiers and replacing it with a long lasting polymer modified grout.

Shelton, CT - Lead structural engineer for the evaluation and assessment of the design of facility improvements to the existing Water Pollution Control Facility (WPCF). Facility is now undergoing an upgrade to expand the aeration system to increase treatment capacity.

Plainfield, CT – Evaluated structural condition of facility structures and buildings as part of a preliminary engineering report to describe and evaluate alternative actions which may be taken to achieve compliance with the new permitted Phosphorus limitations Preliminary for the Plainfield Village WPCF.



Philip E. Forzley, PE, LEED AP

Vice President/Dept Manager

In his capacity as a Project Director, Mr. Forzley manages design teams and actively participates in project design. He has completed a variety of civil and environmental engineering projects that include site planning and engineering, hydrology and hydraulics, stormwater management, water supplies, environmental contamination, wastewater treatment and disposal, and regulatory compliance. He provides services to local and state government entities, public and private school systems and universities, industries, and land developers. His primary strength is management of projects that involve multiple disciplines, where he utilizes his range of technical skills. Frequently he coordinates design services with architects, construction managers, and other project team members. Relevant experience includes:

Mr. Forzley is responsible for evaluation, design and permitting of wastewater management systems. These systems typically include treatment and disposal, but in some cases wastewater may be recycled or applied to land for irrigation. He has extensive experience with industrial wastewater treatment and recycling systems and on-site treatment and disposal systems for domestic wastewater. Representative projects include:

Old Saybrook, CT: Performed site investigations, provided technical assistance to local officials and designed repairs to failing septic systems at individual homes. Helped identify existing systems that were code compliant and therefore not in need of replacement. Reviewed soil testing and ground water data and provided design alternatives that would fit on available land area and comply with requirements of the Connecticut River Area Health District and the State of Connecticut Public Health Code.

Wolfeboro, NH: Managed a technical team in the scientific evaluation of soil, groundwater and geotechnical conditions at a Rapid Infiltration Basin site to help the Town determine optimal operating parameters and protect wetland and watercourses from water quality impacts. Performed water balance analysis for effluent management system and helped the Town obtain various permits including a wastewater holding pond and a spray irrigation system.

Westbrook, CT: Provided site investigations and design services for Hill Farm Active Adult Community, a 21-unit community served by on-site wastewater treatment and disposal systems. Provided survey, design, permitting, construction layout and construction administration services relative to site and utility plans and wastewater treatment and disposal systems. Obtained approvals from local agencies and the Connecticut Departments of Environmental Protection, Transportation and Public Health.

Chester, CT: Evaluated the condition and performance of a community septic system and reviewed potential expansion and performed soil testing on town property as sewer avoidance measures. Reviewed soil testing and

Education

BS, Biological Science - 1981
University of Connecticut
BS, Civil Engineering - 1984
University of Connecticut
MS, Environmental Engineering - 1997
University of Connecticut

Licenses & Registrations

LEED AP
Professional Engineer MA
Professional Engineer CT

Professional Affiliations

American Society of Civil Engineers
Water Environment Federation

11 years with Fuss & O'Neill

31 years Professional Experience

ground water monitoring data and existing treatment and disposal system components, reviewed opportunities for expansion, performed wastewater renovation calculations and determined potential impacts on environmental receptors including wetlands, watercourses and adjacent properties.

Franklin, CT: Provided technical assistance to the design team for the Koff Koff egg farm wastewater treatment and disposal system. Reviewed soil testing and ground water monitoring data, evaluated proximity of potential disposal system locations to bedrock and unsuitable soils and planned soil testing efforts, and helped determine the most suitable location for the new system.

Orange, CT: Designed renovations to this Amity, CT Regional School included an extensive evaluation of and renovations to the effluent pumping station and subsurface wastewater treatment and disposal system. Test pits to determine soil and leaching trench conditions, evaluation of dosing systems and testing and evaluation of pump station performance were required. Designed improvements to dosing, leaching and pump systems and obtained approvals from the CT Department of Public Health.

South Windsor, CT: Performed design and permitting of combined gravity sewers and pump stations to serve mixed uses at the Shoppes at Evergreen Walk. Prepared designs, specifications and cost estimates for construction and obtained permits from local regulatory agencies.

Coventry, CT: Project manager for conversion of Kenyon Mills, a historic manufacturing facility, into residential condominiums. Managed the design of an on-site sewage pump station to convey domestic wastewater to the sanitary sewer.

Eastern US and OH: Project director for conceptual design and cost estimating efforts related to wastewater treatment, and relocation of paper manufacturing equipment from mills in the eastern US. The project required wastewater characterization, preliminary design of a treatment system and design and logistics of removal and reinstallation of manufacturing equipment.

Torrington, CT: Project manager and engineer for design of an industrial wastewater treatment and recycling system for metal finishing wastewater. Significant wastewater flows were recycled for non-critical rinses. Secured permits from the Connecticut Department of Environmental Protection, assisted the owner with soliciting bids, conducting interviews and selecting contractors, performed inspections during construction and provided assistance during startup.

Education

Cert, Drafting - 1990
Porter and Chester

16 years with Fuss & O'Neill
25 years Professional
Experience

Shawn A. Leamy, LS

Senior Analyst

Mr. Leamy has a diverse background in survey and engineering services. He is a highly experienced site planner, and has extensive experience using AutoCAD tools to produce design documents for a variety of civil and environmental engineering projects. These projects have included design and mapping for:

LAND DEVELOPMENT

- Residential, office, retail, commercial and industrial sites
- Mixed-use projects
- Sustainable Design projects
- Landfills and other environmental projects
- On-site wastewater disposal systems
- Schools, hospitals and other municipal and institutional facilities
- Golf courses and other recreational facilities
- Multi-use trails including rails-to-trails projects
- Municipal roadways and infrastructure
- Utility systems

Mr. Leamy has significant land surveying experience. He frequently performs calculations and planning for construction stake-out of projects that range from small and simple to very large and complex.

Mr. Leamy is a multi-faceted professional that brings a wide array of skills to his projects. He is a licensed land surveyor with over 20 years of site design and construction inspection related experience. Mr. Leamy frequently creates project basemaps, develops designs and follows up with construction site observations. His principal strength is to provide clients with a diverse background that allows for the successful completion of new projects. The following projects highlight some of his experience related to your needs:

CONSTRUCTION ADMINISTRATION

Manchester/Bolton, CT – Bolton Lakes Sewers Project - Construction inspection that consisted of the installation of gravity sewers, low pressure sewers, grinder pump stations, a flow meter station with a radio transmitter, road reconstruction and traffic signal loop replacements.

Manchester, CT – Evergreen Walk Development - Utility layout and construction inspection of the stormwater collection system, underground electric and communication facilities to serve the development.

Hartford, CT – Adrian's Landing – Provided layout and construction inspection of the underground utility relocations for the Convention Center construction. The construction utility inspections pertained to the stormwater collection system, sanitary sewer pipe and siphon, electrical and communications infrastructure.

East Hartford, CT – Rentschler Field - Design layout, construction inspection for site grading, the stormwater drainage system, and lighting system for UConn football stadium.

Preston, CT – Lake of Isles Golf Course – Design duties included site grading and drainage collection system. Other activities included construction oversight of field grading, and irrigation pipe with control system layout and installation.

Cromwell, CT –Driving range for Tournament Players Club “TPC”. Design duties include site grading, drainage and layout. Construction Oversight activities included field grading, along with irrigation layout and installation.



Matthew M. Jermine, PE

Project Manager

Mr. Jermine is a senior project engineer in our Wastewater department. His top notch analysis and problem solving skills are heavily relied upon by our company. He employs many different investigative strategies to thoroughly organize available project information and uncover feasible alternatives to challenging problems. He scrutinizes and summarizes large data sets during his assessment of potential solutions, often utilizing and combining the advanced features of AutoCAD, ArcGIS, Excel Spreadsheets, and Access Databases. Matthew has a broad understanding of wastewater management techniques with his extensive experience as a systems' planner, evaluator, and designer. Below is a selection of relevant projects demonstrating a small part of Matthew's broad knowledge base:

Education

BS, Civil Engineering - 2002
Rensselaer Polytechnic Institute

Licenses & Registrations

Professional Engineer CT

Professional Affiliations

North Haven Inland Wetlands
Commission
American Society of Civil Engineers
Water Environment Federation
New England Water Env Assoc

13 years with Fuss & O'Neill
14 years Professional
Experience

Decentralized Wastewater – SWAS

Willington, CT – Project Engineer for the preliminary design of a 9,000 GPD subsurface sewage renovation system at a proposed Truck Stop. Performed two rounds of soil testing with springtime groundwater monitoring and coordinated testing with the CT DEP and the North Central District Health Department. Created a preliminary layout of a leaching field based on soil testing results. Calculated regulatory design requirements including nitrogen dilution and 21-day bacteria travel time.

Lebanon, CT – Project Engineer for a 20,000 GPD leaching bed set in 13 vertical feet of manufactured septic system fill. System was designed with a five zone pressure distribution manifold. Investigated the soil suitability of the site, developed a leaching system design, permitted the system through the CT DEP, and provided construction oversight and system startup testing during the project.

Tolland, CT – Project Engineer for the second part of the Town-wide Wastewater Facilities Plan update. Performed a desktop analysis for siting a 25,000 gpd community subsurface wastewater renovation system as the feasible alternative for a neighborhood area identified with poorly performing on-site septic systems. Soil information was reviewed and site selection was determined based on suitable, undeveloped available land. The analysis was based on the rigorous regulations of the Connecticut Department of Environmental Protection.

Cornwall, CT – Evaluated an 18.9 acre undeveloped parcel on Kent Road for construction of multiple septic systems for 16 residential dwelling units. Completed a desktop review of the site based on public information and two separate on-site soil evaluations. Calculated conceptual requirements for individual on-site septic systems permitted through the Connecticut Department of Public Health and estimated order of magnitude construction costs. This study was part of a program to identify sites in northwest Connecticut for Incentive Housing Zones to offer affordable housing in rural towns for recent college graduates.

Hammonasset Beach, CT– Compared three alternatives for on-site subsurface sewage renovation systems at the main bathhouse buildings at the State Beach for the CT DEP. The evaluation considered abandoning, reusing, or abandoning the existing septic system. A discussion of replacing the wastewater disposal needs with composting toilets similar to ones used in the Visitor's Center was also performed. The alternatives looked at the design requirements, costs, and impacts to the environment for wastewater disposal due to continued beach erosion.

Preston, CT– Project Engineer for the evaluation, repair, and construction of seven separate onsite wastewater disposal systems at a campground facility. Worked with the client and DEP to comply with a draft Consent Order and bring the subsurface sewage disposal systems into compliance.

Old Saybrook, CT– Project engineer on the decentralized wastewater management program to upgrade septic systems within shoreline neighborhoods to reduce nitrogen discharges into Long Island Sound. Provided program management support including design and implementation of a Google Docs spreadsheet with web based user interface for data collection, parcel tracking, and neighborhood reporting of parcel information for project staff at different locations. Created a set of contract document templates to streamline the design and permitting of the numerous program phases.

GIS

Waterbury, CT - GIS Technician responsible for creating GIS mapping of the Rosario Drive sewershed. Mapping included thematic mapping of parcels by various attributes, scanned & georectified as-built mapping, and creation of detailed presentation figures.

East Lyme, CT - GIS Analyst for a detailed capacity study of the sanitary sewer system. 30 miles of gravity sewers, 7 miles of force mains, and 18 pump stations were digitized from as-builts and modeled with existing flows, future flows, and I/I for capacity limitations. Wastewater flows due to future development within the SSD was calculated through a series of complex geospatial analyses of land use data, tax assessor information, DEP datasets, and zoning layers.

Newtown, CT - GIS Analyst responsible for documentation used to transfer the State of Connecticut water company assets to the Town of Newton . Created multiple maps required as part of the transfer permit application for the Department of Public Health using DEP datasets including classification of Class I water company owned lands based on overlaying a large set of criteria defined by the CT Statutes.

Tolland, CT - GIS Analyst for a wastewater facilities plan for the Town of Tolland tasked with the creation of complex databases and data management for various evaluations. As part of the town wide analysis, neighborhoods prone to septic system problems were identified and recommended for inclusion in the town's Sewer Service District.

Section 5 – Staff & Firm Capabilities

Firm Overview

Fuss & O'Neill is a leader in providing a broad range of engineering services to both the public and private sectors in Southern New England. With this wide range of expertise and over 260 employees, 6 regional offices, 3 LLCs and 90 years of experience, we are able to deliver an integrated approach to our projects that also embraces sustainable practices.



At Fuss & O'Neill, we place great emphasis on collaboration; both within the company and with our clients. All members of our team are committed to achieving technical and financial success for each project through innovative, cost-effective solutions that meet our clients' unique needs.

Our core company disciplines include:

- Civil Engineering
- Design Build Delivery
- Energy Alternatives
- Environmental Services
- Facilities Engineering
- Land Development
- Manufacturing Solutions
- Structural Engineering
- Utilities Engineering
- Water & Wastewater
- Water Resources



Groton, CT WPCF Upgrade Project, Completed 2011

Planning Philosophy for Wastewater Projects

We bring a pragmatic and at the same time sustainable approach to your wastewater project. Our expertise in process design and energy management enables us to develop efficient, environmentally friendly alternatives to meeting your wastewater needs for the long run. One of our primary goals in the initial project stage is uncovering the approaches that maximize re-use of existing facilities, such as tankage and buildings, to the extent that they can be integrated into the needs of the future. We used this approach in recent facility upgrades in Plainfield, Putnam and Groton and **saved our clients many millions of dollars while at the same time meeting all of the long-term goals** for the project. This approach is more challenging but results in truly meeting the goals of our clients.

Staff & Firm Capabilities

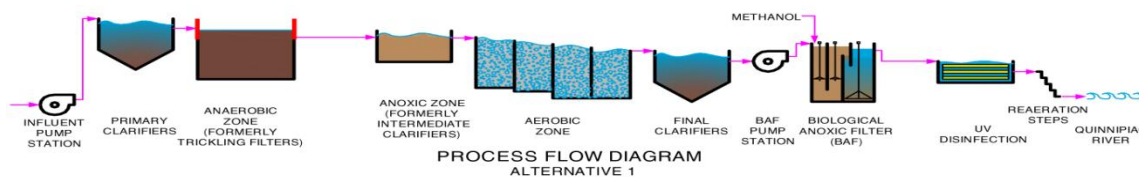
One of the distinctive advantages we offer Ledyard is our comprehensive in-house capabilities coupled with our unique services, which include reliability centered maintenance, instrumentation and controls, and green solutions (among many others). By having all of the required disciplines in-house—disciplines such as electrical, structural, mechanical, SCADA, process—we are able to communicate within the project team effectively, as well as respond to urgent needs on-site quickly. An overview of these capabilities follows.

A benefit we offer Ledyard is our comprehensive in-house capabilities. From PhDs to staff with decades of experience, we can mobilize experienced experts quickly.

Plant Design Services

For facility upgrades, **our goal is to develop innovative ideas and maximize reuse of existing infrastructure, often resulting in projects that cost many millions of dollars less than the standard cookie-cutter approach taken by many of our competitors.** See our write-ups in Section 3 for projects in Shelton, Groton, Plainfield, and Putnam as recent examples.

Our team is experienced with not only municipal wastewater treatment facilities, but also industrial and food service facilities as well. Our staff has expertise with all of the major treatment plant modeling packages, including GPS-X, BioWIN and WRC's STOAT software. We commonly use modeling to evaluate various process upgrade scenarios.



Sample treatment process dynamic modeling

Instrumentation, Controls, and SCADA

Fuss & O'Neill has a dedicated Instrumentation, Controls and SCADA System practice team with in-depth experience in the design, construction services, field-troubleshooting and startup of municipal wastewater treatment facilities and collection systems. The practice team has worked in all phases of wastewater treatment plant upgrade projects, from preliminary design to producing contract documents, to factory/field acceptance testing of instrumentation and control/SCADA systems, to startup and optimization of pump stations and treatment processes. This wealth of experience enables us to focus on your needs and be responsive while providing cost-effective systems that are customized to the specific monitoring and control requirements of your treatment plant and collection system.



Fuss & O'Neill performs Megger testing on motor control center

Sewer Design & Pump Station Design Services

Fuss & O'Neill has designed and administered construction of approximately **100 miles of sewers**, over **30 pump stations**, and over **900 grinder pumps** in the past 15 years.

Fuss & O'Neill is the leader in Connecticut in the design and construction of collection systems, with extensive experience in gravity sewers as well as low pressure sewers, force mains, and pump stations. Our projects frequently feature the use of directional drilling, particularly when disruption of traffic or urban features present difficult challenges with traditional open-cut installation.

We've evaluated and designed a variety of wastewater pumping stations to suit project needs, including submersible, wet pit/dry pit, axial flow, and suction lift stations. Services cover the range from designing a two-stage series-pumping station in Tolland to achieve 384 feet of TDH to stormwater pump stations adjacent to the dike to protect Hartford from Connecticut River flooding with a 43,000 gpm capacity rating. Many of the same diverse experts that assist our team during treatment facility upgrades also participate in evaluating and designing pump station upgrade needs.



Second Stage Pump Chamber, Old Post Road, Tolland, Connecticut

In addition, we provide startup and commissioning of new and rehabilitated pump stations, and troubleshooting for pump station issues.

Our pump station experience over the past 10 years includes 39 pump stations in 10 CT municipalities providing: grinder pumps, design, construction administration, maintain service during construction, condition assessment, structural evaluation, electrical/HVAC, hydraulic/capacity evaluation, equipment testing, SCADA/instrumentation, state/federal funding, permitting and rehabilitation/repairs.

Odor Control

We have a great deal of experience designing a variety of odor control technologies for our clients including biofilters, mist systems, aeration systems, oxygen injection, biochemical inhibitors, and activated carbon scrubbers.

Examples of Odor Control Systems Designed by Fuss & O'Neill



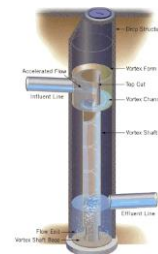
Air Compressor



Carbon Filter Air Scrubber



Biooxide Chemical Feed



Vortex Drop Manhole

Fuss & O'Neill takes a holistic approach to odor control by modifying the conditions which cause the odor formation. At the Shelton Wastewater Treatment Plant, we recommended adding several strategically placed stainless steel doors to the existing sludge thickener to increase the vacuum pressure of the existing carbon filter. For another odor source at a key discharge point at Shelton's head-works facility, an existing pipe was rerouted and extended below the water surface to create a water trap, preventing release of noxious odors to the atmosphere. In Brooklyn, a manhole rehabilitation included a passive Vortex Drop Manhole (which requires no chemicals, electricity, or ongoing maintenance) to mitigate H₂S generation which not only had been generating odor complaints but also had severely corroded the precast concrete manhole structure. **With Fuss & O'Neill recommended solutions, the point of release of nuisance odors has been mitigated with low one-time capital costs while avoiding additional facility O&M costs.**

Engineering and Construction Support Services

We provide engineering and construction support services for the majority of our municipal wastewater projects, from collection system rehabilitation to pump station upgrades, from sewer extensions to treatment plant upgrades. We are experienced in dealing with contract administration requirements and funding mechanisms. We utilize our design teams in the construction phase of sewer projects to provide continuity, which results in seamless service and practical experience.

Environmental Compliance Support Services

Our comprehensive suite of services includes environmental compliance support and contaminated soils evaluation and characterization such as the Groton WPCF, where a hypochlorite leak was discovered. Our team was onsite within hours of notification from the town and located the source of the spill, identified the extents of the plume, characterized the soil and completed remediation of the site within 2 weeks. At the Putnam WPCF, we swiftly altered the design to relocate an administration building after discovering contaminated soils onsite. In Tolland, we encountered contaminated soils at a service station during a sewer construction which we handled efficiently to prevent workers from potential exposure.

Preparation of Capital Improvement Plans (CIPs) and Rate Projections

Fuss & O'Neill has assisted many clients through the capital improvement planning process and rate projections. In Avon, for example, we created a tool to balance potential revenues from service connections with various sewer extension alternatives, thereby prioritizing several capital improvements projects through their enterprise fund.

Annual Life Cycle Costs (2013)	Gravity Sewers to Dedicate Rte. 156 Force Main	Gravity Sewers to Shared Force Main
One Time Capital Cost (Annualized, Rounded)	\$534,000 to \$817,000	\$587,000 to \$898,000
Annual O&M Costs	+ \$120,000 to \$184,000	+ \$120,000 to \$184,000
Annual Cost (Rounded)	\$654,000 to \$1,001,000	\$707,000 to \$1,082,000

Annual Life Cycle Costs (2013)	Gravity Sewers to Dedicate Rte. 156 Force Main	Gravity Sewers to Shared Force Main
Annual Cost (Rounded)	\$654,000 to \$1,001,000	\$707,000 to \$1,082,000
Number of Severed Parcels	+ 260 EDUs	+ 260 EDUs
Total Annual Life Cycle Cost (per Severed Parcel)	\$2,500 to \$3,900	\$2,700 to \$4,200

Comparison of rate projections
Miami Beach Association
Old Lyme, CT

In Chester, and other municipalities, we have assisted with benefit assessment determinations and implementing billing and collection programs. When Waterbury was faced with a shortfall at its wastewater treatment facility, we established a rate program which included surcharges for high strength wastewater contributors to find additional revenues.

Review and Update WPCA Standards, Regulations & Best Practices

One of the needs of small to mid-sized communities is their lack of administrative resources to create and implement standards and regulations. **We have assisted several WPCAs**

including Tolland, Chester, Lebanon and Bolton Lakes Regional WPCA to create their initial set of sewer use and water pollution control regulations, including sections for Fats, Oils and Grease (FOG). However, our experience also extends to evaluation and recommended improvements to established water pollution control facilities such as the City of Waterbury, where we created or modified their regulations, details, developer's permit agreements,



Fuss & O'Neill authored or updated Waterbury WPC's standards and regulations, including Developers Permit Agreements, FOG and High Strength Wastewater Regulations.

Asset Management & CMMS Development

Our expertise in the design and construction of wastewater treatment systems is complemented with our expertise for developing a complete asset management program. Our method of developing a comprehensive approach to asset management ensures the reliability and performance of your equipment while maintaining records and assigning work efforts. Our teams of maintenance and reliability engineers possess the skills and certifications necessary to help clients achieve success in this endeavor by allocating resources where they can provide the greatest return.

We perform equipment assessments and assign criticality factors to help clients prioritize improvement efforts and reduce cost.

Our Asset Management process does not start at the end of the construction phase. **We evaluate the equipment at an early stage where most of the life-cycle costs are determined.** Once equipment is selected, the process for identifying the most appropriate methods for Preventive and/or Predictive Maintenance are evaluated.

Prepare Engineering Reports

Our quality deliverables are another area which separates us from our competitors. **We don't take short cuts while preparing reports because we know how important they are in obtaining support from local government, state agencies and the public.** The key to generate approvals, revenue and regulatory compliance begins with a solid defensible report.

We encourage Suffield to inquire at CTDEEP about the thoroughness and quality of the reports we produce.



Recommendation for a regional sewer system in Old Lyme, CT

Develop and Produce Bid Documents that Control Construction and O&M Costs

Our commitment to quality deliverables does not end with the study and report phase of a project. We understand that incomplete bid documents lead to ambiguity in the construction phase, and that costs real money.

By preparing detailed bid documents, we reduce the number of change orders, thereby saving time and cost. Furthermore, the assemblies are constructed properly as a result of detailed bid documents, reducing long-term costs as well.

Our quality deliverables will result in less change orders, thereby saving Ledyard money.

Prepare Construction Cost Estimates

Ledyard will benefit from our experience with construction in Connecticut and their respective costs.

We implement a series of cost estimates beginning with a preliminary opinion of cost with a limited number of line items at the planning stage, capturing the essence of the project with a substantial contingency for securing funding. As the project becomes more defined, a second opinion of cost is produced to ensure our clients understand the full scope of the project, with a reduction in the project contingency. The final opinion of cost is very detailed and utilized for the bid documents.

These cost estimates are inexpensive in the context of the overall project costs, yet critical to the project's success. This transparency eliminates surprises and assists our clients while making difficult financial and budgeting decisions.

Review and Evaluate Specific Products and Equipment

If a piece of equipment for a treatment plant system or pump station does not function as desired, it can cause operational difficulties and unnecessary maintenance costs for months or years. Our staff will examine proposed equipment for energy use, longevity, adaptability, cost, product warrantee, and support.

We know the vendors in the area very well and will work with you to specify the correct equipment for its intended use. When equipment is delivered with issues, we will be your advocate to obtain the equipment and commission it properly in the field.



Fuss & O'Neill performed a failure analysis on old equipment and implemented a replacement program with new turbo blowers

CTDEEP Regulations & Clean Water Fund Financing

We have extensive experience with obtaining DEEP funding for our clients, going back to the original Construction Grants program in the 1970's. The current Clean Water Fund was established in 1987, and we know that program well and have excellent relationships with the DEEP staff. This relationship is helpful when negotiating and administering Consent Orders, preparing NPDES permits or other tasks on behalf of our clients, and securing Clean Water fund grants and loans. Our ability to bundle clean water funding with additional grant programs is an advantage of being a Connecticut-based engineering firm.

Our extensive experience with CTDEEP regulations and Clean Water Funding will benefit Suffield by serving as an advocate for your interests and maximizing funding.

Section 6 - References

We are proud of our track record of repeat business and successful projects and encourage you to contact the following references if you have any questions.

Contact	Organization, Address & Phone	Projects
Michael DeAngelis Chairman WPCA	City Hall 55 Hill Street Shelton, CT 06484 203-286-8443	Town of Shelton WPCA On-Call Engineering Services
Doug Cutler Town Manager	Town Hall 126 Church Street Putnam, CT 06290 860-963-6800	Town of Putnam On-Call Wastewater Engineering Service
Lou Soja Director of Technical Services	Town Hall 8 Community Avenue Plainfield, CT 06374 860-230-3028	Town of Plainfield Upgrade of the Village WPCF and of the North WPCF
Ray Weaver Chairman WPCA	100 Windsorville Road Vernon, CT 06066 860-647-3213	Town of Vernon Collection System Capacity Evaluations
Jason Hofmann Former Chair Lebanon WPCA	Town Hall 579 Exeter Road Lebanon, CT 06249 860-777-6546	Town of Lebanon Lebanon Sewer Extension to Hebron On-call Wastewater Engineering Services
David Fuss Chairman WPCA Brooklyn, CT	Town Hall 4 Wolf Den Road PO Box 171 Brooklyn, CT 06234 860-377-1517	Town of Brooklyn Collection System Upgrade Project



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